



BADAN PENERBIT DAN PUBLIKASI
UNIVERSITAS GADJAH MADA



THE 3rd INTERNATIONAL CONFERENCE ON SCIENCE AND TECHNOLOGY

11–12 July 2017 / Yogyakarta, Indonesia

5th Asian Network for Natural and Unnatural Material

2nd Computer Symposium

2nd Geomaritime Symposium

1st OMICS Symposium: from Genomics to Metabolomics

1st Infrastructure Technology Symposium

Welcoming Remarks from The 3rd ICST Chairman

Assalaamu'alaikum warahmatullaahi wabarakaatuh

On behalf of the Organizing Committee, I would like to welcome all of you—distinguished guests, invited speakers, and participants—of the 3rd International Conference on Science and Technology. This conference is held as part of the Universitas Gadjah Mada Annual Scientific Conference (UASC) which consists of 4 major events: International Conference on Science and Technology (ICST), International Conference on Tropical Agriculture (ICTA), International Conference on Health Sciences (ICHS), and International Conference on South East Asia Studies (ICSEAS).

The 3rd International Conference on Science and Technology itself consists of 5 symposia, namely the 5th Annual Network on Natural and Unnatural Material Symposium (ANNUM 5), 2nd Computer Symposium, 2nd Geomaritime Symposium, 1st OMICS Symposium, and 1st Infrastructure Technology Symposium. The accepted papers of the conference will be published in journals that are indexed by Scopus or DOAJ/EBSCO: the Indonesian Journal of Chemistry, Indonesian Journal of Geography, Indonesian Journal of Biotechnology, or IEEE Xplore digital library. In addition, the Organizing Committee also provides ICST Proceeding for the publication of conference papers which cannot be published in those journals or publication media due to certain reasons.

Around 288 people are attending this conference. They consist of 221 presenting participants, 29 non-presenting participants, and 38 invited speakers. From this number, 154 people (53%) are joining the ANNUM Symposium, 36 participants (12%) are attending the Computer Symposium, 31 people (11%) are the participants of the Geomaritime Symposium, 19 participants (7%) are for the OMICS Symposium, also 19 participants (7%) are joining Infrastructure Technology Symposium, and 29 people (10%) are non-presenting participants. In fact, these 221 participants attending this conference are only 47,8% of the total 462 people who submitted their abstracts to this ICST 2017. Due to the obligation for submitting full papers and the tough review process of the papers, around 52,2% people finally decided to not continue their participation in this conference.

In terms of country of origin, the participants of this ICST 2017 are coming from 12 countries i.e. Indonesia, Malaysia, Australia, Japan, Korea, India, Philippines, Singapore, Rusia, France, United Kingdom, and South Africa. In this case, Indonesia, Malaysia, and India are three countries with the greatest number of participants of this conference.

The ICST 2017 should be beneficial for all participants. They will learn many new aspects of research in the related topics, either from the invited speakers or general participants. In addition, they could also interact each other which leads to a strong and broad networking in the future.

This 3rd ICST could not become a reality without the help and assistance of many parties. Thus, in this occasion I would like to sincerely thank the Rector of Universitas Gadjah Mada, BPP officers and staff, invited speakers, ANNUM officers, Department of Chemistry FMIPA UGM, Department of Computer Science and Electronic & Instrumentation FMIPA UGM, Department of Electrical Engineering and Information Technology, Faculty of Engineering UGM, Department of Civil and Environmental Engineering, Faculty of Engineering UGM, Faculty of Biology UGM, Faculty of Geography, UGM, all members of the Organizing Committee, Eastparc Hotel, and all sponsors, who have provided meaningful help and assistance for the implementation of this conference.

So far, we have tried to do our best to prepare the ICST 2017. Nonetheless, there is nothing completely perfect in the world including this conference. Therefore, please accept our deep apologies for any inconvenience found in this conference.

Last but not least, please enjoy the International Conference on Science and Technology and your stay in Yogyakarta.

Wassalamu'alaikum warahmatullaahi wabarakaatuh

Yogyakarta, 11 July 2017

Chairman of the Organizing Committee,

Prof. Dr. Jumina

Welcoming Remarks from The Rector of Universitas Gadjah Mada

Dear distinguished invited speakers, participants, ladies and gentlemen,

On behalf of Universitas Gadjah Mada, it is my pleasure and privilege to welcome you to Yogyakarta for the 3rd International Conference on Science and Technology (ICST 2017), hosted by Universitas Gadjah Mada (UGM). This conference brings together academics and professionals across the whole spectrum of science and technology in a time of exciting technological advancement. Society has never moved faster, placing ever greater demands on science and industry, which to date have kept pace through innovation, research, and the sharing of ideas on occasions such as this. Bridging the gap between disciplines has never been more important, and UGM is proud to be leading the way in facilitating the interdisciplinary dissemination of cutting-edge information between subjects as diverse as chemistry, computer science, omics, geomaritime, and infrastructure technology.

Over its 67 year history, UGM has earned a reputation as a pioneering university, pushing the boundaries of discovery and serving as a valuable source of knowledge. Our university has consistently striven to be at the forefront of scientific progress.

With its Annual Scientific Conference Series, Universitas Gadjah Mada builds upon this mission, holding annual gatherings for the brightest minds from Indonesia and abroad to share the latest findings in their respective fields. Through collaboration with our international partners, this series has seen enormous success, shaping the development of scientific networks, increasing Indonesian authors' prominence in publications with a global readership, and underscoring UGM's place as a standard-bearer of scientific development.

We are honored and humbled at the number of people who will be in attendance at this year's conference. The response from authors and participants to the ICST 2017 has truly been remarkable. I don't think I am being too forward in saying that the lively debates borne from today and tomorrow's events will likely impact the fields of science and technology for many years to come.

We thank the invited speakers for the expertise and knowledge they will bring to the conference, and of course the inevitable discussion their talks will spur. Special thanks is also extended to the members of the organizing committee for their hard work in bringing this conference together, as well as the entire staff of UGM's Badan Penerbit dan Publikasi (BPP) for making the ICST 2017 a reality. And last but not least, we would like to thank all of the conference participants who will contribute to making this the most memorable ICST yet.

Over the next two days, we will have the opportunity to gain precious insight into the future of science and technology. I wish you all a wonderful stay in Yogyakarta, and above all a successful ICST 2017.

Thank you.

Prof. Ir. Panut Mulyono, M. Eng., D.Eng.





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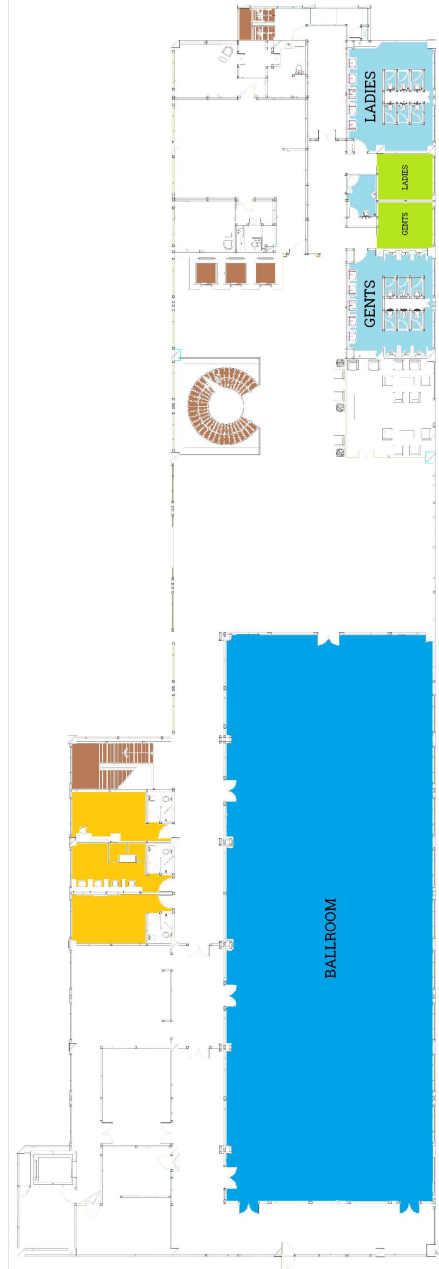
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VENUE



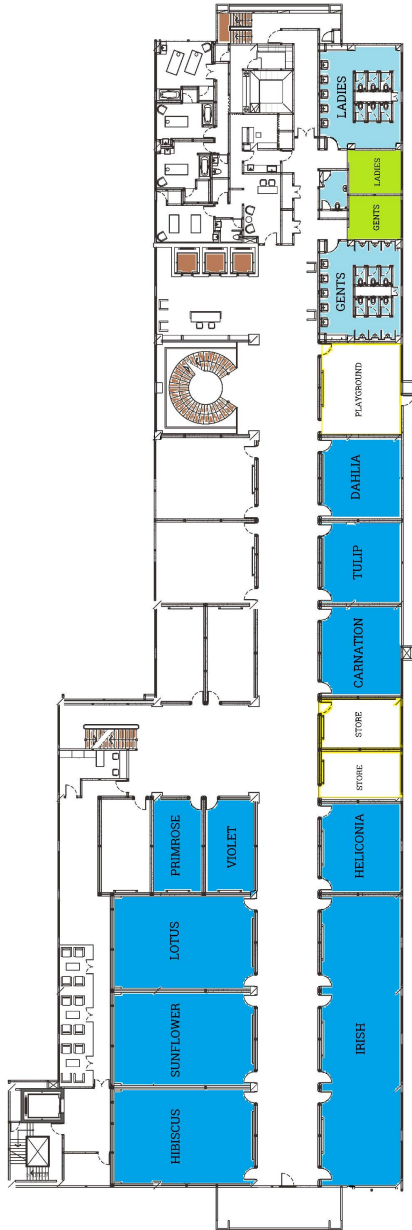
4th FLOOR
THE EASTPARC
MAIN BUILDING

-  Conference room
-  Committee room
-  Prayer room
-  Rest room
-  Stairs / lift




3rd FLOOR
THE EASTPARC
MAIN BUILDING


- Conference room
- Prayer room
- Rest room
- Stairs / lift



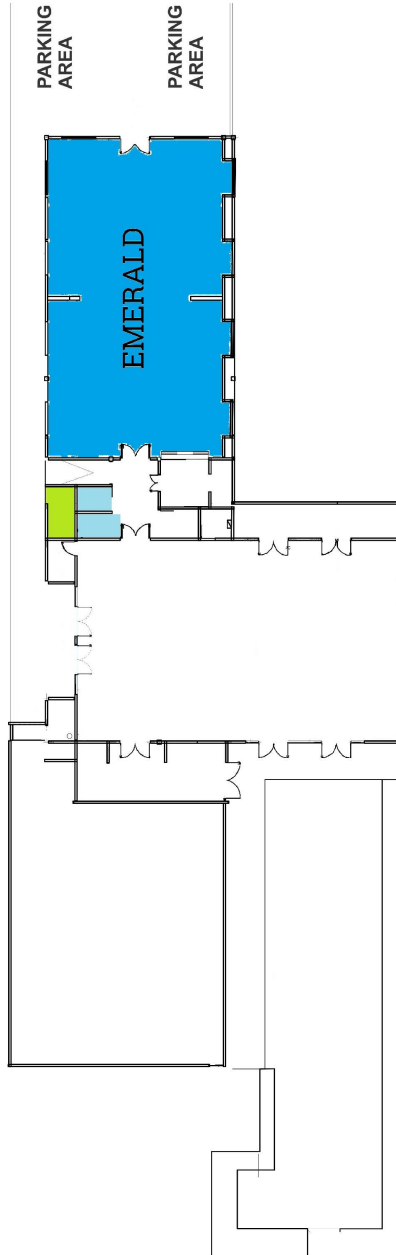
HERITAGE

OPPOSITE
THE EASTPARC
MAIN BUILDING

 Conference room

 Prayer room

 Rest room



Presentation guidelines

Presentations are held in panels with various presenters per session. Your slides will be projected with a projector on to a screen. It is not possible that you use your own computer for your own presentation. Each speaker is responsible for the content of their presentation.

Uploading your presentation

- Computers will be provided during registration in front of the conference room, for you to upload your presentation.
- We would greatly appreciate, if you can save your presentation in PowerPoint 2007 (or earlier) compatible format.
- It is extremely important that you bring your presentation on a USB memory stick or CD-ROM.
- We recommend you to bring your presentation on two different media (e.g. on 2 USB stick, or on one USB stick and on one CD in parallel).
- We cannot take responsibility for media formats other than CD-ROM or USB memory.
- Please do NOT use VIDEOS embedded in the presentation.

Audio visual and room set up

Each session room will be equipped with the following set up:

- Laptop
- Projector
- Single screen
- Microphone
- Laser pointer
- One/two committee members
- One moderator

Oral presentation guidelines

Each oral presenter is allocated 15 minutes for their oral presentation, with in advised 10 minutes in presentation length, and additional 5 minutes for questions/answers. Based on the allocated presentation time, your presentation should comprise approximately 10–12 PowerPoint slides.

Poster presentation guidelines

Poster presentations at ICST 2017 will be conducted as **flash presentation** and **guided poster** on both days of the conference. In the flash presentation, author should present their poster in PowerPoint presentation max 5 slides in 3–5 minutes, include question/answer time. The session schedule will be same as parallel sessions in each symposium. Author is free to join participants during the session, but author should be available when it is their turn to present and discuss their poster. Your poster must be ready on the first day of conference.

CONFERENCE SCHEDULES



Time	Program	Venue
07:00 – 08:00	Registration	Ballroom lobby
Opening ceremony		
08:00 – 08:30	Prof. Dr. Jumina ICST 2017 Chairman	Ballroom
	Prof. Ir. Panut Mulyono, M.Eng., D.Eng. Rector of Universitas Gadjah Mada	
08:30 – 08:40	Photo session	
Plenary session I Moderator: Dr. Tutik Dwi Wahyuningsih, M.Si.		
08:40 – 09:40	Prof. David St. C. Black University of New South Wales, Australia	Ballroom
09:40 – 10:00	Coffee break and poster session I	
Plenary session II Moderator: Muhammad Kamal, Ph.D.		
10:00 – 11:00	Prof. Dr. Ir. Hasanuddin Z. Abidin, M.Sc.Eng. Head of Geospatial Information Agency, Indonesia	Ballroom
11:00 – 12:00	Prof. Dr. Ir. Sunjoto, Dip.HE., DEA. Universitas Gadjah Mada, Indonesia	
12:00 – 13:00	Lunch and prayer	Ballroom lobby
13:00 – 15:00	Symposia session I	Parallel rooms
15:00 – 15:15	Coffee break and poster session II	Front of parallel rooms
15:15 – 16:15	Symposia session II	Parallel rooms

Date : Tuesday, 11 July 2017

Room : Hibiscus

Time	Code	Title and Authors
Symposium session I		
Moderator: Dr. Tutik Dwi Wahyuningsih, M.Si.		
13:00 – 13:05	AP-01	Evaluation potential hazard of the fuel station existence to experimental reactor power (EPR) plant June Mellawati
13:05 – 13:10	AP-02	The blending of EPDM/NR with maleic anhydride as compatibilizer: comparing the effect of accelerators on cure characteristic and mechanical properties Hesty Eka Mayasari, Ike Setyorini, and Arum Yuniari
13:10 – 13:15	AP-03	Nanoencapsulating coconut shell liquid smoke with coacervation and spray drying method using arabic gum and maltodextrin as encapsulant A.Y.Y. Pamungkas, P. Darmadji, and Y. Pranoto
13:15 – 13:20	AP-04	Synthesis of composite material based on Na-Lignosulfonate from isolation of wood sawdust to control urea release Arif Cahyo Imawan, Yehezkiel Steven Kurniawan, Muhammad Fernadi Lukman, Jumina, Triyono, and Dwi Siswanta
13:20 – 13:25	AP-05	An electrochemical characterization of DNA porcine biosensor utilizing screen printed gold electrode based on different supporting electrolyte Emma Izzati Zakariah, Haslina Ahmad, Lee Yoke Heng, and Siti Aishah Hasbullah
13:25 – 13:30	AP-06	Inhibition of cancer cell invasion by novel sulfonamide derivatives Kang Seong-Mook, Song Jie-Young, Choi Hyun Kyung
13:30 – 13:50	Dr. Siti Aishah Hasbullah Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Malaysia	
13:50 – 14:10	Dr. Won Koo Lee Department of Chemistry, Sogang University, Korea	
14:10 – 14:30	Dr. Rakesh Kumar Department of Chemistry, University of Delhi, India	

Time	Code	Title and Authors
14:30 – 14:45	AO-001	Development of C-arylcax[4]resorcinarenes and C-arylcax[4]pyrogallolarenes as antioxidant and UV-B protector Jumina , Dwi Siswanta, Abdul Karim Zulkarnain, Sugeng Triono, Priatmoko, Emmy Yuanita, Nela Fatmasari, and Ikhsan Nursalim
14:45 – 15:00	AO-002	Monoketone curcumin: synthesis and their activity against α –glucosidase Chairil Anwar , Tutik Dwi Wahyuningsih, Intan Kurnia Puteri, and Rahma Dian Martha
Symposium session II Moderator: Prof. Dr. Jumina		
15:15 – 15:35	Prof. Keisuke Ohto	Saga University, Japan
15:35 – 15:55	Prof. H.M. Chawla	Indian Institute of Technology, India
15:55 – 16:15	Prof. Neena Mehta	Department. of Biochemistry, Rayat Bahra Dental College Kharar (Mohali), India
16:15 – 16:30	AO-003	Biological evaluation of <i>n</i> -acetylhydantoin and benzalhydantoin as antibacterial agents Ika Wiani Hidayat , Dadan Sumiarsa, and Ani Riyani
16:30 – 16:45	AO-004	Dissolution enhancement of simvastatin by β -cyclodextrin inclusion complex with freeze drying and co-evaporation method Rochmy Istikharah , Dewi Yuliana, Wawan Afrianto, and Yandi Syukri

Date : Tuesday, 11 July 2017

Room : Sunflower

Time	Code	Title and Authors
Symposium session I		
Moderator: M. Idham D.M., S.Si., M.Sc.		
13:00 – 13:05	AP-07	Antiseptic formulation of libo extract (<i>Ficus varieagata</i> Blume) Rolan Rusli, Mirhansyah Ardana, and Shyntia Mutiarasari Tambunan
13:05 – 13:10	AP-08	Study the production of bioethanol from organic waste dried leaves Mohamad Syafaat, Akhmad Alwan, Hendri Piliang, and Musaddiq Musbach
13:10 – 13:15	AP-09	Termiticidal activity of <i>Toona sinensis</i> wood vinegar against <i>Coptotermes curvignathus</i> Morina Adfa, Arif Juliari Kusnanda, Wendra, Charles Banon, Mai Efdi, and Mamoru Koketsu
13:15 – 13:20	AP-10	The comparison of patchouli oil extraction using conventional hydrodistillation and microwave hydrodistillation methods Heri Septya Kusuma, Ali Altway, and Mahfud Mahfud
13:20 – 13:25	AP-11	Bioconversion of palm oil into biosurfactant by <i>Halomonas meridiana</i> BK-AB4 for the application of corrosion inhibitor Ira Prima Sari, Muhammad Imam Basyiruddin, and Rukman Hertadi
13:25 – 13:45	Prof. Rajesh Sawhney	Department of Microbiology with Rayat-Bahra Dental College & Hospital, India
13:45 – 14:05	Prof. Mamoru Koketsu	Department of Chemistry and Biomolecular Science, Faculty of Engineering, Gifu University, Japan
14:05 – 14:25	Dr. Lee Wah Lim	Department of Chemistry and Biomolecular Science, Faculty of Engineering, Gifu University, Japan
14:25 – 14:40	AO-005	Toxicity and antimalaria activity of ethyl acetate fraction of Indonesian sponge <i>Acanthella cavernosa</i> R.T. Swasono, I. Wijanarko, D.S.N. Safitri, T.J. Raharjo, and H.D. Pranowo

Time	Code	Title and Authors
14:40 – 14:55	AO-006	Substituent effect and in vitro cytotoxicity test of chalcone and flavone derivatives against cervix (HeLa) and colon (WiDr) cancer cells Nendrowati , Sabirin Matsjeh, Bambang Purwono, Chairil Anwar, Eti Nurwening Sholikhah, and Yogo Dwi Prasetyo
Symposium session II Moderator: Dr. Indriana Kartini, M.Sc.		
15:15 – 15:35	Prof. Bohari M. Yamin	Academy of Sciences Malaysia, Malaysia
15:35 – 15:55	Prof. Kristian Handoyo Sugiyarto	Faculty of Mathematics and Natural Sciences, Universitas Negeri Yogyakarta, Indonesia
15:55 – 16:15	Prof. Diwan S. Rawat	Department of Chemistry, University of Delhi, India
16:15 – 16:30	AO-007	Preparation of water repellent layer on glass using hydrophobic compound modified rice hull ash silica Alfa Akustia, Nuryono , Dessy Puspa Aryanti, Madjid Arie Wibowo, Eko Sri Kunarti, Indriana Kartini, and Bambang Rusdiarso
16:30 – 16:45	AO-008	Wet impregnation of copper oxide on Lampung natural zeolite as an adsorbent to produce oxygen-enriched air using PSA technique Andrea Rizky Sabrina Harahap , Adenia Gita Dianty, and Setijo Bismo

Date : Tuesday, 11 July 2017

Room : Lotus

Time	Code	Title and Authors
Symposium session I		
Moderator: Prof. Dr. Mudasir Matsjeh, M. Eng.		
13:00 – 13:05	AP-12	Biosorption of chromium (III) on natrium hydroxide biosorbent activated of coconut coir fiber Diah Prihatiningsih , Emmy Sahara, and I Wayan Sudiarta
13:05 – 13:10	AP-13	The effect of alum addition on the shrinkage temperature, chemical properties and morphology in the manufacture of vegetable-tanned leather Emiliana Kasmudjiastuti, Bidhari Pidhatika, Gresy Griyanitasari , and Iwan Fajar Pahlawan
13:10 – 13:15	AP-14	Dispersing agent of KCl Salt and reinforcing agent of microfibrillated cellulose of bamboo in preparation of biocomposites-sago starch based affecting mechanical property Silviana , Puji Rahayu, Rifaldi Maulana Hasbi, Arisiani Melatika Muthia Hanif, and Nur 'Aini Hamada
13:15 – 13:20	AP-15	Synthesis and characterization of K ₂ O/MCM-41 from Lapindo mud by sonochemical method for transesterification catalyst of used cooking oil Dwi Putra Wijaya , Triyono, Wega Trisunaryanti, and Kumala Dewi
13:20 – 13:25	AP-16	Crystallinity-mechanical property relationship of polypropylene/starch blends A.S.Handayani , I.S. Purwaningsih, L.Marlina, E.Kustiyah, and M.Chalid
13:25 – 13:45	Dr. Shweta Sharma Institute of Forensic Science and Crimatology, Panjab University, India	
13:45 – 14:05	Prof. Surinder K. Mehta Department of Chemistry and Center of Advanced Studies in Chemistry, Panjab University, India	
14:05 – 14:20	AO-009	Cation sensing capabilities of nitrophenyl cinnamaldehyde derivative Venty Suryanti , Fajar Rakhman Wibowo and Meiyanti R. Kumala Sari
14:20 – 14:35	AO-010	The hydrolisis of teak and silk wood sawdust to produce reducing sugar Kristina Theresia Leto and Suprpto

Time	Code	Title and Authors
14:35 – 14:50	AO-011	Physical mixture interaction of acetaminophenol with naringenin Normyzatul Akmal Abd Malek , Hamizah Mohd Zaki, and Mohammad N. Jalil
Symposium session II Moderator: Dr. Dwi Siswanta, M.Eng.		
15:15 – 15:35	Prof. Manihar Situmorang	Universitas Negeri Medan, Indonesia
15:35 – 15:55	Dr. Paulina Taba	Department of Chemistry, Universitas Hasanuddin, Indonesia
15:55 – 16:15	Dr. Jaslin Ikhsan	Faculty of Mathematics and Natural Sciences, Universitas Negeri Yogyakarta, Indonesia
16:15 – 16:30	AO-012	Modified silica adsorbent from volcanic ash for Cr(VI) anionic removal E.T. Wahyuni , R.Roto, F.A. Nissah, Mudasir, and N.H. Aprilita
16:30 – 16:45	AO-013	Comparison of classical and quadratic van der waals mixing rules in predicting VLE of ethanol + water and CO ₂ + ethanol systems using Peng-Robinson EoS Gede Wibawa , Annas Wiguno, Ni Made Veriska Kumalasari, Kartika Eka Pangestuti, and Rizky Tetrisyanda

Date : Tuesday, 11 July 2017

Room : Heliconia

Time	Code	Title and Authors
Symposium session I		
Moderator: Prof. Dr.rer.nat. Nuryono, M.S.		
13:00 – 13:15	AO-014	Synthesis and photoactivity of Fe ₃ O ₄ /TiO ₂ -Co as a magnetically separable visible light responsive photocatalyst Eko Sri Kunarti , Indriana Kartini, Akhmad Syoufian, and Karolina Martha Widyandari
13:15 – 13:30	AO-015	Effect of reducing agents on physical and chemical properties of silver nanoparticles Roto , Hani P. Rasydta, Adhitasari Suratman, and Nurul H. Aprilita
13:30 – 13:45	AO-016	Effect of N-methyl-2-pyrrolidone (NMP) in the coagulation bath via wet phase inversion method Saviera Yonita , Sulistyoy, Aristo Taufiq, Teguh Smedi Bayu A., Sunardi, Gunawan S. Prihandana, Tutik Sriani, and Muslim Mahardika
13:45 – 14:00	AO-017	Synthesis of gold nanoparticles using p-aminobenzoic acid and p-aminosalicylic acid as reducing agent Abdul Aji , Eko Sri Kunarti, and Sri Juari Santosa
14:00 – 14:15	AO-018	The adsorption of phenol using iron-based mesoporous silica SBA-15 Yuvita Eka Pertiwi , Maria Ulfa, Teguh Endah Saraswati, and Bakti Mulyani
14:15 – 14:30	AO-019	Downed-size of montmorillonite nanoparticles by co-precipitation techniques Yohana I. Kedang and Lukman Atmaja
14:30 – 14:45	AO-020	Synthesis of patchouli biochar-nanoparticle Cr ₂ O ₃ composite for photodegradation of organic contaminant Tutik Setianingsih , Masruri, and Bambang Ismuyanto
14:45 – 15:00	AO-021	Extracellular biosynthesis of silver nanoparticles using bacteria from silvercraft waste and its antifungal activity Afrizka Premana Sari , Harsojo, and Endang Sutariningsih Soetarto

Time	Code	Title and Authors
Symposium session II		
Moderator: Prof. Dr.rer.nat. Harno D. Pranowo, M.Si.		
15:15 – 15:30	AO-022	Density-functional-theory calculations of formation energy of the nitrogen-doped diamond Hana Pratiwi Kadarisman, Sholihun , and Pekik Nurwantoro
15:30 – 15:45	AO-023	Chemometric analysis of FTIR spectra from cultured muscle cells (L6) treated with anti-diabetic metals (V, Mo, W, and Cr) Anna Safitri , Aviva Levina, Joonsup Lee, Elizabeth A. Carter, and Peter A. Lay
15:45 – 16:00	AO-024	Dye-sensitized solar cell simulation performance using MATLAB Alvin Muhammad Habieb , Muhammad Irwanto, Hendri Widiyandari, and Vincencius Gunawan
16:00 – 16:15	AO-025	Theoretical study of the effect of macrocyclic ring size on the corrosion inhibition efficiency of some crown ether Saprizal Hadisaputra , Sapri Hamdiani, and Nuryono
16:15 – 16:30	AO-026	QMCF-MD simulation and NBO analysis of K(I) ion in liquid ammonia Yuniawan Hidayat , Ria Armunanto, and Harno Dwi Pranowo
16:30 – 16:45	AO-027	The dynamical properties of Cu ⁺ in liquid ammonia: a quantum mechanical charge field (QMCF) molecular dynamics study Wahyu Dita Saputri , Karna Wijaya, and Ria Armunanto

Date : Tuesday, 11 July 2017

Room : Violet

Time	Code	Title and Authors
Symposium session I		
Moderator: Dr. Indriana Kartini, M.Sc.		
13:00 – 13:15	AO-028	The simulation of the melt viscosity effect on the rate of solidification in polymer by using ordinary differential numerical methods Hanindito Haidar Satrio , Muhammad Joshua Y.B., Arbi Irsyad Fikri, Mochamad Chalid, and Jaka Fajar Fatriansyah
13:15 – 13:30	AO-029	Corn spaghetti quality assessment on increased production capacity Enny Sholichah and Novita Indrianti
13:30 – 13:45	AO-030	Comparative study on properties of the composite edible films: carrageenan-beeswax and chitosan-beeswax Enny Sholichah , Novita Indrianti, Nok Afifah, and Doddy A. Darmayana
13:45 – 14:00	AO-031	Preparation and characterization of heat moisture treated sweet potato starch film Novita Indrianti , Yudi Pranoto, and Akmadi Abbas
14:00 – 14:15	AO-032	The effect of shot peening duration and steel ball diameter on microstructure, surface roughness, and surface hardness of 316L biomaterial Priyo Tri Iswanto, Viktor Malau, Erich Umbu Kondi Maliwemu , Asad Saiful Bahri, and Puput lin Qur'aini
14:15 – 14:30	AO-033	Influence of chemical treatments sequence on internal microstructure and crystallinity of sorghum fibres Ismojo , Abdul Aziz Ammar, Ghiska Ramahdita, and Mochamad Chalid
14:30 – 14:45	AO-034	A comparative study of characterization on 2D and 3D chitosan/gelatin/silica bio-composite Yuni Kusumastuti , Dwi Reinaldy Gunawan, Mazaya Najmina, and Francisca Larasati
14:45 – 15:00	AO-035	Preparation of biodegradable film – cassava bagasse starch-based reinforced chicken feet gelatine, citric acid as crosslinker, and glycerol as plasticizer Silviana , Piontek Benedictus Brandon, and Bella Ayu Silawanda

Time	Code	Title and Authors
Symposium session II		
Moderator: Akhmad Syoufian, S.Si., Ph.D.		
15:15 – 15:30	AO-036	Taguchi optimization for conversion of n-butanol into 1,1-dibutoxybutane by Fe/activated carbon catalyst Mokhammad Fajar Pradipta , Feminindia Icha Kartika, and lip Izul Falah
15:30 – 15:45	AO-037	Corrosion inhibition of aluminum alloys friction stirred dissimilar metal welds in 3.5% NaCl solution using polarization resistance and electrochemical impedance spectroscopy (EIS) FX. A. Wahyudianto , M. N. Ilman, P. T. Iswanto, and Kusmono
15:45 – 16:00	AO-038	The effect of alkaline activator types on strength and microstructural properties of geopolymer from co-combustion residuals of bamboo and kaolin Aprilina Purbasari , Tjokorde Walmiki Samadhi, and Yazid Bindar
16:00 – 16:15	AO-039	The effect of electricity source from bio-reactor microbial fuel cell to Cr (VI) waste treatment Prapti Ira Kumalasari , and Sri Rachmania Juliastuti
16:15 – 16:30	AO-040	Tofu industrial wastewater treatment with ozonation and adsorption method using natural zeolite Eva Fathul Karamah, Linggar Anindita , and Ika Putri Adripratiwi
16:30 – 16:45	AO-041	Synthesis and application of Fe ₃ O ₄ /SiO ₂ /TiO ₂ nanocomposite as photocatalyst in CO ₂ indirect reduction to produce methanol fuel Yudha Ramanda , Saifuddin Aziz, and Eko Sri Kunarti

Date : Tuesday, 11 July 2017

Room : Primrose

Time	Code	Title and Authors
Symposium session II		
Moderator: Prof. Dr.rer.nat Karna Wijaya, M.Eng.		
15:15 – 15:30	AO-042	Transesterification of used cooking oil using CaO/MCM-41 catalyst synthesized from lapindo mud by sonochemical method Putra Mahardika , Wega Trisunaryanti, Triyono, Dwi Putra Wijaya, and Kumala Dewi
15:30 – 15:45	AO-043	The addition of n-butanol in ethanol-isooctane mixture to reduce vapor pressure of oxygenated-gasoline blend Rendra Panca Anugraha , Zul Akbar Andi Picunang, Annas Wiguno, Rizky Tetrisyanda, Kuswandi, and Gede Wibawa
15:45 – 16:00	AO-044	Residue oil desulfurization using oxidation and extraction method Rizky Tetrisyanda , Annas Wiguno, Rizqy Romadhona Ginting, M. Chadiq Dzikrillah, and Gede Wibawa
16:00 – 16:15	AO-045	Combination of ozonation and adsorption using granular activated carbon (GAC) for tofu industry wastewater treatment Eva Fathul Karamah, Ika Putri Adripratiwi , and Linggar Anindita
16:15 – 16:30	AO-046	Ambient air monitoring of nitrogen dioxide at Kalimati, Tirtomartani, Kalasan, Sleman, Yogyakarta Supriyanto , and Indah Suci Ramadhani
16:30 – 16:45	AO-047	Synthesis and characterization of lignin-based polyurethane as a potential compatibilizer Salma Ilmiati , Jana Hafiza, Elvi Kustiyah, and M. Chalid

Date : Tuesday, 11 July 2017

Room : Tulip

Time	Code	Title and Authors
Symposium session I		
Moderator: Prof. Ir. Sunarno, M.Eng., Ph.D.		
13:00 – 13:15	CO-01	The wireless energy transfer recharging system based on the ultra-high frequency by using Yagi-Uda directional antenna Sunarno , Fahmy Rinanda Saputri, Memory Motivanisman Waruwu, and Rony Wijaya
13:15 – 13:30	CO-02	Data service orchestration for law enforcement and open criminal justice data interoperability (National Crime Information Center, Indonesian National Police Case Studies) Muhammad Rinjani , Teguh Bharata Adji, Adhistya Erna Permanasari, and Fahmi Dzikrullah
13:30 – 13:45	CO-03	High-resolution automated Fugl-Meyer assessment using sensor data and regression model Ricky Julianjatsono , Ridi Ferdiana, and Rudy Hartanto
13:45 – 14:00	CO-04	The prediction of energy-absorption on the car crush box Hadi Saputra , Jamasri, and Heru Santoso B. Rochardjo
14:00 – 14:15	CO-05	Machinery equipment early fault detection Using artificial neural network based autoencoder Teguh Handjojo Dwiputranto , Noor Akhmad Setiawan, and Teguh Bharata Adji
14:15 – 14:30	CO-06	A review on driver drowsiness based on image, bio-signal, and driver behavior Bagus Pratama , Igi Ardiyanto, and Teguh Bharata Adji
14:30 – 14:45	CO-07	Cost-based power distribution optimization scheduling in microgrid Andhika Maharsi , Danang Wijaya, and I Wayan Mustika

Time	Code	Title and Authors
Symposium session II		
Moderator: Prof. Ir. Sunarno, M.Eng., Ph.D.		
15:30 – 15:45	CO-08	Performance comparison of SISO and MIMO-OFDM based on SDR platform Ridlo Qomarrullah , I Wayan Mustika, Selo Sulisty, and Satriyo Dharmanto
15:45 – 16:00	CO-09	Real time monocular visual odometry using optical flow: study on navigation of quadrotors UAV Syaiful Mansur , Muhammad Habib, Gilang Nugraha Putu Pratama, Adha Imam Cahyadi, and Igi Ardiyanto

Date : Tuesday, 11 July 2017

Room : Dahlia

Time	Code	Title and Authors
Symposium session I		
Moderator: Dr. Ridi Ferdiana, S.T., M.T.		
13:00 – 13:15	CO-10	Comparison of machine learning algorithms for soil type classification Pramudyana A. Harlianto , Noor Akhmad Setiawan, and Teguh Bharata Adji
13:15 – 13:30	CO-11	Web engineering education through blended learning Ridi Ferdiana
13:30 – 13:45	CO-12	Linking dimensions to support tourism recommender system Kusuma Adi Achmad , Lukito Edi Nugroho, Achmad Djunaedi, and Widy Widyawan
13:45 – 14:00	CO-13	Mango leaf image segmentation on HSV and YCbCr color spaces using otsu thresholding Eko Prasetyo , R. Dimas Adityo, Nanik Suciati, and Chastine Faticah
14:00 – 14:15	CO-14	The application of wavelet recurrent neural network for lung cancer classification Devi Nurdiyasari , Dedi Rosadi, and Abdurrahman Abdurrahman
14:15 – 14:30	CO-15	Parallel implementation of genetic algorithm for searching optimal parameters of artificial neural networks Eko Nugroho , Moh Wibowo, and Reza Pulungan
14:30 – 14:45	CO-16	Long distance automatic number plate recognition under perspective distortion using zonal density and support vector machine Noprianto , Sunu Wibirama, and Hanung Adi Nugroho
Symposium session II		
Moderator: Dr. Ridi Ferdiana, S.T., M.T.		
15:30 – 15:45	CO-17	Research of university sites internal links distribution Ivan Blekanov , Aleksey Maksimov, Sergei Sergeev, and Roman Moskalets
15:45 – 16:00	CO-18	Performance comparison of caching strategy on wordpress multisite Mandahadi Kusuma , Widy Widyawan, and Ridi Ferdiana

Date : Tuesday, 11 July 2017

Room : Irish

Time	Code	Title and Authors
Symposium session I		
Moderator: Ratih Fitria Putri, M.Sc., PhD		
13:00 – 13:20		Dr. Luhur Bayuaji Universiti Pahang Malaysia, Malaysia
13:20 – 13:40		Dr. I Made Andi Arsana Universitas Gadjah Mada, Indonesia
13:40 – 14:00		Dr. I Wayan Gede Astawa Karang Universitas Udayana, Indonesia
14:00 – 14:15	GO-01	Oligocene-Pleistocene paleogeography within Banyumas Basin and implication to petroleum potential Eko Bayu Purwasatriya , Sugeng Sapto Surjono, and D. Hendra Amijaya
14:15 – 14:30	GO-02	Ship detection in Madura Strait and Lamong Gulf using Sentinel-1 SAR data Filsa Bioresita , Cherie Bhakti Pribadi, and Hana Sugiastu Firdaus
14:30 – 14:45	GO-03	Geomaritime strategies of Indonesia maritime routes confronting Thailand's Kra Canal plan Fika Monika and M. Baiquni
Symposium session II		
Moderator: Ratih Fitria Putri, M.Sc., Ph.D.		
15:15 – 15:30	GO-04	Spatio-temporal characteristics of sea level anomaly in the Indonesian water Dina A. Sarsito , Kosasih Prijatna, Dudy D. Wijaya, Ivonne M. Radjawane, Wiwin W. Pranata, and Nur F Trihantoro
15:30 – 15:45	GO-05	Sustainable and contextual utilization of underground river in the arid area Waterman Sulistyana Bargawa
15:45 – 16:00	GO-06	Remote sensing analysis to assess the impact of sea-cage aquaculture intensification to benthic habitat condition in Lampung Bay Abdullah Arif K , Ana Ariasari, Erisa Ayu W, Henki Riko P, Ika Nurfaidah, Made Dwipayana, Maratul Muslimah, and Pramaditya Wicaksono

Time	Code	Title and Authors
16:00 – 16:15	GO-07	Granulometry analysis of Ngrayong Sandstone, Tempuran Area, Rembang Zone, North East Java Basin Myo Min Htun , Sugeng Sapto Surjono, and Jarot Setyowiyoto



Date : Tuesday, 11 July 2017

Room : Carnation

Time	Code	Title and Authors
Symposium session I		
Moderator: Ali Awaludin, S.T., M.Eng., Ph.D.		
13:00 – 13:30		Prof. Ir. Bambang Suhendro, M.Sc., Ph.D. Universitas Gadjah Mada, Indonesia
13:30 – 14:00		Prof. Ir. Henricus Priyosulistyo, Ph.D. Universitas Gadjah Mada, Indonesia
14:00 – 14:15	IO-01	Full height rectangular opening castellated steel beam with diagonal stiffener Muhamad Rusli A., Ali Murtopo, Iman Satyarno , and M. Fauzie Siswanto
14:15 – 14:30	IO-02	Hypocenter analysis of aftershocks data of the Mw 6.3, May 27 th 2006 Yogyakarta earthquake using oct-tree importance sampling method Asri Wulandari , Ade Anggraini, and Wiwit Suryanto
14:30 – 14:45	IO-03	Cost estimation model for i-girder bridge superstructure using multiple linear regression and artificial neural network Inas Winalytra , Arief Setiawan Budi Nugroho, and Andreas Triwiyono
14:45 – 15:00	IO-04	The investigation on setting time and strength of high calcium fly ash based geopolymer Remigildus Cornelis , Henricus Priyosulistyo, Iman Satyarno, and Rochmadi

Date : Tuesday, 11 July 2017

Room : Emerald

Time	Code	Title and Authors
Symposium session I		
Moderator: Muthi' Ikawati, M.Sc., Apt.		
13:00 – 13:15	OO-01	Metabolite profiling of black rice (<i>Oryza sativa</i> L.) after infection <i>Xanthomonas oryzae</i> pv. <i>Oryzae</i> Emma Nur Hidayah , Febri Adi Susanto, Tri Joko, Yekti Asih Purwestri, and Tri Rini Nuringtyas
13:15 – 13:30	OO-02	Expression of haloacid dehalogenase gene and its protein characterization from <i>Klebsiella pneumoniae</i> ITB1 for Bioremediation of organohalogen pollutants Ridani Rino Anggoro and Enny Ratnaningsih
13:30 – 13:45	OO-03	Profile of triiodothyronine (T3) and thyroxine (T4) of female Bali breed cattle transported by traditional vessel from Sumbawa to Pontianak Nichlah Rifqiyah , Hindar Panguji, and Pudji Astuti
13:45 – 14:00	OO-04	Simultaneous clustering analysis with molecular docking approach for discovery of type 2 antidiabetic compounds in network pharmacology Nur Azizah Komara Rifai , Farit Mochamad Afendi, and I Made Sumertajaya
14:00 – 14:15	OO-05	The discovery of secondary and tertiary structure of cervical cancer lncRNA biomarker Arli Aditya Parikesit , Nihayatul Karimah, and Didik Huswo Utomo
14:15 – 14:30	OO-06	Gold mining waste effect on superoxide dismutases activity of mahogany (<i>Swietenia mahagoni</i> (L.) Jacq.) in Kalirejo, Kulon Progo Miswati , Farah Yuant Nidaa, Setya Handayani, Dwi Umi Siswanti, and Sudjino
14:30 – 14:45	OO-07	Cloning and sequencing of acetyl-CoA acetyltransferase gene from <i>Halomonas elongata</i> BK-AG18 and its protein in silico analysis Ni Putu Yuliasri , Enny Ratnaningsih, and Rukman Hertadi
14:45 – 15:00	OO-08	Phenotypic identification and numerical taxonomy of pigmented bacteria isolated from marine and freshwater aquatic at Yogyakarta, Indonesia Fitri Indriana Susanti and Endah Retnaningrum

Time

Code

Title and Authors

Symposium session II

Moderator: Dr. Tri Rini Nuringtyas, S.Si., M.Sc.

15:15 – 16:00

Dr. Farit Mochamad Afendi
Institut Pertanian Bogor, Indonesia

Conference schedules

Wednesday, 12 July 2017

DAY 2

Time	Program	Venue
08:00 – 08:30	Registration	Ballroom lobby
Plenary session III Moderator: Dr. Edi Winarko, M.Sc.		
08:30 – 09:30	Prof. Taku Demura, Ph.D. Nara Institute of Science and Technology, Japan	Ballroom
09:30 – 10:30	Jong Gun Lee, Ph.D. Pulse Lab Jakarta, Indonesia	
10:30 – 10:45	Coffee break and poster session III	
10:45 – 12:30	Symposia session III	Parallel rooms
12:30 – 13:15	Lunch and prayer	Ballroom lobby
13:15 – 15:15	Symposia session IV	Parallel rooms
15:15 – 15:30	Coffee break and poster session IV	Front of parallel rooms
Closing ceremony		
	Traditional dance performance	
	Photo session	
15:30 – 16:00	Widodo, S.P., M.Sc., Ph.D. Head of Badan Penerbit dan Publikasi UGM	Ballroom
	Prof. Dr. Suratman Vice Rector for Research and Community Services UGM	

Date : Wednesday, 12 July 2017

Room : Hibiscus

Time	Code	Title and Authors
Symposium session III Moderator: Dr. Bambang Purwono, M.Sc.		
10:45 – 11:05	Prof. Naresh Kumar	School of Chemistry, University of New South Wales, Australia
11:05 – 11:25	Dr. Ravi P. Singh	Department of Chemistry, Indian Institute of Technology, Delhi, India
11:25 – 11:40	AO-048	An efficient synthesis of bromo substituted 1,3,6-trihydroxyxanthone and their anticancer activity Emmy Yuanita , Harno Dwi Pranowo, Mustofa, Respati Tri Swasono, Jufrizal Syahri, and Jumina
11:40 – 11:55	AO-049	1-(<i>N</i>)-benzyl-substituted-1,10-phenanthroline bromide salts: access from wintergreen oil and vanillin Muhammad Idham Darussalam Mardjan , Dhina Fitriastuti, and Jumina
11:55 – 12:10	AO-050	Synthesis of chalcone derivatives and their in vitro anticancer test against breast (T47D) and colon (WiDr) cancer cell line Yogo Dwi Prasetyo , Sabirin Matsjeh, Winarto Haryadi, Chairil Anwar, Eti Nurwening Sholikah, and Nendrowati
Symposium session IV Moderator: Prof. Dr. Jumina		
13:15 – 13:35	Dr. Sanjeev Chauhan	Department of Forestry & Natural Resources, Punjab Agricultural University, India
13:35 – 13:50	AO-051	Self and cross metathesis of methyl oleate with 4-vinyl-1,3-dioxolan-2-one by 2nd Grubbs and Hoveyda-Grubbs catalyst Nor Wahida Awang , Kotohiro Nomura, Ken Tsutsumi, and Bohari M. Yamin
13:50 – 14:05	AO-052	Utilization of sodium lignosulfonate/chitosan for enhanced oil recovery Marya Agustin, Wahyudi Budi Sediawan, and Yuni Kusumastuti
14:05 – 14:20	AO-053	Modification of sweet potato flour (<i>Ipomea batatas</i> L.) using steam explosion Ery Nurlita Wati , Purnama Darmadji, Yudi Pranoto, and Rini Yanti

Time	Code	Title and Authors
14:20 – 14:35	AO-054	Response surface methodology (RSM) on the synthesis of carboxymethyl cellulose (CMC) from jack bean hull (<i>Canavalia enciformis</i> L (DC)): variation of NaOH concentration and NaMCA addition Imasni Satriani , Agnes Murdiati, Purnama Darmadji, and Andriati Ningrum
14:35 – 14:50	AO-055	Cassava (<i>Manihot esculenta</i>) starch modification by steam explosion Dewi Mukhlisoh , Purnama Darmadji, Yudi Pranoto, and Rini Yanti
14:50 – 15:05	AO-056	Metal oxide supported vanadium substituted Keggin type polyoxometalates as catalyst for oxidation of dibenzothiophene Aldes Lesbani , Sarah Novri Meilyana, Nofi Karim, Nurlisa Hidayati, Muhammad Said, Risfidian Mohadi, and Miksusanti

Date : Wednesday, 12 July 2017

Room : Sunflower

Time	Code	Title and Authors
Symposium session III		
Moderator: Prof. Dr. Mudasir Matsjeh, M. Eng.		
10:45 – 11:05	Prof. Mark Willcox	University of New South Wales, Australia
11:05 – 11:25	Dr. Yuni K. Krisnandi	Faculty of Mathematics and Natural Sciences, Universitas Indonesia, Indonesia
11:25 – 11:45	Prof. Karna Wijaya	Faculty of Mathematics and Natural Sciences, Universitas Gadjah Mada, Indonesia
11:45 – 12:00	AO-057	Hydrocracking of α -cellulose using Co, Ni, and Pd supported on mordenite catalyst Wega Trisunaryanti , Triyono, Ria Armunanto, Lathifah Puji Hastuti, and Desinta Dwi
12:00 – 12:15	AO-058	Natural dye extraction from sappanwood (<i>Caesalpinia sappan</i> L): evaluation on optimum conditions and extractor design parameters Edia Rahayuningsih , Meita Tias Wahyuningrum, and Budhi Wijayanti
12:15 – 12:30	AO-059	Sequential condensation and hydrodeoxygenation reaction of furfural-acetone adduct over mix catalysts Ni/SiO ₂ and Cu/SiO ₂ in water Siti Mariyah Ulfa , Rizka Fauzia Ohorella, and Caterina Widya Astutik
Symposium session IV		
Moderator: Dr. Dwi Siswanta, M.Eng.		
13:15 – 13:30	AO-060	Hybrid of magnetite and Zn/Al layered double hydroxide (Fe ₃ O ₄ -Zn/Al LDH) for humic acid removal Sri Juara Santosa , Nguyen Van Phuoc, Tran Thi Minh Ha, and Philip Anggo Krisbiantoro
13:30 – 13:45	AO-061	Extraction of essential oil from agarwood (<i>Aquilaria malaccensis</i>) using microwave hydrodistillation method Ditta Kharisma Yolanda Putri, Heri Septya Kusuma , Isabel Triesty, Linda Putri Leksono, and Mahfud
13:45 – 14:00	AO-062	Bioconversion of glycerol to biosurfactant by halophilic bacteria Halomonas elongata BK-AG18 Mieke Alvionita and Rukman Hertadi

Time	Code	Title and Authors
14:00 – 14:15	AO-063	Degradation of batik dye waste remazol brilliant blue using plasma electrolysis method with addition of microbubbles Chandra Dewi Rosalina and Nelson Saksono
14:15 – 14:30	AO-064	Synthesis of biodiesel from palm oil by using cathodic plasma electrolysis Nelson Saksono, Ratih Anditashafardiani, and Jeremia Jan Chandra Pranata
14:30 – 14:45	AO-065	Comparison between latent fingerprint identification using black powder and cyanoacrylates glue Sri Adelila Sari , Ulfa Qalbiah, and Isfin Cahyani Putri
14:45 – 15:00	AO-066	Extraction of kaffir lime (<i>Citrus hystrix</i> DC.) essential oil using steam explosion process Y.W. Wulandari , P. Darmadji, Supriyadi, and A. Chairil

Date : Wednesday, 12 July 2017

Room : Lotus

Time	Code	Title and Authors
Symposium session III Moderator: Dr. Roto		
10:45 – 11:05	Dr. Neetu Singh	India Institute of Technology, Delhi, India
11:05 – 11:25	Dr. Haryadi	Department of Chemical Engineering, Politeknik Negeri Bandung, Indonesia
11:25 – 11:40	AO-067	Starch nanoparticle formation via oxidation-sonication with hydrogen peroxide addition: influence some factors on particle size Niken Widya Palupi , Purnama Darmadji, Yudi Pranoto, Sutardi, Muthupandian Ashokkumar, Meifang Zhou, Charitha Pahala, and Enrico Colombo
11:40 – 11:55	AO-068	Synthesis and analysis characterization of nanocomposites tin oxide-graphene doping pd using Polyol method Aminuddin Debataraja , Robeth V. Manurung, Lia A. T. W. Asri, Brian Yuliarto, Nugraha, and Bambang Sunendar
11:55 – 12:10	AO-069	Short-time synthesis of titania nanotubes Indriana Kartini , Ira Nur Arba'atul Jannah, Salim Mustofa, Eko Sri Kunarti, and Respati Tri Swasono
Symposium session IV Moderator: M. Idham D.M., S.Si., M.Sc.		
13:15 – 13:30	AO-070	Synthesis 2-hydroxy-4,6-dimethoxychalcone, 2-hydroxy-4,6,4'-trimethoxychalcone, 2-hydroxy-4,6,3',4'-tetramethoxychalcone and cytotoxicity test against breast T47D, cervix HeLa and kolon WiDr cancer cells Sabirin Matsjeh , Winarto Haryadi, Bambang Purwono, Eti Nurwening Sholikhah, and Wiwit Sepvianti
13:30 – 13:45	AO-071	Syntheses and antibacterial test of benzoyl pyrazolines from vanillin and veratraldehyde Putra Jiwamurwa Pama Tjitda, Jumina, and Tutik Dwi Wahyuningsih
13:45 – 14:00	AO-072	Activities correlation between extracts and compounds from <i>Etingera calophrys</i> stems toward bacteria and radical scavenger agent Sahidin , Wahyuni, Muh. Hajrul Malaka, Imran, and Marianti A. Manggau

Time	Code	Title and Authors
14:00 – 14:15	AO-073	Optimization on supercritical CO ₂ extraction process to improve the quality of patchouli oil by response surface methodology approach Edi Priyo Utomo , Marina, Warsito, and Egi Agustian
14:15 – 14:30	AO-074	Synthesis and antimalarial evaluation of chalcones and flavones from vanillin derivatives Bambang Purwono , Alvia Dhia Shabriah, and Anggiadita Prissilla
14:30 – 14:45	AO-075	Synthesis and antioxidant activity of C-4-allyloxy-3-methoxyphenylcalix[4]resorcinarene Endah Sayekti , Dwi Siswanta, Mustofa, and Jumina
14:45 – 15:00	AO-076	Characterization and purification of fatty acid methyl ester from kemiri sunan (<i>Reutealis trisperma</i>) using fraction distillation Sarifah Nurjanah , M. Ade Moetangad Kramadibrata, Efri Mardawati, Mimin Muhaemin, Wahyu Daradjat, Handarto, Totok Herwanto, Rosalinda, and Fathia Salsabila Emmaputri

Date : Wednesday, 12 July 2017

Room : Heliconia

Time	Code	Title and Authors
Symposium session III		
Moderator: Prof. Dr. Sri Juari Santosa, M.Eng.		
10:45 – 11:00	AO-077	Encapsulation of curcumin in chitosan-pectin beads and its release study Dwi Siswanta , Hariyanti Hutabarat, and Agus Kuncaka
11:00 – 11:15	AO-078	Biosynthesis of silver nanoparticles from exopolysaccharides produced by <i>Bacillus subtilis</i> FNCC 0059 Dwi Junianto , Endang Sutariningsih Soetarto, and Yateman Arryanto
11:15 – 11:30	AO-079	The effect of mold rotational speed on porosity of femoral stem based on neutron tomography and radiography test Sutiyoko , Suyitno, Muslim Mahardika, Fahrurrozi Akbar, Juliani, Setiawan, and Bharoto
11:45 – 12:00	AO-080	Electrically conductive nanocomposites polymer of poly (vinyl alcohol) and multiwalled carbon nanotubes: preparation and characterization Fitri Khoerunnisa , Hendrawan Hendrawan, Yaya Sonjaya, and Rizki Deli Hasanah
12:00 – 12:15	AO-081	Extraction of hydroxyapatite (ha) from bovine bone and its performance in adsorbing heavy metals in water Satriawan Dini Hariyanto , Muslim Mahardika, Tutik Sriani, and Gunawan Setia Prihandana
12:15 – 12:30	AO-082	Rapid synthesis of gold nanoparticles in room temperature Shohifah Annur , Sri Juari Santosa, Nurul Hidayat Aprilita, Nguyen Thanh Phuoc, and Nguyen Van Phuocs
Symposium session IV		
Moderator: Respati Tri Swasono, Ph.D.		
13:15 – 13:30	AO-083	Forgery detection beef with mice meat (<i>Mus musculus</i>) in meatballs using real time-polymerase chain reaction (RT-PCR) primer specific for a target mitochondrial DNA ND-1 gene Tri J. Raharjo , Gilang A.Pratama, Irma Nuryanti, and Rarastoeti Pratiwi

Time	Code	Title and Authors
13:30 – 13:45	AO-084	Cytotoxicity of isolated compounds from leaves of <i>Aglaia odorata</i> L. Mai Efdi , Syafrizayanti, Dessy Arisanti, Masayuki Ninomiya, and Mamoru Koketsu
13:45 – 14:00	AO-085	The use of secondary metabolites of mexican sunflower (<i>Tithonia diversifolia</i>) leaf as α -glucosidase inhibitor Endang Astuti and Made Gendis Putri Pertiwi
14:00 – 14:15	AO-086	Effect of precursor concentration and soaking time on glucosamine palmyrah (<i>Borassus flabellifer</i> L.) seeds extraction Nur Lailatul Rahmah , Susinggih Wijana, and Dewi Istiqomah
14:15 – 14:30	AO-087	Secondary metabolites from <i>Cinnamomum parthenoxylon</i> leaves and their biological activities Antoni Pardede , Morina Adfa, Arif Juliari Kusnanda, Masayuki Ninomiya, and Mamoru Koketsu
14:30 – 14:45	AO-088	The effect of MRN complex and ATM kinase inhibitors on UVC-treated zebrafish embryonic development Malina Kumaran, and Shazrul Fazry
14:45 – 15:00	AO-089	The anthocyanin content, colour changes and stability of thermally treated extract from rosella (<i>Hibiscus sabdariffa</i> L.) petal Suharyani Amperawati , Umar Santoso, Pudji Hastuti, and Purnama Darmadji

Date : Wednesday, 12 July 2017

Room : Violet

Time	Code	Title and Authors
Symposium session III		
Moderator: Prof. Dr.rer.nat. Nuryono, M.S.		
10:45 – 11:00	AO-090	Synthesis and characterization of silica from coal bottom ash Ayusti Dirga , Nurul Hidayat, and Endang Tri Wahyuni
11:00 – 11:15	AO-091	Degradation of blue KN-R dye in batik effluent by advanced oxidation process using a combination of ozonation and hydrodynamic cavitation Eva Fathul Karamah, and Pristi Amalia Nurcahyani
11:15 – 11:30	AO-092	Effect of concentration and calcination temperature On the synthesis of NaOH-modified zirconia As a prospective heterogeneous solid base catalyst Mega Fia Lestari , Karna Wijaya, Wega Trisunaryanti, Eddy Heraldy, and Nasih Widya Yuwono
11:30 – 11:45	AO-093	Composite of magnetite-oleic acid-chitosan: sonochemical synthesis and characterization Suyanta , Sutarno, Nuryono, Hesti Kusumastuti, and Lia Kurnia
11:45 – 12:00	AO-094	Integrative assessment of heavy metals pollution in Porong estuaries using sediment chemistry, bioavailability and bioconcentration factor Barlah Rumhayati , and Catur Retnaningdyah
12:00 – 12:15	AO-095	Electrokinetic remediation of artificially silver (Ag) contaminated soil from Kotagede area using acetic acid as electrolyte Rudy Syah Putra and Kharis Pratama
Symposium session IV		
Moderator: Dr. Tutik Dwi Wahyuningsih, M.Si.		
13:15 – 13:30	AO-096	Substituent effect and in vitro cytotoxicity test of chalcone and flavone derivatives against cervix (HeLa) and colon (WiDr) cancer cells Nendrowati , Sabirin Matsjeh, Bambang Purwono, Chairil Anwar, Eti Nurwening Sholikhah, and Yogo Dwi Prasetyo
13:30 – 13:45	AO-097	Synthesis of N-phenyl pyrazoline derivatives from veratraldehyde Setiawati , Estin Nofiyanti, Lina Fauzi'ah, and Tutik Dwi Wahyuningsih

Time	Code	Title and Authors
13:45 – 14:00	AO-098	Dextrin production from taro flour (<i>Colocasia esculenta</i>) by steam explosion method Dyah A. Puspitasari , Purnama Darmadji, Yudi Pranoto, and Rini Yanti
14:00 – 14:15	AO-099	Innovative method in parmesan cheesemaking: utilization of ultrafiltration membrane and non-starter lactic acid bacteria Lienda A. Handoyo, Henry Sutjiono, and Cindy
14:15 – 14:30	AO-100	Anodic plasma depth influence on synthesis of biodiesel using plasma electrolysis method Ratih Anditashafardiani and Nelson Saksono
14:30 – 14:45	AO-101	The effect of ethyl acetate solvent combination in corn silk (<i>Zea mays</i> L.) methanol extract to their potential as a natural sunscreen Rosalina Ariesta Laeliocattleya and Ismizana Jati P.
14:45 – 15:00	AO-102	Early intrauterine diagnosis and conservative treatment with silo bag for gastroschisis in Indonesia Akhmad Makhmudi

Date : Wednesday, 12 July 2017

Room : Primrose

Time	Code	Title and Authors
Symposium session III		
Moderator: Suherman, S.Si., M.Sc., Ph.D.		
10:45 – 11:00	AO-103	Isolation and characterization of cellulose from palm midrib M. Khoiron Ferdiansyah , Yudi Pranoto, and Djagal Wiseso Marseno
11:00 – 11:15	AO-104	Microwave assisted cationic polymerization of palm oils Bambang Soegijono, Muhamad Farid , and Zainal Alim Mas'ud
11:15 – 11:30	AO-105	Study of physico-mechanical properties and release kinetics of eugenol on chitosan-alginate polyelectrolyte complex films as a food active packaging Baiq Amelia Riyandari , Suherman, and Dwi Siswanta
11:30 – 11:45	AO-106	Potato starch modification by steam explosion Raymond Tommy Tjahjadi , Purnama Darmadji, and Yudi Pranoto
11:45 – 12:00	AO-107	Catalyst screening in diimide hydrogenation of latex F.H Ikhwan , Santi Puspitasari, Adi Cifriadi, Muhammad Fadlilah, and Mochamad Chalid
12:00 – 12:15	AO-108	Utilization of bamboo leaves silica for intermediate product of sodium silicate precursor Silviana , Rifaldi Maulana Hasbi, Christyowati Primi Sagita, Moh Taufiq Anwar, Riski Amalia, ErnisaIsmirani Khusna, and Iqbal Ryan Ramadhan
Symposium session IV		
Moderator: Akhmad Syoufian, S.Si., Ph.D.		
13:15 – 13:30	AO-109	Hyaline cartilage regeneration on osteochondral defects of rat's knee joints with intraarticular human peripheral blood CD34+ stem cells, hyaluronic acid, TGF, IGF, FGF and fibronectin injection Basuki Supartono , Katsumi Shigemura, Errol Hutagalung, Ismail Hdilogo, Arief Boediono, Samsuridjal Djauzi, Ahmad A. Yusuf, Nurjati C. Siregar, Jacob Pandelaki, Masato Fujisawa, Toshiro Shirakawa, and Adang Bachtiar
13:30 – 13:45	AO-110	Formulation of oleozon with <i>Phaleria macrocarpa</i> and <i>Cinnamomum burmannii</i> extract for diabetic wound treatment Nabila Salsabila , Farah Moulydia, and Setijo Bismo

Time	Code	Title and Authors
13:45 – 14:00	AO-111	Functionalization of cellulose through polyurethanization by the addition of polyethylene glycol and diisocyanate Imam Prabowo , Fauzia Hanum, Ghiska Ramahdita, and Mochamad Chalid
14:00 – 14:15	AO-112	The efficacy of the root ethanol extract of <i>Acalypha indica</i> L. on metabolic syndrome rat model: focus on hyperglycemia and hyperuricemia D.G.B. Khrisnamurti, A.R. Priyanti, R.W. Hakim, and Erni Hernawati Purwaningsih

Date : Wednesday, 12 July 2017

Room : Tulip

Time	Code	Title and Authors
Symposium session III Moderator: Gilang Nugraha P.P.		
10:45 – 11:00	CO-19	Robustness of PD control for transporting quadrotor with payload uncertainties Gilang Nugraha Putu Pratama , Ibnu Masngut, Adha Imam Cahyadi, and Samiadji Herdjunanto
11:00 – 11:15	CO-20	Servo state feedback based on coefficient diagram method in magnetic levitation system with feedback linearization Alfian Ma'arif , Adha Imam Cahyadi, Oyas Wahyunggoro, and Herianto
11:15 – 11:30	CO-21	Simulation of modified tubular linear permanent magnet generator for wave energy conversion in Indonesia Danang Wijaya , Budi Azhari, and Sarjiya
11:30 – 11:45	CO-22	Analysis of ferrite effect in axial flux permanent magnet generator using magnetic circuit approach Prih Sumardjati Mulyaseputra , Sasongko Hadi, Danang Wijaya, and Suharyanto
11:45 – 12:00	CO-23	Evaluation of spatial and regional planning map Using remote sensing and GIS in East Lombok Indonesia Fithrothul Khikmah , Muhammad Andhika, Hidayat Dewanto, Anggito Venuary, Muhammad Arfiyah, Widya Fauziah, Muhammad Eko Raharja, and Iswari Hidayati
12:00 – 12:15	CO-24	Development of orthosis design for spastic cerebral palsy through biomechanical approach Djoko Kuswanto , Syukriyatun Ni'amah, and Farah Aulia Rahma
Symposium session IV Moderator: M. Manggalanny		
13:15 – 13:30	CO-25	Design and implementation of surveillance embedded ip camera with improved image quality using gamma correction for surveillance camera Setiya Purbaya , Dodi Wisaksono Sudiharto, and Catur Wijutomo

Time	Code	Title and Authors
13:30 – 13:45	CO-26	Low cost switched array-wide band antenna for search and rescue disaster management Arif Hidayat , Elyas Palantei, and Syafruddin Syarif
13:45 – 14:00	CO-27	Combination of DNS traffic analysis - a design to enhance APT detection Muhammad Manggalanny and Kalamullah Ramli

Date : Wednesday, 12 July 2017

Room : Dahlia

Time	Code	Title and Authors
Symposium session III		
Moderator: Reza Pulungan, Ph.D.		
10:45 – 11:00	CO-28	Parallelization of modular exponentiations of polynomials M. Ridwan Apriansyah Budikafa and Reza Pulungan
11:00 – 11:15	CO-29	Lung detection using adaptive border correction Rizki Nurfauzi , Hanung Adi Nugroho, and Igi Ardiyanto
11:15 – 11:30	CO-30	A systematic review: b-cell conformational epitope prediction from epitope characteristics view Binti Solihah , Edi Winarko, Afiahayati, Sri Hartati, and Moh. Wibowo
11:30 – 11:45	CO-31	Monte carlo simulation and clustering for customer segmentation in business organization Andry Alamsyah and Bellania Nurris
11:45 – 12:00	CO-32	Semantic search with rule reasoning for scholarship information search Kartikadyota Kusumaningtyas and Khabib Mustofa
Symposium session IV		
Moderator: Andry Alamsyah, M.Sc.		
13:15 – 13:30	CO-33	Direct comparison method of information dissemination using legacy and social network analysis Andry Alamsyah , Bernaully Sarniem, and Indrawati Indrawati
13:30 – 13:45	CO-34	Big data analytic for estimation of origin-destination matrix in bus rapid transit system Widy Widyanawan , Sri Suning Kusumawardani, Dzaky Widya Putra, Bagas Prakasa, Budi Triwibowo Yuli Widhiyanto, and Fathurrochman Habibie
13:45 – 14:00	CO-35	Construction inverted index for dynamic collections visualization in thematic virtual museums system Sajarwo Anggai

Date : Wednesday, 12 July 2017

Room : Irish

Time	Code	Title and Authors
Symposium session III		
Moderator: Dr. Arry Retnowati, M.Sc.		
10:45 – 11:00	GO-08	Facies analysis of coal bearing formation in the Tamu Area, upper Chindwin Basin, Sagaing Region, Myanmar Thawng Lian Mung , Sugeng Sapto Surjono, and Myo Thant
11:00 – 11:15	GO-09	Microzonation of landslide vulnerable area using horizontal to vertical spectral ratio (Hvsr) by shear strain analysis method of microseismic data in Giritirta Village, Pejawaran District, Banjarnegara Regency Annisa Trisnia Sasm i, Hibatul Haqqi Laksana, and Alfian Romadhoni
11:15 – 11:30	GO-10	Geomorphological condition analysis of Pramuka Cay, Kepulauan Seribu, Jakarta, Indonesia Ahmad Cahyadi , Tjahyo Nugroho Adji, Muh Aris Marfai, and Dhandhun Wacano
11:30 – 11:45	GO-11	Regression model accuracy comparison for mangrove canopy density mapping using NDVI, MSAVI, and MSARVI Deha Agus Umarhadi and Akbar Muammar Syarif
11:45 – 12:00	GO-12	Logistics cost structure cold and non-cold supply chain of catchment sea-fish in coastal areas, Java Island, Indonesia Adi Djoko Guritno and Endy Suwondo
12:00 – 12:15	GO-13	Study of fresh-saline water interface in correlation with groundwater chemical type in Coastal Area of Cilacap, Indonesia Setyawan Purnama
12:15 – 12:30	GO-14	The effect of difference polynomial order on the geometric correction of very high resolution satellite imagery to delineation of coastline Jali Octariady
Symposium session IV		
Moderator: Ratih Fitria Putri, M.Sc., Ph.D.		
13:15 – 13:30	GO-15	Analysis of suitability and carrying capacity for coastal tourism in Siung Beach and Wediombo Beach, Gunungkidul Yustikarani Julianti Pambudi and Intan Mawar Tiani

Time	Code	Title and Authors
13:30 – 13:45	GO-16	A simple approach for radargram pattern recognition: identification of metal and non metal object Galih Prasetya D. , Wisnu S. Priyanto, Doni Fernando, and Heni S.
13:45 – 14:00	GO-17	Mapping of tidal flood affected areas and discovering the community adaptation strategies in Demak Regency, Central Java Bowo Susilo , Rika Harini, M Chrisna Satriagasa, Rina Ariani, and Tiara Sarastika
14:00 – 14:15	GO-18	Analysis access and utilization of icts by farmers in coastal area of rural Yogyakarta, Indonesia Subejo , Dyah Woro Untari, Ratih Ineke Wati, and Gagar Mewasdinta
14:15 – 14:30	GO-19	Land use priority assessment based on evaluation of land capability, landslide hazard and population pressure on agriculture land analysis in Blukar, Bodri, and Blorong Watersheds; Central Java, Indonesia Ratih F. Putri , J.T.Sri.Sumantyo, J.Sartohadi, and F.Nishio
14:30 – 14:45	GO-20	Mangrove forest change monitoring using multitemporal image in Karimunjawa and Kemujan Island Putri Marulia Sari , Evy Rosa, Fiqi Arman, Any T. Atmaja, and Muhammad Kamal
14:45 – 15:00	GO-21	Investigating the role of rainfall variability in the hydrological response of small tropical upland watershed prone to land degradation Nugroho Christanto , Junun Sartohadi, M. Anggri Setiawan, and M. Promono Hadi

Date : Wednesday, 12 July 2017

Room : Lavender

Time	Code	Title and Authors
Symposium session IV Moderator: Dr. Arry Retnowati, M.Sc.		
13:15 – 13:30	GO-22	Mangrove vegetation inventory in Bogowonto Estuary Hartono, Sudaryatno , and Wahyu Nurbandi
13:30 – 13:45	GO-23	Recent coastline dynamic along northern coast of Java (PANTURA) Indonesia and their driving forces Heri Andreas , Dina A. Sarsito, Dhota Pradipta
13:45 – 14:00	GO-24	ConnectiFarm: android mobile field support as a DSS tool for agriculture technology investments in developing countries Maharani Listiafitri and Ramdan Septiawan
14:00 – 14:15	GO-25	The usefulness of multi resolution landsat image for detecting urban sprawl Djaka Marwasta
14:15 – 14:30	GO-26	Inundation flood evaluation in North Kalimantan Province’s coastal area based on watershed factor Sudaryatno , Totok Gunawan, and Disyacitta Awanda
14:30 – 14:45	GO-27	Strengthening the global maritime fulcrum concept through the inclusion of bioecoregion connectivity aspects (case study the South Coast of West Java, Indonesia) Atikah Nurhayati , Isah Aisah, and Asep K Supriatna

Infrastructure technology symposium schedule

DAY 2

Date : Wednesday, 12 July 2017

Room : Carnation

Time	Code	Title and Authors
Symposium session III		
Moderator: Intan Supraba, S.T., M.Sc., Ph.D.		
10:45 – 11:15	Prof. Dr. Tech. Ir. Danang Parikesit, M.Sc.	
	Universitas Gadjah Mada, Indonesia	
11:15 – 11:30	IO-05	Development of batch photocatalytic solar reactor into a continuous system to degrade peat water into clean water Gusfiyesi , Hendri Sawir, and Edo Handika
11:30 – 11:45	IO-06	Microbiological quality assessment of drinking water in Teros Village, East Lombok District, West Nusa Tenggara Province, Indonesia Baiq Liana Widiyanti , Ig.L. Setyawan Purnama, Adi Heru Sutomo, and Setiadi
11:45 – 12:00	IO-07	Rain behaviour at Mt. Merapi area as observed by XMPR and ARR Roby Hambali , Hanggar G. Mawandha, Djoko Legono, Rachmad Jayadi, and Satoru Oishi
12:00 – 12:15	IO-08	Impact of sedimentation counter measure on the performance of flood control: a case study of Wonogiri reservoir Rachmad Jayadi , Istiarto, and Ansita Gukitapingin Pradipta
12:15 – 12:30	IO-09	Simulation of angular flow in a shallow basin triggered by a rotating vertical cylinder by SPH method Warniyati , Radiana Triatmadja, and Nur Yuwono
Symposium session IV		
Moderator: Endita Prima Ari Pratiwi, S.T., M.Eng., Ph.D.		
13:15 – 13:30	IO-10	A study of Universitas Gadjah Mada Drinking Water Supply System (UGM-DWSS) potential on supporting green campus program in Universitas Gadjah Mada Adhi Fahrianto S. , Intan Supraba, Radiana Triatmadja, and Budi Kamulyan
13:30 – 13:45	IO-11	Campus drinking water supply system performance analysis in Universitas Gadjah Mada of Yogyakarta Teguh Setiawan , Radiana Triatmadja, Intan Supraba, and Budi Kamulyan

Time	Code	Title and Authors
13:45 – 14:00	IO-12	Policy analysis of Clean Water Supply System (CWSS) development (case study of Kotamobagu’s CWSS) Ahmad Nithasi Damopolii , Radiana Triatmadja, and Intan Supraba
14:00 – 14:15	IO-13	Study on hydraulic flow in stratified pipe performed by numerical simulation Ani Hairani , Djoko Legono, and Adam Pamudji Rahardjo
14:15 – 14:30	IO-14	Comparison of wind load analysis results based on Indonesia minimum design loads standard SNI 1727:2013 inputted automatically and manually by using SAP2000 Oktaviani Tri Handayani, Mhd. Despriodi Syaher, and Inggar Septhia Irawati
14:30 – 14:45	IO-15	Numerical investigation on buckling failure of slender member with cutout presence Miftahul Iman , Bambang Suhendro, Hrc. Priyosulistiyo, and Muslikh

Date : Wednesday, 12 July 2017

Room : Angsana

Time	Code	Title and Authors
Symposium session III		
Moderator: Yuni Kusumastuti, S.T., M.Eng., D.Eng.		
10:45 – 12:30	Prof. Mime Kobayashi	Nara Institute of Science and Technology, Japan
11:30 – 11:45	OO-09	Detection of bacterial leaf blight resistance gene <i>Xa4</i> and transcriptomic analysis of its gene in black rice after infection of <i>Xanthomonas oryzae</i> pv. <i>oryzae</i> Mita Dewi Retnoningrum , Siti Roswiyah Yulyani, Rizka Saumi, Febri Adi Susanto, Tri Rini Nuringtyas, Tri Joko, and Yekti Asih Purwestri
11:45 – 12:00	OO-10	GC-MS based metabolomics study on pigmented rice (<i>Oryza sativa</i> L.) resistant to Rice Ear Bug (<i>Leptocoris oratorius</i> F.) Nur Afra , Tri Rini Nuringtyas, Yekti Asih Purwestri, Febri Adi Susanto, Tomoyo Irifune, Sastia Prama Putri, and Eiichiro Fukusaki
12:00 – 12:15	OO-11	NMR metabolite comparison of local pigmented rice in Yogyakarta Dio Nardo Wijaya , Febri A. Susanto, Yekti A. Purwestri, Dyah Ismoyowati, and Tri Rini Nuringtyas
12:15 – 12:30	OO-12	Identification of cytotoxic compounds from torbangun leaves by metabolomics approach Nancy Dewi Yuliana , Masao Goto, Rizal Damanik, Dedi Fardiaz, Farida Laila, and Yuko Takano Ishikawa
Symposium session IV		
Moderator: Dr. Yekti Asih Purwestri, M.Si.		
13:15 – 13:30	OO-13	Cloning and expression of haloacid dehalogenase gene from <i>Bacillus cereus</i> IndB1 Idris and Enny Ratnaningsih
13:30 – 13:45	OO-14	The expression of growth factors signalling gene from different donor age of human adipose derived stem cell during in vitro maturation Erif Maha Nugraha Setyawan , Hyun Ju Oh, Min Jung Kim, Geon A Kim, Seok Hee Lee, Yoo Bin Choi, Ki Hae Ra and Byeong Chun Lee

Time	Code	Title and Authors
13:45 – 13:50	OP-01	Detection of <i>Strongyloides Stercoralis</i> using single polymerase chain reaction method in hookworm-positive fecal samples Ardina Nugrahani , E. Elsa Herdiana Murhandarwati, and Erna Kristin
13:50 – 13:55	OP-02	Edible biofilm formation from guava seed waste fermentation Sari Darmasiwi , Oktaviana Herawati, and Endah Retnaningrum

ABSTRACTS



SPEAKERS



Modified chicken claw (*cakar ayam*) system a new concept in green pavement technology over soft and swampy ground

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Some parts of Indonesia region, especially near the coast, have soft subgrade and apart of them is swampy with relatively deep soft soil layer. To utilize and develop such areas absolutely need an adequate road network, while the existing road on such areas need high maintenance cost. Conventional solutions with embankment made of better soil properties through preloading process, or with the technology of slab on pile system, is expensive and not environmentally friendly. This paper discusses the basic principles, methods of analysis and design, implementations, and practical applications of the Modified Chicken Claw (*Cakar Ayam Modifikasi*) system, which in addition to technically meets the requirements, is also relatively much cheaper, easier and faster to construct, and more environmentally friendly. This is a totally new concept of pavement system originally developed in Indonesia, which has been widely applied as road construction over soft and swampy grounds with satisfactory long-term performance. The system consists of a relatively thin (10~15 cm) reinforced concrete slab, pipes (chicken claws) inserted into the soft ground at about 2.5 m distances as slab stiffener, and underlying soft soil layer. Compared to previous similar versions, the Modified Chicken Claw system has many advantages including: (a) a much more accurate method of analysis and design so as to obtain optimal design, (b) much smaller dimension and chicken claw weight, (c) vertical concrete fin as underlying soil barrier for more pavement stability and durability, (d) the present of thin asphalt layer to significantly reduce the effect of cyclic thermal loading and act as wearing course, (e) combination with a light fill material to minimize the consolidation settlement, and (f) a much shorter construction time with a relatively cheaper cost, since heavy equipments are not necessary.

Keywords: green-technology, modified-*cakar-ayam*-system, rigid-pavement, soft-soil, swampy-ground

Molecular design and synthesis

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Synthetic organic chemistry is a creative area of science involving the transformation of existing molecules into completely new ones. Initially the design of a target molecule must be based on some hypothesis that the resulting structure will provide new insights into chemistry. For example the new molecule might be intrinsically desirable because of its shape, its reactivity, its physical and spectroscopic properties, or its anticipated biological activity. The desired products could lead to new drugs or new materials. Once the target structure has been chosen, a synthetic route must be determined: this can be based on known transformations or can pose a challenge to discover new transformations. In practice, a new target molecule must combine originality of structure with feasibility of synthesis. The overall process is one of molecular architecture followed by molecular construction. In addition to the science, there is an artistic element in this field of research. Simple buildings can easily be constructed using known principles: however something quite novel and beautiful, such as the Sydney Opera House, requires solutions to be found to fundamental construction problems.

These principles will be illustrated in the case of indoles, which are important molecules in the chemistry of life, as a consequence of the essential amino acid tryptophan. Over recent years, we have investigated the chemical reactions of specifically activated indoles, and these have generated a wide range of interesting, novel structures. The synthesis of indorphyrins - relating indoles to porphyrins - and related heterocyclic structures will be exemplified.

Groundwater engineering computation methods based on Forchheimer's equation

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Darcy was known as very generous engineer, he is undoubtedly the father of the science of fluid flow in soils for his experiment on the flow of water through sand column which was published in his book '*Les fontaines publiques de la ville de Dijon*' in 1856, named after him as Darcy's law. For the practical computation this equation was developed by Dupuit (1863) and Thiem (1906) and then it called Dupuit-Thiem equation and this equation was developed by many researchers in many variations with different parameters especially for radial flow in pumping and recharging systems. Their basic pumping system equations for confined and unconfined aquifer as well as for full penetration well with fully perforated casing. In the practical implementation, this condition rarely occurs especially for thick aquifer; therefore many researchers developed a correction for those formulas from full penetration to be partial penetration wells. Partial penetration well is a well which its depth or tip of its casing does not reach an impermeable stratum beneath the aquifer. Despite the correction, those formulas still have difficulty to compute the design of pumping system due to its need for hydraulic gradient data which can only be defined by two real time data of piezometric head before and after pumping related to horizontal distance of both points. In this paper will be presented some inventions of computation methods based on Forchheimer equation such as: dimension of recharge well, water losses on the lake, drawdown of pumping, computation of power and discharge of pumping on the aquifer, permeability test, analysis of pumping test and partial penetration well equation and by these methods they can be computed easily.

Keywords: drawdown, pumping, recharge, steady state, unsteady state

Multi-omics approach to understand molecular mechanisms of woody biomass production

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The major constituents of woody biomass are derived from secondary cell walls (SCWs) of woody cells (tracheids, vessels, and fibers). Therefore, understanding of molecular mechanisms underlying woody biomass production is important for modification of quantity and quality of woody biomass. Xylem vessels, as the water-conducting cells in vascular plants, undergo characteristic SCW deposition and programmed cell death. To understand the molecular mechanisms of xylem vessel cell differentiation, we carried out a comprehensive transcriptome analysis in a model plant *Arabidopsis*, which allowed us to find that these processes are regulated by the VASCULAR-RELATED NAC-DOMAIN (VND) transcription factors. Using one of the VND transcription factor, VND7, we established an effective system for induction of vessel cell differentiation in *Arabidopsis* plants and tobacco BY-2 and *Arabidopsis* T87 suspension culture cells. We subjected the tobacco cells to LC/MS-based wide-target metabolome analysis and transcriptome analysis: time-course data for 128 metabolites showed dynamic changes in metabolites related to amino acid biosynthesis. Transcriptome data indicated that xylem vessel cell differentiation involved active upregulation of genes encoding the enzymes related to the metabolome changes, showing that xylem vessel cell differentiation is associated with changes in primary metabolism, which could facilitate the production of woody biomass. Moreover, we quantitatively analyzed SCWs in *Arabidopsis* plants with altered expression of a number of SCW-related genes using the pyrolysis-GCMS, indicating the possibility to modify the quality of woody biomass based on the knowledge of SCW formation in model plants. In addition, we recently started a proteome analysis of differentiating xylem vessel cells in the cultured cells for further understanding of molecular mechanisms of woody biomass production.

Complexation of tetraazanium salt with copper(II) in methanol and aqueous solution

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Several metal complexes with 5,7,7,12,14,14-hexamethyl-1,8-diaza-4,11-diazoniacyclictrideca-4,11-diene ligand were obtained by templation method after the discovery by Curtis in 1960. In the present study the ligand in the form of salt with perchlorate counter anion $\{(\text{Me}_6\text{C}_{10}\text{H}_{16}\text{N}_4)(\text{ClO}_4)_2\}$ was complexed with copper chloride, copper acetate, copper perchlorate, copper sulfate and copper bromide. In methanol all the copper salts gave same copper complexes with molecular formula of $[(\text{Me}_6\text{C}_{10}\text{H}_{14}\text{N}_4)(\text{ClO}_4)\text{Cu}(\text{II})](\text{ClO}_4)$ except copper chloride and copper perchlorate which gave $[(\text{Me}_6\text{C}_{10}\text{H}_{14}\text{N}_4)\text{Cu}(\text{II})](\text{ClO}_4)_2$. The later complex has square planar geometry compare to square pyramidal in the first type. Generally, the same counter anion from the ligand is maintained in the complexes. In aqueous solution, all the copper salts gave same complexes of the second type with two perchlorate counter anions except copper bromide gave quit a different complex with molecular formula of $(\text{Me}_6\text{C}_{10}\text{H}_{14}\text{N}_4)\text{Cu}(\text{II})$ $[(\text{Me}_6\text{C}_{10}\text{H}_{14}\text{N}_4)(\text{H}_2\text{O})_2\text{Cu}(\text{II})]$ $[\text{Cu}(\text{I})\text{Br}_3]_2$. The complexes were characterized by micro elemental analysis and infrared and Uv-visible spectroscopic techniques including chemical crystallography. In addition to chemical crystallography the formation of Cu(I) in the counter anion of the last complex was also proven by XPS spectrum. The $2p_{3/2}$ binding energy of Cu(I) and Cu(II) are 931.39 and 933.87 eV respectively. The ligand and $[(\text{Me}_6\text{C}_{10}\text{H}_{14}\text{N}_4)(\text{ClO}_4)\text{Cu}(\text{II})](\text{ClO}_4)$ complex were screened for their antibacterial activity against *E. coli* (ATCC 10536), *E. aerogenes* (ATCC 13048), *K. pneumoniae* (ATCC BAA 1144), *P. vulgaris* (ATCC 33420), *P. aeruginosa* (ATCC 10145), *S. epidermidis* (ATCC 12228), *S. aureus* (ATCC 259 23), *B. subtilis* (ATCC 11774), *E. faecalis* (ATCC 14506), methicillin-resistant *S. aureus* (MRSA ATCC 43300) and methicillin-resistant *S. aureus* (MRSA TM). Cytotoxic study showed both compounds are not toxic to vero cell with CC_{50} value of 2.754 and 1.332mh/mL respectively. Although both ligand and complex displayed ability to inhibit the growth of *E. coli*, *S. aureus* and *B. subtilis* bacteria their selectivity indexes are low to be considered as therapeutic antibacterial agents.

Keywords: antibacteria, chemical crystallography, complexes, copper, cytotoxicity, tetraaza

Disruptive technology and improvement of mobility in Indonesian cities

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The emergence of disruptive technologies has changed the technology landscape in the urban mobility management. The introduction of electronic platform for transaction, contract management, GPS and internet-assisted route assignment, fleet management and other IoT system have forced companies and government both at national and sub national levels to adjust themselves to survive in the competitive business and policy environment. This paper examines the state-of-the art prediction of the future mobility technology. It looks at several paths that will be taken by business and regulators and context within which those paths are best suited to local condition. The paper discusses the introduction of internet platform for haul-ride services in Indonesian cities and how the government reacted to the growing demand of urban mobility.

Keywords: competition, disruptive technology, Indonesian cities, mobility, urban areas

Greener routes to organics synthesis: sustainable applications of nanocatalysts

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Although many organic reactions can be promoted by homogeneous or heterogeneous catalysis, but later offers many advantages such as easy workup, recyclability and less waste production.^[1] The global concern about the climate change, energy production and conservation has prompted scientists to develop efficient recyclable heterogeneous catalysts for industrial processes. The study of heterogeneous catalysis has been a subject of intense study since the industrial revolution in the early 1800s.^[2] Several solid base catalysts such as zeolites, metal oxides, mixed oxides, hydrotalcites etc. have been developed for the manufacture of organic intermediates and fine chemicals, among them metal oxides such as MgO, CuO, and ZnO are of especial interest. During the synthesis of medicinally relevant molecules,^[3] we became interested to develop heterogeneous catalytic system that can be used for more than one organic transformation. To achieve these objectives we synthesized various nano-materials and studied their catalytic potential for A3 and KA2 coupling and related organic reactions.^[4] Some of the organic molecules synthesized during this work have been evaluated for antimalarial activity and have exhibited potent *in vitro* and *in vivo* antimalarial activity.

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Network pharmacology of jamu formula

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The paradigm of drug development has been shifted from one-drug one-target into multi drug network target. The Indonesian traditional medicines, Jamu, is composed from several plants. It provides a promising source in developing drug addressing this new paradigm. In this paper, we propose a concept of Jamu informatics as a tool in understanding Jamu as well as guidance in developing a new Jamu formula. We provide our implementation of Jamu informatics started from modeling the ingredients of Jamu as to estimating the efficacy of Jamu. We found that the developed model performs well in predicting Jamu efficacy given the information of its ingredients. Given the model, a new Jamu formula targeted for type-2 diabetes is developed and tested to Zebra fish. The experiment results show that the new Jamu formula is promising and showing better performance compared to negative control. The ingredient composition of the new Jamu formula is then optimized using the response surface optimization. Finally, we evaluate the working mechanism of the new formula using network pharmacology.

Development of FruWash technology for preserving post-harvest horticulture produce: challenges, failures and successes through supramolecular chemistry

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Despite inadequate advanced farm practices, tools and machines, India ranks first in varieties and second in the production of fruits and vegetables in the World. This distinction gets diluted when estimates indicate that about 40-45% of fruits and vegetables do not reach the consumer due to lack of appropriate technology options. During the past several years, our group at IIT Delhi has been working on exploring natural product guided supramolecular technologies to arrest losses in the horticulture produce. We have been able to achieve extension of shelf life of fruits and vegetables at ambient high temperatures through Fruwash Technology based upon a natural bioresource abundantly available in India and Indonesia. Without giving extensive technical details, both failures and successes encountered during the development will be presented.

C dots derived from waste of biomass and their photocatalytic activities

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Carbon nanodots (CNDs) which are part family of carbon nanoparticles have drawn a lot of attention due to their prominent characters and wide prospective applications. The materials are nontoxic and exhibit fluorescence properties that are potential for application in photo catalysis, optoelectronic, bio imaging and sensors. Various approaches of CNDs synthesis have been investigated by means of a large variety of starting materials and techniques. A green and an effective approach in gaining carbon nanodots (CNDs) from wastes biomass-carbonaceous particles of dried solid waste of cow manure have been employed by hydrothermal treatment. The carbon nanodots were then attained after carbonaceous particles dissolution step under microwave irradiation. The temperature range of hydrothermal treatment was in between 250 to 300°C. The formation of C=C, C-O bonds and conjugated structures has been observed by FTIR and photoluminescence properties has been identified under 366 nm of UV irradiation. Furthermore, the morphology of as-synthesized carbon nanodots was investigated by HR-TEM and crystallinity was observed by X-Ray Diffraction (XRD). Photocatalytic degradation of synthetic dye solution of methylene blue (MB) in the presence of carbon dots has been investigated under visible light.

Keywords: carbon nanodots, methylene blue, photocatalyst

The damping mechanism of steel-rubber composite beams under flexural dynamic excitation

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Damping is one of several important parameters in the dynamic system. It reduces amplitude response of a structure, especially around the resonance. The higher the damping the better the performance (more comfort, lower stress, longer fatigue), and the longer the life cycle of the structure will be. There are many types of damper amongst other is the tuned mass damper (TMD), where a mass and a spring are designed in such that the TMD frequency is close to the natural frequency of the structure but the phase angle is about 180° out of phase. Applying an additional damper in the TMD system is expected to increase the damping of the structure of interest. The objective of this study is to test experimentally and numerically the damping characteristics of rubber-steel composite beams upon a cantilever support system under flexural dynamic excitation. When the rubber beam is bent by flexural moment, the embedded steel will axially restrain, due to by its composite action. The effectiveness of the damping may be dependent on the strain, the bonding, and the cross section area of reinforcing steel. Three rubber-steel composite beams were experimentally and numerically tested. The damping ratios were then calculated on the basis of free vibration test.

Keywords: damping, rubber-steel composite, structural vibration

Adsorption kinetic and equilibrium of Ca(II) AND Mg(II) onto sulfonate-modified silica from sugarcane bagasse

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Sugarcane bagasse contains silica, which was separated and modified in this investigation. The silica was reacted by 3-(trimethoxysilyl)-1-propanethiol, and the product was oxidized to produce sulfonate-modified silica (SMS). The result of modification was accomplished by spectroscopic analysis of FTIR, XRD, and SEM-EDX. The SMS was used as adsorbent for adsorption kinetic and equilibrium of Ca²⁺ and Mg²⁺. The mechanism of the adsorption can be proposed from these experiments. Adsorption kinetic studied the adsorption of the cations as the function of contact time, and the data were evaluated by intra-particle diffusion model, Boyd equation, and Lagergren pseudo kinetic model. The calculated model fitted well to the experimental data and suggests that both Ca²⁺ and Mg²⁺ were adsorbed by SMS through external mass transfer, and were pseudo-second ordered. Adsorption equilibrium was evaluated using proton stoichiometry, and adsorption isotherms, the adsorption as the function of cation concentration, and the data were analysed using Dubinin-Radushkevich (DR)-Raduskovich. The results showed that the adsorption of Ca²⁺ onto SMS was through cation exchange and, that of Mg²⁺ onto SMS was via physisorption.

Keywords: Boyd model, Dubinin – Radushkevich, intraparticle diffusion, Lagergren pseudo kinetic, proton stoichiometry

Modified natural clay as heterogeneous catalysts for biofuel preparation

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Nowadays many different heterogeneous catalysts have been synthesized to catalyze the conversion of vegetable oils into biofuel. Natural clays, especially bentonite, are important as catalysts because they are available in large quantities, relatively cheap, environmental friendly, high thermal stability, easily modified and recycled by chemical and/or physical treatments. In term of biofuel preparation, the main purpose of using natural clay as catalysts is to reduce the temperature required for hydrocracking of vegetable oil into biogasoline, to increase the yield of light fraction of biogasoline, and to provide acid sites in term of biodiesel preparation. In addition, for hydrocracking purpose, the clay is usually impregnated by transition meta such as Cu, Ni or Pt in order to increase the acidity of the catalyst. This article discussed about the preparation, characterization, and the application of bentonite as natural clay on catalysis processes. Preparation of the catalyst was generally began by activating the bentonite using sulfuric acid or ammonium nitrate followed by calcination process to increase Brønsted acid sites on the bentonite. To increase the thermal stability, the bentonite should be pillared with metal oxides, such as TiO_2 , Fe_2O_3 , Cr_2O_3 , etc. The physicochemical properties of the catalyst were finally revealed by x-ray diffractometry, microscopy, FT-IR spectrometry, BET/Isothermal and elemental analysis methods. Catalysis process on biofuel preparation was affected by catalyst loading, active sites and specific surface area of catalyst, as well as thermodynamic variables such as temperature. Increasing of catalyst loading generally increases the active sites; as consequence, the conversion of vegetable oil increases as well. Large surface area of the catalyst plays an important role to increase the conversion. It was also observed that the conversion of vegetable oil into biofuel increased with an inclinement of temperature reaction. Gas Chromatography method was used to determine the composition and the content of the biofuel. In conclusion, modified bentonite is good candidate and can be applied as heterogeneous catalyst for biofuel preparation.

Keywords: bentonite, catalyst, conversion, hydrocracking, natural clay/biofuel

New trident molecule with phosphoric acid functionality for trivalent rare earth extraction

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Tripodal extraction reagent with three phosphoric acid groups, together with the corresponding monopodal molecule has been prepared to investigate some metals extraction behavior, in particular, trivalent rare earth elements (REEs). The tripodal reagent exhibited extremely high selectivity for metals with high valency such as Zr(IV), In(III), Lu(III), and Fe(III). Tripodal reagent also exhibited exceptionally high extraction ability compared with the corresponding monopodal one in the extraction of trivalent rare earths. The result for the stoichiometry of tripodal reagent to heavy rare earths showed the inflection point between Er (2:1 for a ligand with ion) and Tm (1:1). The extraction reactions were determined for all rare earths with both reagents. The extraction equilibrium constants (K_{ex}), the separation factors (β), half pH values ($pH_{1/2}$), difference half pH values ($\Delta pH_{1/2}$) for extraction of REEs with both reagents are estimated.

Keywords: rare earth metals, solvent extraction, tripodal compound

Synthesis and structural analysis of powder complex of tris(bipyridine)cobalt(II) trifluoromethanesulfonate octahydrate

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The powder complex of tris(bipyridine)cobalt(II) trifluoromethanesulfonate octahydrate has been synthesized by interaction of the corresponding cobalt(II) nitrate salt, bipyridine, and potassium triflate. AAS measurement showed the content of metal to be 6.06 %, corresponding to the theoretical value of 6.06 % in $[\text{Co}(\text{bipy})_3](\text{CF}_3\text{SO}_3)_2 \cdot 8\text{H}_2\text{O}$. The analysis of conductance producing the charge ratio of cation by anion to be 2:1, confirms the formula. The magnetic moment, μ_{eff} , of this complex which was to be 4.5-4.9 B.M, indicates that the complex is paramagnetic corresponding to the three unpaired electrons with significantly orbital contribution. UV-Vis spectrum of the complex reveals the first band observed at about 11100 cm^{-1} , which is associated with the spin-allowed transition, ${}^4T_{1g} \rightarrow {}^4T_{2g}$. A distinct shoulder at only about 16100 cm^{-1} should be associated with spin-forbidden transition of ${}^4T_{1g} \rightarrow {}^2T_{2g}, {}^2T_{2g} (\text{G})$. The expected second and third bands which are associated with spin-allowed transitions of ${}^4T_{1g} \rightarrow {}^4T_{1g}(\text{P})$ and ${}^4T_{1g} \rightarrow {}^4A_{2g}$ at higher energy were not well resolved. The infrared spectrum shows absorptions of functional group of ligand which is influenced by the metal-ligand interaction in this complex. The powder XRD of this complex was refined using Le Bail method of Rietica program and found to be fit as monoclinic crystal system with space group of C2/c.

Keywords: bipy, cobalt(II), Le Bail, rietica, trifluoromethanesulfonate

Preparation of various quercetin derivatives and their antioxidant activities

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Quercetin derivatives are widespread in the plant kingdom and exhibit various biological activities. We investigated the structure-activity relationships of quercetin derivatives, with a focus on the influence of functional groups and sugar composition on their antioxidant capacity. Therefore, a series of quercetin derivatives were prepared and assessed for their DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging properties. Isoquercetin *O*-gallates were more potent radical scavengers among quercetin derivatives, which were prepared by chemical syntheses. The systematic analysis highlights the importance of the distribution of hydroxy substituents in isoquercetin *O*-gallates to their potency. This study focuses on verifying the importance of both the degree of hydroxylation and the sugar composition of quercetin derivatives with respect to their radical scavenging potency towards DPPH radicals. For isoquercetin *O*-gallates, we confirmed that the inclusion of a pyrogallol moiety in the galloyl unit was of greater importance in determining radical scavenging ability than the presence of a catechol moiety in the flavonol B ring.

The development of reproducible uric acid biosensor by using electrodeposited polytyramine as matrix polymer

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A versatile method for the construction of reproducible uric acid biosensor is explained. Electrodeposited polytyramine is used as biosensor matrixes due to its compatibility to immobilize enzyme uric oxidase in the membrane electrode. The precise control over the charge passed during deposition of polytyramine allows concomitant control over the thickness of the deposited enzyme layers onto the surface of the electrode. The uric acid biosensor showed a sensitive response to uric acid with a linear calibration curve lies in the concentration range of 0.1 – 2.5 mM, slope 0.063 $\mu\text{A}/\text{mM}$, and the limit detection was 0.05 mM uric acid ($S/N = 3$). The biosensor shown excellent reproducibility, the variation between response curves for uric acid lies between RSD 1% at low concentrations and up to RSD 6% at saturation concentration. The biosensor showed good stability and to be applicable to determine uric acid in real samples. Various type of food samples were analyzed independently by two methods: the present biosensor method and the standard spectrophotometric method, gave a correlation coefficient of 0.935. This result confirms that the biosensor method meets the rigid demands expected for uric acid in real samples.

Keywords: biosensor, electrodeposited, polytyramine matrix, reproducible, uric acid

Application of low-temperature atmospheric plasma for controlling cell differentiation

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Low-temperature (non-thermal) atmospheric pressure plasma generates active species such as radicals, ions, and electrons. These stimulants can be used to activate or deactivate cell functions. Plasma irradiation has been used to heal skin wounds, and application of plasma for introducing proteins into plants has been reported. However, the mechanism of plasma effects has not been well understood partly because physical and chemical complexity of plasma. For the past a few years, we have been trying to understand the mechanism. One approach is to develop a device with which a single cell analysis is possible. The device is called plasma-on-chip and it has been demonstrated to work on *Chlorella* and yeast cells ^{1,2}). Another approach is to analyse change in gene expression upon plasma irradiation. As a proof of concept, plasma irradiation was conducted for five seconds on cultured murine fibroblast NIH3T3 cells. After culturing the cells for another 1 or 3 hours, RNA expression was analysed using a microarray. Upregulation of RNAs including hypothetical transmembrane proteins and U3 small nucleolar RNAs were detected ³). Our results provide a basic principle for understanding the molecular mechanisms of plasma effects on cells. Analysing change in gene expression by single cell omics, our study will pave the way to control cell growth and differentiation by plasma irradiation.

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Bio-inspired development of antimicrobial compounds

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The main focus of the research undertaken in my group is the discovery and development of novel bioactive molecules. Naturally produced chemicals are of fundamental importance in biological systems. Innovative organic syntheses not only provide access to these bioactive molecules but also their analogues, facilitating the development of new therapeutic leads. Our group is working on the development of novel antimicrobial agents based on fimbrolides and antimicrobial peptides. Fimbrolides are an important class of halogenated furanones isolated from the red marine algae *Delisea* which exhibit potent antimicrobial properties, while antimicrobial peptides are a key component of the mammalian immune system that provide protection against infections caused by various pathogens. We have generated a wide range of fimbrolides and their lactam analogues, and have attached these molecules to surfaces to investigate their potential applications in biomedical devices. We have also synthesized new classes of antimicrobial peptidomimetics by exploiting the facile ring opening of *N*-acylisatins with amino acids. This versatile synthetic approach has been further extended to the generation of amphiphilic guanidine-embedded peptidomimetics and dendrimer core structures that show potent antimicrobial activity.

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Amine-functionalized MCM-48 as adsorbent of Zn²⁺ and Ni²⁺

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Modification of mesoporous silica, MCM-48, with 3-aminopropyltrimethoxy silane (NH₂-MCM-48) has been conducted and used as adsorbent for Zn²⁺ and Ni²⁺ ions from aqueous solution. The mesoporous material was synthesized using a hard-template approach using colloidal silica (Ludox HS40), cetyltrimethylammonium bromide and Triton X-100 under alkaline solution. X-ray diffraction and FT-IR were used to characterize the samples. The ions adsorption on NH₂-MCM-48 were studied at various conditions, such as pH, contact time and initial ions concentrations. The kinetic study was performed using pseudo-first-order and pseudo-second-order models. The adsorption isotherm was examined by Langmuir and Freundlich isotherms. Results showed that optimum contact time for the adsorption of Zn²⁺ was lower than that for Ni²⁺. It was found that the adsorption of both ions followed the pseudo-second-order model with the adsorption rate of 4.56×10^{-2} and 7×10^{-4} for Zn²⁺ and Ni²⁺, respectively. The optimum pH of the adsorption was 6 for Zn²⁺ and 4 for Ni²⁺. The uptake of Zn²⁺ and Ni²⁺ from solutions by NH₂-MCM-48 fixed better the Langmuir than the Freundlich model with the adsorption capacity of 0.55 for the former ion and 0.43 mmole g⁻¹, correspondingly.

Keywords: 3-APTMS, adsorption, heavy metals, mesoporous silica

Design, synthesis, biological activity of extended 1,4-dihydropyridines and their applications as metal sensors

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Iron is the second most abundant metal in the earth's crust in which it mostly exists as ferrous (Fe^{2+}) and ferric (Fe^{3+}) ions. The deficiency of iron leads to severe diseases, however excess iron also causes health and environmental problems. Hence, the determination of iron becomes a necessity to control water contamination and health problems. A water soluble ferric (Fe^{3+}) ion sensor (**C1**) was designed and synthesised using one pot multicomponent Hantzsch synthesis, followed by Cu(I) catalysed "Click reaction". The chemosensor **C1** showed selective binding towards Fe^{3+} ion through turn-off fluorescence response among all the tested metal ions i.e. Ag^+ , Ca^{2+} , Cr^{3+} , Co^{3+} , Cu^{2+} , Fe^{2+} , Hg^{2+} , Mn^{2+} , Ni^{2+} , Pb^{2+} , Zn^{2+} , Cd^{2+} and Na^+ in aqueous medium. This selectivity towards sensing of Fe^{3+} ion was proved by several techniques and experiments. 1,4-Dihydropyridines are well known drugs for the cure of cardio-vascular diseases. Moreover, 1,4-Dihydropyridines and triazoles are well-known precursors for synthesis of biologically active compounds. The calcium channel agonist/antagonist activity of 1,4-dihydropyridine derivatives and anticancer activity/cytotoxicity of 1,4-dihydropyridine linked bis-triazoles will also be discussed.

New developments in enantioselective C-C and C-Heteroatom bond formation through spatial control at remote place

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The relay of electronic effects through a conjugated organic bonding system, such as those in a vinylogous system provides opportunity to achieve transformation at a remote place. In this regard, vinylogous nucleophiles such as 2-silyloxy dienes (acyclic and cyclic) have emerged as powerful synthons. Particularly, 2-silyloxy furans useful in accessing γ -butenolides and γ -lactone frameworks have been extensively explored in the total synthesis of natural products and biologically active molecules. These heterocycles behave as a vinylogous nucleophile and after reaction with carbonyl and carbonyl derived compounds (aldehydes, ketones, aldimines, ketimines, enals, enones, and heteroatom-stabilized carbenium ions) offer a multitude of highly functionalized structures.^{[1],[2],[3]} Also, it grants a synthetic track, where a number of functional group and selected stereochemistry can be established.

In this presentation, a highly diastereo- and enantioselective organo catalytic asymmetric vinylogous Mukaiyama-Michael addition of various silyloxyfurans to enones,^[4] and vinylogous aldol reaction of 2-silyloxyindoles to ketones which proceeds through the bifunctional catalysis,^[5] will be presented. Also vinylogous Mannich reaction of a highly regio- and diastereo- selective TMSOTf promoted synthesis of chiral quaternary 3-aminooxindole butenolides from 2-silyloxy furans and chiral ketimines will be discussed.^[6] I will also discuss a highly regio- and diastereo- selective Lewis acid catalyzed vinylogous Mannich reaction of 2-silyloxyindoles with chiral aldimines and vinylogous nucleophilic substitution reaction with diarylmethanols.^[7]

As an example of C-heteroatom bond formation, through spatial control at remote place, a novel organocatalytic route for the construction of 3-*O*-aryl-3-substituted-2-oxindoles in high yields and excellent enantioselectivities through stereoablative aryloxylation of 3-haloxyindoles will be discussed.

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Cloud point extraction coupled with microwave-assisted back-extraction (CPE-MABE) for determination of Eszopiclone from complex matrices using Uv-Visible, HPLC and mass spectroscopic (MS) techniques: forensic prospective

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A procedure for the determination of Eszopiclone (ESZ) from complex matrices i.e. in vitro (impaled matrices), as well as in vivo (mice model) was developed using cloud point extraction coupled with microwave-assisted back-extraction (CPE-MABE). Analytical measurements have been carried using UV-Visible, HPLC and MS techniques. The proposed method is validated according to ICH guidelines and legitimate reproducible and reliability of protocol has been assessed through intraday and inter-day precision <3.61% and <4.70%, respectively. The coaservate phase in CPE was back extracted under microwaves exposure, with isoctane at pre-concentration factor ~50 when 5 mL of sample solution was pre-concentrated to 0.1 mL. Under optimized conditions i.e. Triton X-114 4% (w/v), pH 4.0, NaCl 4% (w/v) and equilibrium temperature of 45°C for 20 minutes, average extraction recovery has been obtained between 89.8-99.2% and 84.0-99.2% from UV-Visible and HPLC analysis, respectively. The method has been successfully applied to the pharmacokinetic estimation (post intraperitoneal administration) of ESZ in mice. MS analysis precisely depicted racemization of ESZ in mice plasma.

Keywords: cloud point extraction, eszopiclone, forensic, pharmacokinetics, Triton X-114

Design, synthesis of nitrogen heterocycles and their application as bioactive molecules

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By virtue of their presence in drug candidates, natural products and active pharmaceutical ingredients, nitrogen heterocycles are extremely popular targets of synthesis. Various techniques for their synthesis are reported in the literature and many more are being devised. My research focuses on designing, synthesizing and evaluating the biological properties of various nitrogen heterocycles. Herein I will present our effort to develop novel strategies to access spiropyrroloindoles. I will also talk about a novel design strategy to generate new pyridone based anticancer molecules and finally I will present an IBX based oxidative dehydrogenation method of heterocycles to access bioactive heteroarenes.

New thiourea compounds as potential ionophores for metal ion sensor

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Four new thiourea compounds, **1 a – 1d** have been synthesized in good to moderate yields. The compounds were characterized using FTIR, ^1H NMR, ^{13}C NMR, COSY, NOESY, HMQC, MS spectroscopy and Elemental analysis. Their binding properties with various cations were also carried out using UV-vis and ^1H NMR titration experiments. Both compounds exhibited effective binding with Ag^+ , Cu^{2+} , Ni^{2+} , Hg^{2+} , Pb^{2+} and Fe^{3+} in the presence of other cations, such as Na^+ , Co^{2+} , Cd^{2+} , Zn^{2+} , Mn^{2+} , Mg^{2+} , Ca^{2+} , Sn^{2+} , and Al^{3+} . Continuous variation titration experiments were conducted in order to determine the binding behaviour which showed the selective binding ability for certain metal ions in competition to other cations. Stoichiometries of the host and guest complexation were also determined using continuous variation titration experiments and plotting molar-ratio curves. Pearson Product moment method was employed to calculate correlation coefficient, and nonlinear regression equation was put in use to calculate dissociation constant K_d . Molar-ratio and binding constant data substantiated the presence of binding sites for all compounds. The detection limit was evaluated from the slope of fit line curve.

A facile, efficient solvent-free synthesis of 1,3-substituted pyrazoles from acylaziridines and various hydrazines

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We developed a novel, efficient and environmentally benign method for pyrazole synthesis. The reaction uses condensation between acylaziridines and hydrazines followed by an acid catalyzed intramolecular aziridine ring opening then elimination of benzylamine in high yields. No organic solvent is involved in this process except a small amount of phenol as an acid catalyst to provide 1,3-substituted pyrazoles.

Hierarchical MnOx/ZSM-5 as heterogeneous catalysts in conversion of delignified biomass to levulinic acid

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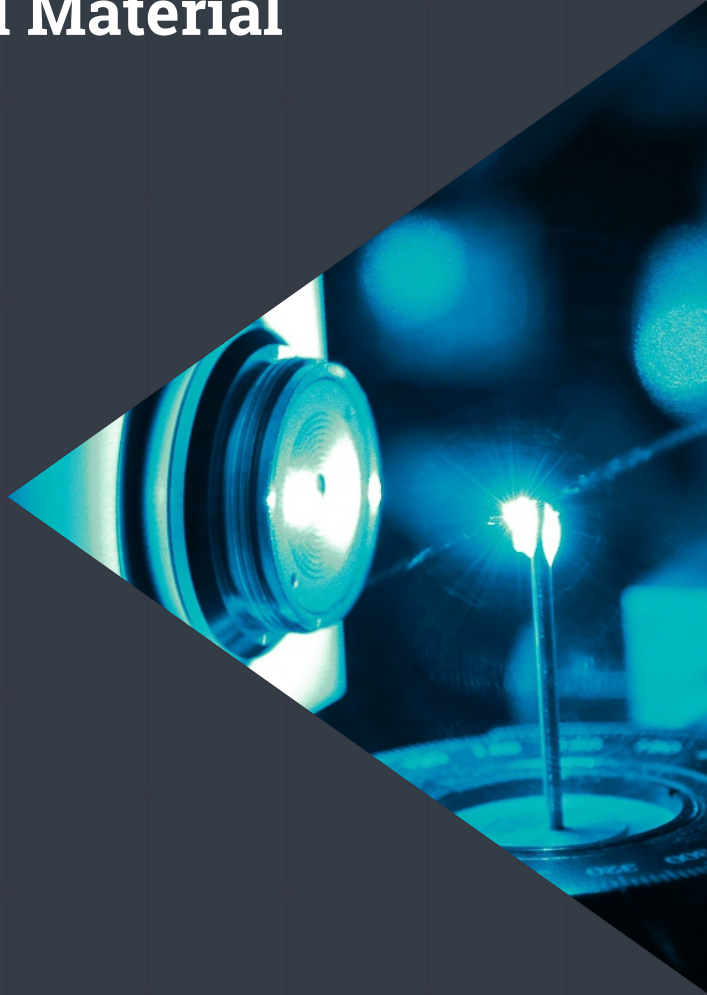
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Hierarchical ZSM-5 zeolite was synthesized using double template method using TPAOH and PDDA as templates, while microporous ZSM-5 was also prepared using only TPAOH as template. The syntheses then were followed by impregnation with Mn(II) c.a. 2 wt% and calcination at 550 °C to obtain Mn/ZSM-5 zeolite catalysts. Extensive characterization of the zeolite catalysts was performed using XRD, FE-SEM, AAS, EDX, FTIR and BET measurement. The characterization showed that hierarchical or mainly mesoporous ZSM-5 was successfully synthesized, having added features compared to the microporous counterpart. The catalysts then were used in conversion reaction of delignified rice husk to levulinic acid, a platform chemical. As comparison, certain amount of MnCl₂.4H₂O was used as homogenous catalyst in similar reaction. The product of the reaction was separated and analysed with HPLC. It shows that conversion with mesoporous Mn/ZSM-5 catalyst gave the highest amount of levulinic acid (%Y of 15.83%), followed by microporous Mn/ZSM-5 (% Y of 13%). The %yield of levulinic acid using homogeneous Mn(II) catalyst (%Y of 9.8%) gave more charcoal as product. Meanwhile, the stability of the zeolite catalysts after reaction has also been investigated, mainly by analyzing the FTIR and EDX of the used catalysts after separated and calcined at 550 °C.

Keywords: biomass conversion, catalyst stability, delignified cellulose, hierarchical ZSM-5, levulinic acid

Asian Network for Natural and Unnatural Material



Development of C-arylcax[4]resorcinarenes and C-arylcax[4]pyrogallolarenes as antioxidant and UV-B protector

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Indonesia is rich with essential oils such as clove leave and anise oils. In respect to explore the potential utilization of these resources, it has been conducted the transformation of vanillin and *p*-hydroxybenzaldehyde respectively derived from clove leave oil and anise oil to a series of C-arylcax[4]resorcinarenes and C-arylcax[4]pyrogallolarene macrocycles. Treatment of these aldehydes with resorcinol in the presence of HCl in absolute ethanol at reflux for 8 hours afforded C-4-hydroxy-3-methoxyphenyl-calix[4]resorcinarene (**3a**) and C-4-methoxyphenyl-calix[4]resorcinarene (**3b**) in good yields. When the aldehydes were treated with pyrogallol under the similar condition, the outcomes were C-4-hydroxy-3-methoxyphenylcalix[4]pyrogallolarene (**3c**) and C-4-methoxyphenylcalix[4]pyrogallolarene (**3d**) which were also obtained in excellent yields. Treatment of these calix[4]resorcinarenes and calix[4]pyrogallolarenes with cinnamoyl chloride in pyridine afforded the corresponding cinnamate esters in high yields. The resulted C-arylcax-[4]resorcinarenes and C-arylcax[4]pyrogallolarenes were subjected to antioxidant activity test using DPPH method and showed strong activity with ES₅₀ values of 15-80 g/mL. In terms of the synthesized calix cinnamates, the compounds showed UV-B absorption with SPF values of 15-30 at concentration of 25 ppm which demonstrate their potential to be applied as UV-B protector.

Keywords: antioxidant, calixresorcinarene, calixpyrogallolarene, UV-B protector

Monoketone curcumin: synthesis and their activity against α -glucosidase

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Natural curcumin has limitation to be used as medicine due to low bioavailability and easily degrade. Based on structural view this is related to the presence of 1,3-diketo and methylene diketo. By eliminating one keto group to yield monoketo curcumin will overcome this weakness. Ten monoketones curcumin had been prepared by keto-aldol condensation of benzaldehyde derivatives with three ketones i.e. acetone, cyclohexanone and cyclopentanone under basic as well as acid catalyst. In general under basic catalyst the yield of products were higher compare to under acid catalyst, moreover when brom introduced to benzaldehyde the yields were lower. Comparing the three ketones, cyclopentanone yielded higher monoketone curcumins. The ten products were assayed the activity against α -glucosidase enzyme and showed that (2E,5E)-2,5-bis(4-hydroxy-3-methoxy)benzylidene)cyclopentanone gave highest inhibition activity (94.30%) while (2E,6E)-2,6-bis(3,4-dimethoxy)benzylidene)cyclohexanone showed the second highest (88,50%) compare to quercetin as standard. So far it was not clear yet to relate the inhibition activity to the specific structure.

Keywords: glucosidase, keto-aldol condensation, monoketone curcumin, quercetin

Biological evaluation of *n*-acetylhydantoin and benzalhydantoins as antibacterial agents

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N-acetylhydantoin and benzalhydantoin derivatives were synthesized and evaluated for antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*, by the paper disc diffusion method. Some compounds showed activity and selectivity against their bacteria such as 1-acetylhydantoins 7 and 5-(benzal)-1-acetylhydantoin 14 demonstrated high activity and selectivity against *S.aureus* and also potential as drug lead compounds.

Keywords: antibacterial, benzalhydantoins, diffusion method, *N*-acetylhydantoin, paper disc

Dissolution enhancement of simvastatin by β -cyclodextrin inclusion complex with freeze drying and co-evaporation method

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Simvastatin, one of the dyslipidemia drugs, has insoluble property in water causing limited dissolution. Therefore, it is necessary to improve its dissolution on inclusion complexes formation. The aims of this study were to characterize and improve dissolution of simvastatin on inclusion complexes formation using β -cyclodextrin by freeze-drying and co-evaporation method, and to analyze the influence of both methods on simvastatin dissolution. The characteristics of inclusion complexes were analyzed using infrared spectroscopy, x-ray diffraction (XRD), UV-Vis spectrophotometry, and thin layer chromatography (TLC), while dissolution test was performed using apparatus I. The evaluation results showed that inclusion complex was characterized by a change in spectrum and its intensity in infrared spectroscopy, a change in diffraction pattern and intensity in XRD, and decreasing retention factor in TLC, but there were no changes in UV-Vis spectrophotometry. The dissolution test result showed that freeze-drying and co-evaporation method could increase simvastatin dissolution. However, the enhancement of simvastatin dissolution using co-evaporation method was higher than using freeze-drying method.

Keywords: β -cyclodextrin, co-evaporation, freeze-drying, inclusion complexes, simvastatin

Toxicity and antimalaria activity of ethyl acetate fraction of Indonesian sponge *Acanthella cavernosa*

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The aims of this research is to examine toxicity and antimalaria activity of ethyl acetate fractions of Indonesian sponge *Acanthella cavernosa*. The isolation was performed by maceration using mixture dichloromethane:methanol. The dichloromethane extract was partitioned in ethyl acetate:water and then separated by column chromatography. Toxicity test was carried out by Brine Shrimp Lethality Test (BSLT) method and *in vitro* antimalarial assay by hematin polymerization inhibition method. The most active fraction in antimalarial assay was analysed by Liquid Chromatography-Mass Spectrometry (LC-MS). The ethyl acetate extract was obtained as a toxic brownish orange solid with LC_{50} value of 0.79 ppm. Separation by column chromatographic gave 7 combined fractions with IC_{50} values ranging from 1,52 to 4,66 mg/mL. The most potent fraction in antimalarial assay (fraction 6 with IC_{50} value of 1.52 mg/mL) had lower IC_{50} value compare to that of chloroquine with IC_{50} value of 2.19 mg/mL. LC-MS analysis indicated that components of the most potent antimalarial fraction are Kalihinol Y, Isokalihinol and Kalihinol F, Kalihinene, 8-hydroxy-kalihinol-F, and Kalihinol G which were found in the sponge *Acanthella cavernosa* from different collection region.

Keywords: *Acanthella cavernosa*, antimalaria, isolation, sponge, toxicity

Substituent effect and in vitro cytotoxicity test of chalcone and flavone derivatives against cervix (HeLa) and colon (WiDr) cancer cells

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Synthesis of chalcone and flavone derivatives and its cytotoxicity against cancer cell lines had been investigated. The chalcone **1a** [2'-hydroxy-4-methoxychalcone], chalcone **1b** [2'-hydroxy-3,4-dimethoxychalcone] and chalcone **1c** [2'-hydroxy-4-chlorochalcone] were prepared by Claisen-Schmidt condensation of 2-hydroxyacetophenone with 4-methoxybenzaldehyde, 3,4-dimethoxybenzaldehyde, and 4-chlorobenzaldehyde. Synthesis of chalcones were carried out by stirring at room temperature for 48 hours using methanol as a solvent and KOH 40% as a catalyst with 85.30, 83.33, and 84.01% yields respectively as yellow solid. Furthermore, oxidative cyclization from chalcones (**1a** - **1c**) with iodine as a catalyst in DMSO resulted flavone **2a** [4'-methoxyflavone], flavone **2b** [3',4'-dimethoxyflavone], and flavone **2c** [4'-chloroflavone] with 83.33, 85.10, and 87.10% yields respectively as pale yellow solid. The cytotoxicity test indicated that chalcone **1c** had good enough activity for inhibiting the growth of HeLa and WiDr cancer cells with IC₅₀ value 44.67 and 41.67 µg/mL respectively. While flavones (**2a** – **2c**) were not active for inhibiting the growth of HeLa with IC₅₀ value more than 100 µg/mL.

Keywords: anticancer activity, chalcone, flavone, HeLa cell lines, WiDr cell lines

Preparation of water repellent layer on glass using hydrophobic compound modified rice hull ash silica

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In this study, water repellent layered glass has been prepared by coating silica (SiO_2) combined with hydrophobic silane compound. Silica (SiO_2) was extracted from rice hull ash and two silane compounds, namely hexadecyltrimethoxysilane (HDTMS) and trimethylchlorosilane (TMCS) were used. Coating was performed through two deposition techniques, i.e. one step (mono-layer) and layer by layer (multi-layer). The technique producing layer with highest hydrophobicity and transparency was used to evaluate the effect of mole ratio of silane to SiO_2 , type of silanes and the layer number on the glass characters. Characterization included hydrophobicity, transparency, surface roughness and stability of coating. Results showed that increasing the mole ratio of silane to SiO_2 and the layer number increased the hydrophobicity of the glass surface. The optimum mole ratio of silane to SiO_2 was 5:1. The significant increase of contact angle occurred at lower mole ratio of silane to SiO_2 , but the stability tends to be increased at higher mole ratio. For HDTMS- SiO_2 layer, the technique of LBL deposition produced a coating with higher hydrophobicity and transparency properties than single-stage one. The LBL deposition technique produced the highest water contact angle of $103.7 \pm 1.3^\circ$ with transmittance of 96%, while for TMCS- SiO_2 later the technique of one stage deposition produced hydrophobic layer with a higher water contact angle of 108.0° and transparency about 94.52%. Prepared hydrophobic glasses were relatively stable in polar and non-polar solvents, but unstable to ambient environmental conditions.

Keywords: hydrophobic, self cleaning, silica, transparent, water repellent

Wet impregnation of copper oxide on Lampung natural zeolite as an adsorbent to produce oxygen-enriched air using PSA technique

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Investigation of an adsorbent to produce oxygen-enriched air was carried out by using copper oxide (CuO) which is impregnated to natural zeolite. The natural zeolite used is from Sidomulyo, South Lampung, Indonesia. It is a clinoptilolite zeolite type, namely Zeolit Alam Lampung (ZAL). Oxygen purification method applied is Pressure Swing Adsorption (PSA) technique. Several variables are varied to get the optimum method to produce the best quality of oxygen, such as size of ZAL (18-100 mesh), CuO loading percentage (0-1%-wt), and the concentration of sulfuric acid (1-3 M). ZAL will be characterized using BET, SEM-EDX, and XRF methods. The oxygen produced will be analysed using GC method. The result showed that ZAL with size 35-60 mesh and prepared using sulfuric acid of 1 M has the most optimum trend of nitrogen adsorption and desorption. It also has the best surface area and micro pore volume to be impregnated, which is $64.37 \text{ m}^2/\text{g}$ and $0.011253 \text{ cm}^3/\text{g}$, respectively.

Keywords: copper oxide, pressure swing adsorption, wet impregnation, zeolite

Cation sensing capabilities of nitrophenyl cinnamaldehyde derivative

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The cationic chemosensor based on organic compound bearing an aminophenol moiety as a receptor for metal analyte and a cinnamaldehyde moiety as chromophoric fragment has been developed. In this work, we report the colorimetric sensing of nitrophenyl cinnamaldehyde derivative towards a variety of metal cations, such as, Cu^{2+} , Fe^{3+} , Ni^{2+} and Zn^{2+} . The cation sensing abilities of the sensor were observed for Cu^{2+} and Fe^{3+} with a colour change from colourless to pink and faint yellow, respectively. The characteristic UV-Vis spectra changes were observed upon addition of Cu^{2+} and Fe^{3+} cations. The hypsochromic absorption spectra shifts were obtained, indicating the cations and sensor complexations had formed. A metal-to-ligand-charge-transfer (MLCT) had occurred and the charge density of the sensor changed resulting in appearance of new absorption peaks in the UV-Vis spectra and color changes of the sensor solution upon addition of the Cu^{2+} and Fe^{3+} .

Keywords: cation sensor, chemosensor, chromophoric fragment, cinnamaldehyde derivative

The hydrolysis of teak and silk wood sawdust to produce reducing sugar

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The leaching of manganese ore by sulphuric acid with the addition of particular reductant has widely been investigated. An alternative reductant which can be used to reduce the manganese ore is sawdust. The sawdust was hydrolysed to obtain reducing sugar. This research was conducted in four stages: water removal, delignification, cellulose hydrolysis and the determination of produced reducing sugar. The teakwood (*Tectona grandis* L.f.) sawdust has 1.65% water content, while silk tree (*Albizia chinensis*) sawdust has 1.75%. Furthermore, the delignification process using 0.1 M NaOH was conducted for 2 hours at 55⁰ C, through which 77.6% of cellulose was obtained for teak sawdust, while silk tree sawdust was 83.0%. Hydrolysis process using 12% H₂SO₄ at 110⁰ C was conducted for 1 hour, through which the 80.41% sugar was obtained for teak wood, while silk tree was 67.4%. The last stage was the determination of the reducing sugar content, which was done by Luff Schrool method. It was found that the soluble glucose reducing sugar in teak sawdust was 49.3684%, while in silk tree sawdust was 40.3681%.

Keywords: delignifation hydrolysis, reducing sugar, sawdust

Physical mixture interaction of acetaminophenol with naringenin

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The interaction of Active Pharmaceutical Ingredient (API) with other compounds will affect drugs stability, toxicity, modified dissolution profiles or may form a new compound with different crystal structure. Acetaminophenol (APAP), the most common drug used widely was mixed with Naringenin (NR) to glance for new phase of interactions leading to new compound phase. The amide-acid supramolecular heterosynthon; N-H...O interaction between acid and the respective base were observed in the APAP / NR mixture blend. The interaction was obtained from the binary interaction from neat grinding and solvent drop grinding techniques. The compounds demonstrate different stoichiometry of binary mixture ratio of APAP / NR at 1:1 mol ratio, 1:2 mol ratio and 2:1 mol ratio. The interaction was estimated using Group Contribution Method (GCM) and physicochemical properties were characterized by Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR), powder X-ray diffraction (PXRD) and Differential Scanning Calorimetry (DSC) analysis. The GCM calculation gave good interaction strength at 212.93 MPa^{1/2}. The, ATR-IR, DSC and PXRD results obtained revealed an interaction with new phase formed.

Keywords: acetaminophenol, intermolecular interaction, naringenin, neat grinding

Modified silica adsorbent from volcanic ash for Cr(VI) anionic removal

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In order to give an added value of the volcanic ash from the active volcanoes standing in Indonesia, as well to provide cheap cationic surfaced adsorbent, and to provide a technology for treatment of wastewater containing toxic anionic metals, in the present research CTAB-modified silica adsorbent from Kelud's volcanic ash has been prepared and examined for removal of the hazardous Cr(VI) anionic. The research was initiated by purification of SiO₂ from the volcanic ash, carried out by reacting the volcanic ash with NaOH powder at 900°C for 2 h, followed by dissolving the ash into water at 100°C, and then acidified with HCl 1M to form hydrogel. By calcination of the hydrogel, silica (SiO₂) gel was obtained. The next step was CTAB-modified silica adsorbent preparation, that was performed by interacting CTAB solution with the gel, in which the concentration of the CTAB was varied. The CTAB-modified silica samples were characterized by using IR, XRD, and SEM machines and tested for adsorption of Cr(VI) anionic in the solution. The results of the research demonstrate that the amorphous silica gel and the amorphous CTAB-modified silica have been obtained. The CTAB-modified silica was found to possess much higher ability in the adsorption of CrO₄⁼ anionic compared to that of the unmodified silica gel. In contrast, the unmodified silica gel was observed to show higher Pb(II) adsorption than the modified silica. These findings strongly prove that the negative surface of the CTAB-modified silica adsorbent has been successfully formed. Furthermore, it is also observed that increasing concentration of CTAB can promote more effective adsorption of the CrO₄⁼, but the further enlargement of the concentration leads to the adsorption decreased, due of to the alteration of the negative silica surfaces.

Keywords: adsorbent, Cr(VI), CTAB, modification, silica, volcanic ash

Comparison of classical and quadratic van der Waals mixing rules in predicting VLE of ethanol +water and CO₂ + ethanol systems using Peng-Robinson EoS

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Recently, supercritical separation using CO₂ to remove ethanol from aqueous solution is paid more attention. To the rational design of such separation technique, knowledge of vapor-liquid equilibria (VLE) for systems consisting of CO₂, ethanol and water is necessary. In this work, The Peng-Robinson equation of state combined with classical and quadratic Van der Waals mixing rules were evaluated in predicting VLE of both systems using temperature dependence and independence of binary interaction parameters. The evaluation was performed by comparing the calculated values with the literature data in the temperature range from 313.15 to 523.15 K, pressure range from 0.01 to 7.17 MPa for ethanol-water system and in the temperature range from 293.15 to 353.15 K, pressure range from 0.68 to 12.3 MPa for CO₂+ ethanol system. The accuracies of the prediction results showed by quadratic mixing rule were found to be better than classical mixing rule. Application of temperature-independent parameters gave comparative VLE prediction results compared with that of temperature-dependent parameters. Peng-Robinson EoS with quadratic and classical mixing rules using temperature-independent parameters gave average absolute deviations (AAD) in pressure of 3.4% and 4.4%, respectively for CO₂+ethanol system and those of 1.3% and 3.6%, respectively for ethanol-water system.

Keywords: CO₂, ethanol, Peng – Robinson EoS, purification, VLE

Synthesis and photoactivity of Fe₃O₄/TiO₂-Co as a magnetically separable visible light responsive photocatalyst

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In order to study the magnetic photocatalyst which is responsive to the visible light, synthesis of Fe₃O₄/TiO₂-Co with characterization and photoactivity examination have been conducted. The study was initiated by the preparation of Fe₃O₄ nanoparticles using coprecipitation method with NaOH as precipitating agent in a mixture of FeCl₃.6H₂O and FeSO₄.7H₂O salts. The Fe₃O₄ nanoparticles were then coated with TiO₂-Co at various ratio of Fe₃O₄:TiO₂ and various concentration of Co(II) dopant. The Fe₃O₄/TiO₂-Co was characterized by FTIR, XRD, TEM, SEM-EDX, VSM and SR UV-visible methods. Photoactivity examination of the Fe₃O₄/TiO₂-Co was carried out using methylene blue as a target molecule in degradation reaction within a batch system. Effect of Co (II) ions concentration on the photocatalytic reaction was evaluated. Moreover, by using optimum conditions, the degradation of methylene blue solution catalyzed by Fe₃O₄/TiO₂-Co was performed under exposure to UV, visible light and dark condition. Results showed that the Fe₃O₄/TiO₂-Co formation was confirmed by the presence of Fe₃O₄ and anatase diffraction peaks in the X-ray diffractogram. SR UV-Vis spectra indicated that the Fe₃O₄/TiO₂-Co was responsive to visible light. Band gap energy (E_g) value of the Fe₃O₄/TiO₂-Co with dopant concentration variation of 1; 5; 10 and 15% were 3.22; 3.12; 3.09 and 2.81 eV, respectively. Photocatalyst performance results showed that methylene blue solution can be well photodegraded at a pH of 10 for 210 minutes' irradiation time. The Fe₃O₄/TiO₂-Co has the highest ability to methylene blue photodegradation in dopant concentration of 10% with the degradation yield was 80.51% and 95.38% under UV and visible irradiation, respectively.

Keywords: Fe₃O₄ /TiO₂-Co, magnetic, methylene blue, photocatalyst, visible light

Effect of reducing agents on physical and chemical properties of silver nanoparticles

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Silver nanoparticles having uniform size and shape, diameter range of 10-50 nm, good stability, and high zeta potential are always desirable for many applications. The silver nanoparticles were synthesized by chemical reduction method using some reducing agents in polyvinyl alcohol solution. This study aims at determining the effect of reducing agents on the chemical and physical properties of silver nanoparticles. Ascorbic acid, sodium borohydride, hydrazine, sodium citrate, and glucose were used as reducing agents. Surface plasmon resonance (SPR) absorbance, morphology, zeta potential, crystal system, and stability of the products were studied. The results show that the chemical and physical properties of the colloidal Ag nanoparticles were dependent on the reducing agents. In general, the produced silver nanoparticles have *fcc* crystal system with unit cell of 4.0906-4.0992 angstrom. The SPR absorbance of the colloids has the peak in the range of 401-433 nm. We found that the colloid of silver nanoparticles prepared by using ascorbic acid has uniform spherical shape, diameter of about 20 nm, and zeta potential of -10.4 mV. After being stored for one month, the SPR absorbance of the colloid decreases by only 5%. This type of colloidal Ag nanoparticles is expected to be used for chemical sensors, antibacterial agent, and so on.

Keywords: reducing agent, silver nanoparticles, SPR, zeta potential

Effect of N-methyl-2-pyrrolidone (NMP) in the coagulation bath via wet phase inversion method

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A semipermeable membrane made of Polyethersulfone (PES) is optimized. This research was conducted to get the optimum composition to manufacture membrane that has good permeability and surface hydrophilicity using wet-phase inversion method. PES with molecular weight of 45000 was used as basic material with Polyethyleneglycol (PEG) and N-Dimethylacetamide (DMAc) as the additive and the solvent, respectively. Coagulation bath was done in gelatinization media composed of pure water by varying concentration of N-Methyl-2-Pyrrolidone (NMP) to 0 wt%, 1 wt%, 3 wt%, 5 wt%, and 7 wt%. Diffusion test showed that addition of NMP at concentration of 7 wt% has increased the water permeability and diffusion coefficient of NaCl molecule by 78.57%. To conclude, adding NMP into coagulation bath would help improve water permeability and antifouling property of PES membrane.

Keywords: CKD, hemodialysis, microfilter, membrane, polyethersulfone, WAK

Synthesis of gold nanoparticles using p-aminobenzoic acid and p-aminosalicylic acid as reducing agent

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Synthesis of gold nanoparticles (AuNPs) by reduction of HAuCl_4 with p-aminobenzoic acid and p-aminosalicylic acid as reducing agents was investigated. This work was conducted to determine the optimum condition of synthesis AuNPs, effect of the hydroxyl groups in p-aminosalicylic acid towards the size, shape and stability of the resulted gold nanoparticles (AuNPs). The optimum condition of synthesis AuNPs was determined by UV/Vis spectrophotometer, the shape and size of AuNPs was determined by Transmission Electron Microscope (TEM). The synthesized was started by reacting HAuCl_4 and the reducing agents in an aqueous solution at 86 °C. The initial gold concentration, reducing agents concentration and pH were changed to get the optimum condition. In the optimum condition, the results showed that p-aminosalicylic acid that has hydroxyl groups have higher reduction ability than p-aminobenzoic acid that haven't hydroxyl groups. Reducing agents which have hydroxyl groups (p-aminosalicylic acid) could produce AuNPs with smaller concentration of HAuCl_4 than p-aminobenzoic acid. Gold nanoparticles that was produced by p-aminosalicylic acid was more stable and smaller particle size than p-aminobenzoic acid.

Keywords: gold nanoparticles, p-aminobenzoic acid, p-aminosalicylic acid

The adsorption of phenol using iron-based mesoporous silica SBA-15

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The iron based mesoporous silica ($\text{Fe}_2\text{O}_3/\text{SBA-15}$) was studied for the first time for adsorption of phenol as a model adsorbate compound. The $\text{Fe}_2\text{O}_3/\text{SBA-15}$ was synthesized from mesoporous silica SBA-15 as the supporting material and $\text{FeNO}_3.9\text{H}_2\text{O}$ as the iron source. The structural and textural properties of the synthesized samples were characterized by means of X-ray diffraction, transmission of microscopy electron, FTIR and element analysis techniques by EDAX. Unit cell parameters of the sample by XRD measurement demonstrated that $\text{Fe}_2\text{O}_3/\text{SBA-15}$ has the high intensity with the large pore of 8,2 nm. The elemental analysis by EDAX showed that the sample containing silica, oxygen, iron and hydrogen of 60, 10, 20, and 10 wt%, respectively. Surface functional groups of iron based mesoporous silica investigated by FTIR show that the sample has sylanol and a hydroxyl group. The isolated Fe_2O_3 particles of which the size is close to the silica pore diameter ($\sim 1\text{-}2$ nm) were obtained homogeneously dispersed within the hexagonal pore structure of the SBA-15 that generated by self-combustion of an impregnated iron source. Adsorption performances of the materials were evaluated with UV-Vis in the case of phenol adsorption. The $\text{Fe}_2\text{O}_3/\text{SBA-15}$ afforded a maximum removal of 57% of phenol at the optimized conditions (adsorbent dose 55 mg, initial concentration of adsorbate 200 mg L^{-1} ; contact time 3,5 h; temperature 33°C). The higher removal capacity of $\text{Fe}_2\text{O}_3/\text{SBA-15}$ is ascribed to its unique structure which composed of iron on the surface of ordered arrays of silica nanopipes separated by ordered arrays of mesoporous channels in a bimodal pore system. Kinetic studies revealed that the sorption process achieved equilibrium within 60 min. Langmuir isotherm best represented the equilibrium adsorption of phenol onto $\text{Fe}_2\text{O}_3/\text{SBA-15}$.

Keywords: adsorption of phenol, iron particle, mesoporous silica SBA-15

Downed-size of montmorillonite nanoparticles by co-precipitation techniques

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Montmorillonite nanoparticles are nano-technology-based products developed at this time. Montmorillonite nanoparticles are used as filler in the fabrication of composite membranes. Our study aims to synthesize nano montmorillonite by co-precipitation method. The synthesis was conducted by mixing montmorillonite with HCl as solvent, NaOH as precipitant, and polysaccharides as a dispersing agent. Polysaccharides used were rice flour mixed with agar powder of concentration 25% (w/w) in montmorillonite. The results of X-ray Diffractometer (XRD) show that the average crystal size of montmorillonite is 108.14 nm while the montmorillonite with the addition of agar powder shows the average of 22.62 nm and the montmorillonite with the addition of rice flour shows the average of 22.31 nm. Analyzing by Particle Size Analyzer (PSA) shows that montmorillonite particle has an average of 1210.59 nm on particle size distribution. The addition of agar powder leads to 278.64 nm in size while the addition of rice flour shows 157.82 nm in size. Characterization of surface morphology of montmorillonite particles, rice flour and agar powder using Scanning Electron Microscopy (SEM) are polygonal, nanoflower, and nanoflake, respectively.

Keywords: co-precipitation, nanomontmorillonite, polysaccharide

Synthesis of patchouli biochar-nanoparticle Cr_2O_3 composite for photodegradation of organic contaminant

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Biochar is a porous carbon black which can be modified with metal/oxide transition metal nanoparticles to improve its performance in adsorption. Those nanoparticles give another chance to treat organic wastewater by decomposition reaction due to the metal/oxide transition metal ability as photocatalyst in degradation reaction of organic substances. In this research, biochar was prepared from patchouli biomass and impregnated using nanoparticle Cr_2O_3 . The biochar was prepared from patchouli biomass using CoCl_2 activator at 450 °C. The biochar was impregnated with CrCl_3 at various concentration (0.1 – 0.9 M) and calcinated at 600 °C to form nanoparticle Cr_2O_3 . FTIR spectra of the composites indicated no effect of CrCl_3 concentration on composites' functional groups. X-ray diffractogram indicated impregnant structure of Cr_2O_3 . TEM image indicated nanoparticle size, and SEM image showed rough morphology. Photodegradation reaction of organic contaminant model (paracetamol) was conducted at sunrise for 3 h. Photodegradation test showed that concentration of 0.9 M gave the highest degradation.

Keywords: biochar, Cr_2O_3 , composite, patchouli biomass, photodegradation

Extracellular biosynthesis of silver nanoparticles using bacteria from silvercraft waste and its antifungal activity

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Biosynthesis of silver nanoparticles (AgNPs) using *Bacillus* sp. (strain BAgBK3) isolated from silvercraft slurry-waste was investigated. The isolate was resistant in a high concentration of silver ion and can transform silver ion to be silver nanoparticles. In present studies the silver nanoparticles were synthesized through the reduction of aqueous silver ion using culture supernatant and evaluate its antifungal properties against *Candida albicans*. The morphology of the synthesized silver nanoparticles (AgNPs) was characterized using Uv-vis spectrophotometry, FTIR and TEM. Biosynthesized AgNPs using culture supernatant has size range 6 - 13 nm. The silver nanoparticles exhibit maximum absorbance at 410 nm in UV-vis spectrum. The AgNPs colloids were also evaluated for their antifungal activities against *Candida albicans* by Nathan's agar well diffusion method. Antifungal properties of AgNP can inhibit *C. albicans* with inhibition zone at 7,5 mm. Thus, the biosynthesis of silver nanoparticles using *Bacillus* sp. culture supernatant deserves to be a good candidate as an anti-candidiasis agent.

Keywords: antifungal, extracellular biosynthesis, silver nanoparticles

Density-functional-theory calculations of formation energy of the nitrogen-doped diamond

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The geometry optimization of the nitrogen-doped diamond is carried out by using the density functional theory (DFT). The substitutional and interstitial nitrogen are simulated to model the defective diamond by using a simple-cubic supercell. Atoms in the supercell are relaxed by allowing them to move so that the atomic forces are less than 5.0×10^{-3} eV/Å. We calculate the formation energy for substitutional and interstitial sites. We find that the formation energy for the substitutional defect is 21.88 eV. We check the convergence of the calculation with respect to the $n \times n \times n$ - Monkhorst-Pack grids ($k_{MP} = n$). We show that the energy difference between $k_{MP} = 4$ and 6 is very small (7.0 meV). We also check the calculations by using a 216-sites supercell and find that the energy difference is 0.10 eV. Thus, the calculations of the formation energy well converge. As for the interstitial defect, we model some possible configurations and find that the smallest formation energy is 21.88 eV. Therefore, the most stable configuration of the nitrogen-doped diamond belongs to the substitutional site.

Keywords: formation energy, N-doped diamond, outward relaxation

Chemometric analysis of FTIR spectra from cultured muscle cells (L6) treated with anti-diabetic metals (V, Mo, W, and Cr)

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Complexes of V(V/IV), Cr(III), W(VI), and Mo(VI), have all been proposed as possible drugs in the treatment of diabetes mellitus. Anti-diabetic activities of V(V/IV), Mo(VI), and W(VI) compounds are likely to be based on similar mechanisms, which involve phosphorylation/dephosphorylation reactions in glucose uptake and metabolism. In order to clearly understand biological activities and phosphorylation/dephosphorylation, the current research involves the use of cultured insulin-sensitive cells treated with these compounds. Comprehensive analyses can be conducted through analysis of FTIR spectra of L6 cells after treatments with V(V/IV), Mo(VI), W(VI), and Cr(III) compounds, and also chemometric analysis of their second derivatives spectra. In the current work, the chemometric analyses were carried out by performing PCA (principal component analysis) and PLSR (partial least square regression). Both PCA and PLSR calculations resulted in complete separation between the spectra from L6 cells in untreated and treated conditions. In addition, the chemometric separation within treatments (control excluded) resulted in the two different groups within treatments. This observation can be related to the differences in the effects of anti-diabetic metals used in this work, V(V/IV), Mo(VI), W(VI), and Cr(III) complexes. As expected, V(V), V(IV), Mo(VI) and W(VI) complexes were grouped together as they have been suggested to have similar mechanism of actions as anti-diabetic drugs, while Cr(III) compound was separated out from other treatments. Overall, chemometric analyses provide objective delineation of the differences between control and treatments with anti-diabetic metal complexes and to determine whether there were any differences not revealed by visual inspection.

Keywords: anti-diabetic drugs, FTIR, PCA, phosphorylation, PLSR

Dye-sensitized solar cell simulation performance using MATLAB

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In this research, we simulate the performance of the Dye -Sensitized Solar Cell (DSSC) using numerical calculations. The simulation is based on differential equation model of photoelectrochemical behavior and values that become factors in the performance of the DSSC. By calculating internal parameters of the DSSC (L , m , D , n_0 , t), we obtained values of short circuit current density (J_{sc}), open circuit voltage (V_{oc}) and the maximum point of the voltage (V_{mp}) and current density (J_{mp}) generated in the DSSC. The results show that the variation of the layer thickness, temperature, solar irradiation, and absorbance coefficient of the photoanode material will affect the performance generated. This is caused by the influence of large photoanode interface producing more electrons thus resulting in a large current density, while the energy difference between the Fermi level of the photoanode and potential energy from electrolyte producing the voltage and resulting in the J-V characteristic curve. This study provides an explanation of the working principle of DSSC physically. Thus with such modeling can be developed to consider the right material for photoanode for DSSC efficiency is higher.

Keywords: DSSC, photovoltaic, simulation performance

Theoretical study of the effect of macrocyclic ring size on the corrosion inhibition efficiency of some crown ether

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The effect of macrocycle ring size on the corrosion inhibition efficiency of dibenzo-12-crown-4 (DB12C4), dibenzo-15-crown-5 (DB15C5), dibenzo-18-crown-6 (DB18C6), dibenzo-21-crown-7 (DB21C7) and dibenzo-24-crown-8 (DB24C8) have been elucidated by mean of density functional calculation at B3LYP/6-31G(d) level of theory in the gas and aqueous environment. The quantum chemical parameters including the frontier orbital energies (E_{HOMO} , E_{LUMO}), ionization potential (I), electron affinity (A), the absolute electronegativity (χ), hardness (η), softness (σ), and the fraction of electron transferred (ΔN) are positively correlated to the corrosion inhibition efficiency (IE%) of the studied crown ethers. The calculation results shows that DB24C8 exhibits the highest inhibition efficiency, whereas DB12C4 substituent exhibits the lowest highest inhibition efficiency. The results of this study will contribute to design crown ethers potential as corrosion inhibitors.

Keywords: crown ether, dibenzo-18-crown-6, corrosion inhibition, substituent, DFT method

QMCF-MD simulation and NBO analysis of K(I) ion in liquid ammonia

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Ab initio of Quantum mechanic charge field molecular dynamic (QMCF-MD) and NBO analysis of solvation of K(I) ion in liquid ammonia has been studied. A Hartree-Fock level of theory was implemented with basis set LANL2DZ ECP for K(I) ion and DZP (Dunning) for ammonia. Structure and dynamical data of simulation was analyzed using RDF, CND, ADF, and MRT, while for first solvation shell ion-ligand interaction was analyzed by NBO. Two region as first and second solvation shell were observed. In first solvation shell at distance 3.7 (Å), K(I) ion was coordinated by four to eight ammonia molecules with dominantly by $K(NH_3)_6^+$ species. Second shell of solvation was ranging between 3.7 Å to 7.3 Å. Within simulation time of 20 ps, frequent exchange process of ligands are observed indicate for a very labile solvation structure. Four mechanism types of ligand exchange between first and second solvation shell are observed. Mean residence time of ligand is less than 2 ps confirming weak in ion-ligand interaction. Evaluation of $K(NH_3)_6^+$ using NBO analysis shows that Wiberg bond Index is less than 0.05 indicating weak electrostatic interaction of K-N.

Keywords: lability, ligand exchange, NBO, QMCF, simulation

The dynamical properties of Cu^+ in liquid ammonia: a quantum mechanical charge field (QMCF) molecular dynamics study

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A quantum mechanical charge field (QMCF) molecular dynamics (MD) has been carried out to describe the structural and dynamical properties of Cu^+ ion in liquid ammonia. The first and second shells were treated by ab initio quantum mechanics at the Hartree-Fock (HF) level with the DZP-dunning basis set for ammonia and LANL2DZ ECP basis set for Cu. The system was equilibrated for 4 ps, then the trajectory data was collected every fifth step for 16 ps at 235.15 K. The structural analysis showed that Cu^+ is solvated by 4 ammonia molecules forming tetrahedral structure with Cu-N bond length of 2.09 Å. Mean residence time of 2.43 ps was observed for the second solvation shell indicating a highly in stable structure of the solvation shell. The obtained structure of the first solvation shell from this simulation is in excellent agreement with experimental data.

Keywords: Cu^+ ion, dynamical, liquid ammonia, QMCF

The simulation of the melt viscosity effect on the rate of solidification in polymer by using ordinary differential numerical methods

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Phase field model has been successfully derived from ordinary metal phase field equation to simulate the behavior of semi-crystalline polymer solidification phenomenon. To derive polymer phase field model, non-conserved phase field equation can be expanded to include the unique polymer parameters which do not exist in metals for example: polymer melt viscosity and diffusion coefficient. In order to expand this model, we include free energy density and non-local free energy density based on Harrowel-Oxtoby and Ginzburg-Landau theorem for polymer. The expansion principle for higher order of binary phase field parameter, was employed to obtain full modified phase field equation. To optimize the final properties of the products, the solidification phenomenon in polymer is very important. Here, we use our modified equation to investigate the effect of melt viscosity on the rate of solidification by employing ordinary differential equation numerical methods. It was found that the rate of solidification is correlated with melt viscosity in complex manner.

Keywords: numerical differential equation, phase field, polymer, solidification

Corn spaghetti quality assessment on increased production capacity

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The heat treatment either before or during the extrusion in the production of non-wheat noodles can produce products with good quality. The objective of this study was to study the quality of extrusion treatment of corn spaghetti produced in increased production capacity. Spaghetti produced from corn and cassava flour using a single screw extruder, 5,5kW drive motor and heater system ceramic band heater 3 kW (3 modules @ 1000 W). The capacities of corn spaghetti production are 6, 12, 18 and 24 kg/day. Corn spaghetti at each capacity analyzed physical and chemical properties are proximate, crude fiber, elongation and cooking loss. Corn spaghetti product quality is relatively stable or unchanged with an increase in production capacity, the elongation 24.45 – 26.65%, cooking loss 5.83 – 8.38%, moisture content 11.52 – 12.79%, ash content 2.2 – 2.54%, protein content 4.71 – 5.25%, fat content 0.15 – 0.23%, carbohydrate 63.74 – 70.21% and crude fiber 1.34 – 1.65%.

Keywords: corn spaghetti, extruder, increased production capacity, quality

Comparative study on properties of the composite edible films: carrageenan-beeswax and chitosan-beeswax

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A novel edible film prepared for local indigenous food was formulated from composite of carrageenan or chitosan with beeswax. The effect of adding beeswax at different percentages, 0.05; 0.10; 0.15; and 0.20% were evaluated through assessment of the physical properties of edible films including thickness, water vapor transmission rate, water absorption, some mechanical properties (tensile strength and elongation) and morphological properties of films. Results showed that adding beeswax tended to increase the film thickness up to 50% and 14.67% for carrageenan-beeswax and chitosan-beeswax composite film respectively. Particularly for the chitosan-beeswax film, increasing beeswax concentration tended to decrease tensile strength and elongation of the film. The highest tensile strength and elongation of carrageenan-beeswax film was obtained with beeswax concentration 0.15 and 0.10%. The WVTR of all composite film decreased with the increase of the concentration of beeswax used. Morphological analysis of surface film showed that adding beeswax caused irregular surface, presence of pores, lipid agglomeration or lipid droplets in the films.

Keywords: beeswax, carrageenan, chitosan, composites, edible film

Preparation and characterization of heat moisture treated sweet potato starch film

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Native starch films have poor mechanical properties and poor gas permeability. Heat moisture treatment (HMT) is a physical modification are used to improve the starch film. The objective of this study was to investigate the characteristics of HMT sweet potato starch films. Sweet potato starch based films produced from native and HMT sweet potato starch with starch concentrations 1%, 1.25% and 1.5%. The films were characterized by moisture content, thickness, tensile strength, elongation, water vapor permeability (WVP), water solubility, morphological properties, thermal properties, and x-ray diffraction. The results showed that HMT sweet potato starch increased thickness, tensile strength, and elongation and decreased solubility and water vapor permeability of films. The longer time of HMT had no effect on characteristics of sweet potato starch films. The moisture content, thickness, WVP, and elongation of films were increased with the increase starch concentration, but the water solubility and tensile strength of films were decreased. Native film had a smoother surface than HMT sweet potato starch film. The HMT sweet potato starch film showed increased crystallinity and thermal stability than native film.

Keywords: film, heat moisture treatment, sweet potato starch

The effect of shot peening duration and steel ball diameter on microstructure, surface roughness, and surface hardness of 316L biomaterial

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Shot peening is a cold working surface treatment method that is used to improve physical and mechanical properties of materials such as microstructure, surface roughness, and surface hardness. Its beneficial effects are mainly due to the residual stress field caused by the plastic deformation on material surface that resulted by multiple impacts of the shot on the peened components that can strongly improves the physical and mechanical properties in different service conditions. The aim of this study is to investigate the effect of shot peening duration and steel ball diameter on microstructure, surface roughness, and surface hardness of 316L stainless steel biomaterial that is widely used as biomedical implant. Shot peening was applied on the surface of 316L by time variations of 5, 10, 20, 30 and 40 minutes. Steel balls with diameter of 0.4, 0.6, and 0.8 mm were used in this process. Working pressure was kept constant at 7 bars and the distance between shot gun (nozzle) and specimen surface at 10 cm. The results showed that the duration and steel ball diameter of shot peening presented a significant modification on the surface morphology. The duration of shot peening can decrease the surface roughness at 40 minutes with 0.4 mm diameter of steel ball and can increase the surface hardness at 40 minutes with 0.4 mm diameter of steel ball.

Keywords: 316L, microstructure, shot peening, surface hardness, surface roughness

Influence of chemical treatments sequence on internal microstructure and crystallinity of sorghum fibres

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Micro-fibrillated cellulose (MFC) derived from natural fibre is continuously gaining interest to produce an environmentally-friendly material, due to economic and ecological reasons. In consequence, sorghum is one of the most-cultivated crops that usually remain the waste as byproduct of bioethanol production. Indeed, it will be a promising area to utilize sorghum waste to produce MFC for enhancing polymer performance, especially in terms of crystallinity. The objective of this study is to investigate the effect of a sequence of chemical modification was applied to sorghum fibres, i.e. alkalization using 4% sodium hydroxide followed by bleaching using 1.7% sodium chlorite plus acetic acid as a buffer. The treatment was purposed to unbundle the lignocellulose networks into microfibrils cellulose with less amorphous part and lower hydrophilic properties. Evaluation of the chemical treatments effect on internal microstructure, crystallinity index and chemical composition of sorghum fibre was measured via Field-Emission Scanning Electron microscope (FE-SEM), X-ray Diffraction (XRD) and Fourier Transformation Infra-Red (FTIR) Spectroscopy. The experiments show that treatments led to a removal of binding materials, such as amorphous parts hemicellulose and lignin, from the sorghum fibres, resulting MFC of sorghum fibres and enhanced crystallinity index from 41.12 % to 75.73%.

Keywords: chemical treatments, crystallinity index, FE-SEM, FTIR, micro-fibrillated cellulose (MFC), sorghum bagasse

A comparative study of characterization on 2D and 3D chitosan/gelatin/silica bio-composite

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Scaffold has an essential role in tissue regeneration, providing the supportive environment during cells growth. The incorporation of inorganic material, such as silica for modification of organic-based scaffold has been extensively studied. Silica is a potential material to improve the properties of chitosan/gelatin scaffold. Particularly, this study was aimed to explore the feasibility of geothermal silica from the unutilized product of geothermal power plant as biomaterial and to develop better fundamental understanding on the fabrication and characterization of both 2D film and 3D scaffold. The 3D scaffolds were prepared by using freeze-drying method. Meanwhile, the 2D films were fabricated by drying at room temperature and ambient pressure. The resulted 2D films and 3D scaffolds were subjected to SEM and FTIR characterization. Furthermore, swelling and degradation test were also performed in this study. The presence of interaction between chitosan/gelatin/silica was recorded by FTIR analysis. While, the SEM analysis shows that interconnected pores were formed by silica addition to the 3D scaffold. The degree of swelling and the degradation rate of bio-composite were showing decreasing trend along with addition of silica. Therefore, silica is a highly potential blend material to control the degradation rate of chitosan/gelatin scaffold.

Keywords: bio-composite, chitosan, gelatin, geothermal silica, scaffold

Preparation of biodegradable film cassava bagasse starch-based reinforced chicken feet gelatine, citric acid as crosslinker, and glycerol as plasticizer

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Biodegradable films is easily degraded so it could overcome problem of plastics usage. Chicken feet is one of source used to make biodegradable films due to inexpensive and abundant availability. Chicken feet contains gelatine amount of 27.61 to 33%. Other materials used in preparation of biofilm were cassava tapioca starch from cassava bagasse, citric acid as cross-linker and glycerol as plasticizer. Cassava bagasse still contains about 40-64% of starch. This study observed the optimum composition of cassava bagasse-based biofilm based on design experiment of Central Composite Design with variables of gelatin, glycerol, and citric acid concentration. This study was executed in several steps, i.e. extraction of gelatine, tapioca starch extraction from cassava bagasse, and casting of biofilm. Optimum condition of the biofilm preparation can be obtained at 12.98% w of gelatine content, 0.22% w of glycerol and 0.27% w of citric acid released 21.73 MPa of tensile strength and 19.73% of elongation at break. Mass loss of biofilm with lower gelatine content given almost the same with that of blank biofilm. Increase of gelatine content affected increase of the mass loss. However, the biofilm given good thermal stability based on thermal gravimetry analysis.

Keywords: biofilm, cassava bagasse starch, chicken feet, gelatine

Taguchi optimization for conversion of n-butanol into 1,1-dibutoxybutane by Fe/activated carbon catalyst

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Conversion of n-butanol into 1,1-dibutoxybutane by using Fe/activated carbon (AC) catalyst has been done. This research was conducted by preparing 60-80 mesh activated carbon from coconut shell charcoal, then activated it at 850 °C for 4 hours using CO₂ gas at flow rate of 10 mL/min. The activated carbon was then washed by acetone and HCl 1.0 M solution. Subsequently, the activated carbon was impregnated with 2% FeCl₃ and reduced for 3 hours at 650 °C using H₂ gas at flow rate of 10 mL/min. The contents of Fe, Ca and Na in the activated carbon were determined using Atomic Absorption Spectroscopy (AAS). Characterization of the catalyst was conducted to determine the acidity of activated carbon and catalyst Fe/AC by gravimetric method using ammonia adsorption. The process of conversion reaction of n-butanol into 1,1-dibutoxybutane was carried out in an electric furnace by varying the temperature of 500, 550, and 600 °C, the mass of catalyst 10, 15, and 20 g, and H₂ gas at flow rate of 5, 10, and 15 mL/min. Variations of experiments were conducted based on Taguchi method and produced nine variations of the experiment. Conversion reaction products were analyzed by FTIR, GC, GC-MS, ¹H-NMR and ¹³C-NMR. The analysis showed that the activated carbon containing impurities such as Fe, Ca and Na metals. Washing activated carbon by acetone and HCl solution decreased the content of Fe, Ca, and Na metals significantly. Activated carbon acidity increased after Fe impregnation, from 6.490 mmol/g to 10.091 mmol/g. The highest conversion of n-butanol into 1,1-dibutoxybutane was 59.51%, based on Taguchi optimization at temperature of 550 °C, mass of catalyst 15 g, and H₂ gas flow rate of 5 mL/min.

Keywords: 1,1-dibutoxybutane, conversion, Fe/AC catalyst, n-butanol, Taguchi optimization

Corrosion inhibition of aluminum alloys friction stirred dissimilar metal welds in 3.5% NaCl solution using polarization resistance and electrochemical impedance spectroscopy (EIS)

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Aluminum alloys AA5083 and AA6061 have been used in marine ship constructions, high speed trains and car body structures. In this study, both the aluminum alloys were joined using friction stir welding (FSW) method. A rotating tool having a cylinder-shaped pin was used with a tool rotating speed of 2280 rpm. The corrosion behaviors of AA5083/AA6061 dissimilar joints in 3.5% NaCl solution containing 0.5% sodium chromate (Na_2CrO_4) and 0.5% sodium molybdate (Na_2MoO_4) inhibitors was analyzed by using polarization resistance and electrochemical impedance spectroscopy (EIS) techniques. Results showed that the EIS spectra of the dissimilar metal welds joints between that of the individual parent materials, e.i. AA5083 and AA6061. Consistent with the EIS result, it was also shown that the corrosion resistance of the weld joints exists between on the parent materials. The additions of chromate inhibitor into 3.5% NaCl solution of FSW weld effectively reduced corrosion rate.

Keywords: chromate, corrosion, dissimilar friction stir welding, EIS, inhibitor, molybdate

The effect of alkaline activator types on strength and microstructural properties of geopolymer from co-combustion residuals of bamboo and kaolin

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Geopolymer as a Portland cement substitute had been synthesized from alkaline activation of co-combustion residuals of bamboo and kaolin. Types of used alkaline activators were NaOH solution, KOH solution, mixture of NaOH solution-water glass, and mixture of KOH solution-water glass. Geopolymer with NaOH solution as activator had compressive strength which was higher compared to geopolymer with KOH solution as activator, but geopolymer with NaOH solution-water glass as activator had compressive strength which was lower compared to geopolymer with KOH solution-water glass as activator either at room temperature curing or at temperature of 60 °C curing. The use of water glass with NaOH or KOH solution as activator could increase compressive strength of geopolymer and yielded geopolymer having more dense and more homogeneous microstructure from SEM micrographs. XRD patterns revealed the presence of sodium aluminosilicate hydrate in geopolymer with NaOH solution and NaOH solution-water glass as activators, and potassium aluminosilicate hydrate in geopolymer with KOH solution and KOH solution-water glass as activators. Furthermore, FTIR spectra indicated asymmetrical vibration of Si(Al)-O at around 1008 cm⁻¹ related to geopolymer product.

Keywords: alkaline activator, bamboo, cement, geopolymer, kaolin

The effect of electricity source from bio-reactor microbial fuel cell to Cr (VI) waste treatment

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Microbial fuel cell (MFC) can be applied not only for producing electricity from organic waste and biomass but also for heavy metal treatment. The objective of this research was to study the effect of pH in cathodic and bacteria concentration in anodic to the amount of electricity production. The amount of electricity production was defined as density power. The various of pH were 3; 4; 5 and bacteria concentrations were 12.5, 15 and 17.5 % (v/v). In this research, double chamber reactor was used, Cr (VI) solution was placed in cathodic chamber and anaerobic bacteria (*Escherichia coli*) was placed in anodic chamber. MFC reactor was batch reactor type, and operated at ambient temperature with 10 Ω external resistor used. The results of this experiment showed the highest Cr (VI) reduction from 16.79 mg L⁻¹ to 0.075 mg L⁻¹ and power density of MFC at 20.41 mW m⁻² and 1.5 mV potential difference was achieved at pH 4 and 15% of bacteria concentration. The maximum COD decreasing in cathodic was 28 - 50% and BOD decreasing in anodic was 89 - 95%

Keywords: *Escherichia coli*, bioelectrical reactor, chromium hexavalent, MFC

Tofu industrial wastewater treatment with ozonation and adsorption method using natural zeolite

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Tofu industrial wastewater is usually disposed directly without undergo waste treatment so that would endanger the environment. The number of BOD, COD, and TSS in tofu industrial wastewater is high and exceed maximum number of BOD, COD, and TSS number that determined by government that is 100 - 150 mg/L, 150 - 300 mg/L, and 100 – 200 mg/L respectively. Ozonation and adsorption method are well known method that able to degrade organic and inorganic compounds in wastewater effectively. In addition, adding adsorption to this process can also increase hydroxyl radical production that have ability to oxidize organic compounds quickly. In this research, the removal of BOD, COD, and TSS in tofu industrial wastewater was examined by ozonation method, adsorption method using natural zeolite, and combination of them. Before the treatment, the sample was filtered to remove large particles. The sample then will be flowed into the packed bed column containing natural zeolite and using ozone with the processing time in 60 minutes. The method effectiveness was evaluated from percentage of BOD, COD, and TSS degradation, amount of dissolved and off gas ozone, and amount of hydroxyl radicals that formed by varying the dosage of ozone and amount of natural zeolite (50 g, 75 g, and 100 g). The result shown that formation of hydroxyl radicals in combination method with 100 g natural zeolite (2.75 mg/L) had greater value that ozone method (1.78 mg/L) in 60 minutes and the BOD, COD, and also TSS number become significantly lower.

Keywords: adsorption method, ozonation method, tofu industrial wastewater, zeolite

Synthesis and application of Fe₃O₄/SiO₂/TiO₂ nanocomposite as photocatalyst in CO₂ indirect reduction to produce methanol fuel

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Synthesis of Fe₃O₄/SiO₂/TiO₂ nanocomposite and its application as photocatalyst in CO₂ indirect reduction had been conducted. Magnetite preparation was carried out by sono-coprecipitation method. The deposition of SiO₂ and TiO₂ were performed by sol-gel method under ultrasonic irradiation. All material products were characterized by X-ray diffraction (XRD), Fourier transform infra-red spectrophotometry (FT-IR), and transmission electron microscopy (TEM). The final material product was also analysed by specular reflectance UV-Visible (SR-UV-Vis) and turbidimetry. The product of indirect reduction was analysed by gas chromatography – mass spectrometry (GC-MS). The XRD diffractogram and FT-IR spectra confirmed the presence of Fe₃O₄, SiO₂, and anatase phase of TiO₂. The TEM image revealed the presence of nanocomposite with core-shell structure. The SR-UV-Vis spectrum was used to determine band gap energy of the photocatalyst and it gave a result of 3.22 eV. Turbidimetry was aimed to measure the magnetic recoverability of final material and it gave a good magnetic recoverability. The GC chromatogram of indirect reduction product indicated four major fractions. The MS spectra showed that four major fractions were methanol, formaldehyde, formic acid, and CO₂. GC-MS result revealed that CO₂ indirect reduction gives 73.91% conversion of CO₂ and 40.66% selective to methanol.

Keywords: Fe₃O₄/SiO₂/TiO₂, indirect reduction, methanol fuel, nanocomposite, photocatalyst

Transesterification of used cooking oil using CaO/MCM-41 catalyst synthesized from lapindo mud by sonochemical method

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Transesterification of waste cooking oil using CaO/MCM-41 synthesized from lapindo mud by sonochemical method has been carried out. The silica was separated from the mud by reflux method. The silica was then analyzed by XRF and used as silica source in MCM-41 synthesis. The synthesis of MCM-41 was carried out by sonochemical method, then analyzed by XRD, FT-IR, SAA, and TEM. The Ca²⁺ was loaded onto the MCM-41 by wet impregnation method under variation of Ca²⁺ content of 1.15, 1.29, 2.39, and 3.25 wt.% analyzed by ICP produced CaO(1), CaO(2), CaO(3), and CaO(4)/MCM-41 catalyst respectively. Transesterification of used cooking oil was carried out under methanol/oil mole ratio of 15, temperature of 55, 65 and 75 °C, and catalyst/oil weight ratio of 5/100,10/100 and 15/100 for 2 h. The XRD analysis of the MCM-41 showed characteristic peak at $2\theta = 2-5^\circ$. The MCM-41 has specific surface area of 1290 m²/g and pore diameter of 3.4 nm. The TEM images of MCM-41 showed ordered pore distribution with a hexagonal shape. The highest conversion of methyl ester was 78.17 wt.% obtained under the reaction conditions at 65 °C and catalyst/oil weight ratio of 15/100 using the CaO(4)/MCM-41. The life-time CaO(4)/MCM-41 catalyst was 9.8h.

Keywords: CaO/MCM-41, lapindo mud, MCM-41, sonochemical, transesterification

The addition of n-butanol in ethanol-isooctane mixture to reduce vapor pressure of oxygenated-gasoline blend

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In this work, vapor pressure of binary systems for isooctane + ethanol, isooctane + n-butanol and ethanol + n-butanol and ternary system for isooctane + ethanol + n-butanol were measured in the temperature range from 313.15 to 318.15 K using the inclined ebulliometer. The experimental results show that the existence of n-butanol in isooctane decreases the vapor pressure of mixture, while increasing n-butanol fraction in ternary isooctane-ethanol-n-butanol mixture decreases vapor pressure of mixture. Experimental data for binary systems studied were correlated with Wilson, NRTL and UNIQUAC model with average relative deviation (ARD) of 3.5%. The optimized binary parameter pairs obtained in this work were used to estimate the ternary system. The Wilson model give the best performance for estimation of ternary system with ARD of 6.1%.

Keywords: ethanol, gasoline, isooctane, n-butanol, vapor pressure

Residue oil desulfurization using oxidation and extraction method

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This study has successfully improve the performance of oxidative desulfurization method to reduce sulfur content from residue oil (condensate) with modifications in oxidation and extraction step that repeated for several stages. Residue oil used in this study contain 386.26 ppm of initial sulfur content. In oxidation process, H₂O₂ oxidizer and acid as catalyst are used within range temperature and time of 30 °C - 60 °C and 30 - 120 minutes. In extraction process, various alcohol solvent (methanol, ethanol and propanol) is used with temperature of 30 °C in 30 minutes for every residue oil ratio to solvent (v/v). The best reducing sulfur result achieved is 35.94 ppm or 90.7 % desulfurization. This result was achieved after 4 recursive extractions. This study has successfully reduce sulfur content in residue oil to meet international standard (< 50 ppm).

Keywords: extraction, oxidation, oxidative desulfurization, residue oil

Combination of ozonation and adsorption using granular activated carbon (GAC) for tofu industry wastewater treatment

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Tofu industry wastewater is one of environment pollutant that needed more effective treatment. Ozonation and adsorption method are known of having the capability to oxidize organic compound in wastewater. Adsorption is done by using granular activated carbon (GAC) as adsorbent to increase tofu wastewater degradation process by adsorbing organic materials and increasing production of hydroxyl radical, the main oxidator agent. This research is carried out to evaluate the performance of ozonation, adsorption, and combination of both in processing tofu wastewater. To get the optimal condition, variations are done for the dosage of ozone; 60, 112, and 157 mg/h, and amount of GAC used; 50, 75, and 100 grams. Parameters of the process are organic substances of tofu wastewater such as COD, BOD, TSS, and pH. Other parameters taken are amount of dissolved ozone and off gas ozone. The measurement are done using spectrophotometry colorimetric, and pH meter. The outcome of this research aim to provide alternative method in liquid waste treatment of tofu industry and the processed wastewater to meet the environmental quality standards. Combination of ozonation and adsorption able to removed 1508,48 mg/L COD and 26 mg/L of TSS.

Keywords: chemical oxygen demand, granular activated carbon, ozone, tofu wastewater, total suspended solid

Ambient air monitoring of nitrogen dioxide at Kalimati, Tirtomartani, Kalasan, Sleman, Yogyakarta

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Nitrogen dioxide (NO₂) is one of parameters in air quality respected to Indonesia Government No. 41/1999. NO₂ has influence in respiratory problem of human being if it exceeds threshold level (400 µgNO₂/Nm³). This study is air monitoring of NO₂ concentration in ambient air and it uses a Griess-Saltzman method using the spectrophotometer (Indonesia Standard SNI 19-7119.2-2005). The sampling location has two points at Kalimati Village, Tirtomartani, Kalasan, Sleman, D.I Yogyakarta. On December 2016, the results show which NO₂ concentration is below threshold level with 0,469 µg NO₂/Nm³ at first point and 0,234 µg NO₂/Nm³ at second point.

Keywords: ambient air monitoring, Griess-Saltzman, Kalimati, nitrogen oxide

Synthesis and characterization of lignin-based polyurethane as a potential compatibilizer

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Lignin is one of the most abundant biopolymer on earth. It has polarity and non-polarity side due to its hyperbranched structure, but the polarity of lignin has a higher tendency than non-polarity. Lignin has potential to be compatibilizing agent if the portion of non-polarity can be increased. This research is focused on investigation of synthesize lignin-based polyurethane to enhance the portion of non-polarity in lignin. Lignin-based polyurethane was prepared by reacting 4,4'-Methylenebis (Cyclohexyl Isocyanate) (HMDI) and polyethylene glycol (PEG) with variation molar mass, then lignin was added to the reaction. In this study, the structure of lignin-based polyurethane was confirmed by nuclear magnetic resonance spectroscopy (NMR) and fourier transform infrared spectroscopy (FTIR). NMR and FTIR showed that lignin successfully grafted. NMR, also used to investigated the effects of variation molar mass of PEG and isocyanate contents to polarity of lignin-based polyurethane. The polarity of lignin-based polyurethane decrease as the composition and molecular weight of PEG increase. Thermal properties of lignin-based polyurethane also investigate using simultaneous thermal analysis (STA). The result was the increasing of thermal degradation of lignin-based polyurethane as well as the composition of HMDI.

Keywords: lignin, polyurethane, synthesis

An efficient synthesis of bromo substituted 1,3,6-trihydroxyxanthone and their anticancer activity

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The synthesis of bromo-substituted 1,3,6-trihydroxyxanthone had been carried out through two pathways i.e. bromination before and after formation of the xanthone ring using bromine in acetic acid. The first route was bromination after formation of 1,3,6-trihydroxyxanthone, which was afforded as yellowish solid (81%) (dec at 322-323 °C) from the reaction of recorcylic acid with phloroglucinol in Eaton's reagent at 80 °C for 3 h. The bromo-substituted xanthone obtained from this route was 4,5-dibromo-1,3,6-trihydroxyxanthone as a red solid in yield of 57.5%. The second route involved bromination of 2,4-dihydroxybenzoic acid to produce 5-bromo-2,4-dihydroxybenzoic acid as a white solid in 73.8% (m.p. 188 – 189 °C). The acid was then mixed with phluoroglucinol and Eaton's reagent and refluxed for 3 h to afford 7-bromo 1,3,6-trihydroxyxanthone in 52.5% as a yellow solid. This study revealed that modification of reaction pathways leads to the different position and also number of the bromide attached in xanthone derivatives. Anticancer assay of the two prepared compounds, 4,5-dibromo-1,3,6-trihydroxyxanthone and 7-bromo 1,3,6-trihydroxyxanthone, against murine leukemia P388 cell showed strong activity with IC₅₀ values of 2.550 and 3.455 µg/mL respectively.

Keywords: 1,3,6-trihydroxyxanthone, bromination, Eaton's reagent

1-(*N*)-benzyl-substituted-1,10-phenanthroline bromide salts: access from wintergreen oil and vanillin

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This study describes simple synthetic method to prepare two new 1-(*N*)-benzyl-substituted-1,10-phenanthroline bromide salts. The salts were synthesized from wintergreen oil (methyl salicylate) and vanillin in four steps comprising alkylation, reduction, halogenations and bimolecular nucleophilic substitution reactions. The products were characterized by means of ¹H-NMR, GC-MS and FT-IR spectrometers.

Keywords: 1-(*N*)-benzyl-substituted-1,10-phenanthroline bromide salts, wintergreen oil, vanillin

Synthesis of chalcone derivatives and their in vitro anticancer test against breast (T47D) and colon (WiDr) cancer cell line

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The synthesis of chalcone derivatives as target compounds and anticancer test against breast (T47D) and colon (WiDr) cell line had been performed. The stepwise of synthesis was performed by Claisen-Schmidt condensation used acetophenone and benzaldehyde derivatives. The anticancer activity of chalcone derivatives was carried out by MTT assay against T47D and WiDr cell line. The first step of synthesis was started by reacting 4-hydroxyacetophenone and benzaldehyde derivatives such as 4-anisaldehyde (chalcone **A** [4'-hydroxy-4-methoxychalcone]), veratraldehyde (chalcone **B** [4'-hydroxy-3,4-dimethoxychalcone]), 4-chlorobenzaldehyde (chalcone **C** [4'-hydroxy-4-chlorochalcone]) and 2,4-dihydroxyacetophenone with 4-chlorobenzaldehyde (chalcone **D** [2',4'-dihydroxy-4-chlorochalcone]) in methanol as solvent. The synthesis was carried out in base condition (KOH) by stirring for 48 h at room temperature (RT). The structures of products were identified by using FTIR, GC-MS, ¹H- and ¹³C-NMR. Furthermore, the activity of chalcone derivatives was tested against T47D and WiDr cell line by using MTT Assay. The results show that the chalcone derivatives (**A-D**) were yielded in 96.1; 96.5; 96.2; and 92.7% respectively as yellow solid. The anticancer test indicated that the chalcone **D** was the most active as breast anticancer with IC₅₀ 42.66 µg/mL and the chalcone **C** was the most active as colon anticancer with IC₅₀ 20.42 µg/mL.

Keywords: anticancer, breast cancer, chalcone derivatives, colon cancer

Self and cross metathesis of methyl oleate with 4-vinyl-1,3-dioxolan-2-one by 2nd Grubbs and Hoveyda-Grubbs catalyst

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The self and cross-metathesis of methyl oleate (MO) and 4-vinyl-1,3-dioxolan-2-one (4VDO) were studied to find for the optimise condition by suppressing the side reactions to achieve high conversion and yields. All the four targeted products, dec-1-ene, methyl dec-9-enoate, 4-(dec-1-en-1-yl)-1,3-dioxolan-2-one and methyl 10-(2-oxo-1,3-dioxolan-4-yl)dec-9-enoate were detected and analysed by both GC-FID and GC-MS spectrometer. The side products were from the concurrent metathesis reaction known as homodimers resulting from the self-metathesis of starting material. The suppression method was successful to improve the selectivity of the targeted products.

Keywords: 2nd generation Grubbs, metathesis, methyl oleate

Utilization of sodium lignosulfonate/chitosan for enhanced oil recovery

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Enhanced oil recovery is a special method of extracting crude oil after the primary and secondary methods fail to extract the oil from the reservoir rock. One of these methods is by using chemical flooding. In this study, sodium lignosulfonate (SLS) solution added by chitosan was applied. SLS can reduce interfacial tension in the oil-water interface, while chitosan is predicted to reduce the oil-water interfacial tension as well as to increase solution viscosity. The research was carried out by dissolving SLS 1% of weight to salt solution, added by chitosan diluted by 0.1 M acetic acid. The concentration of chitosan was varied. The mass ratio of SLS:chitosan was 2:1. The Inter Facial Tention (IFT) of the solution was measured, while the viscosity of solution was also measured using Ostwald Viscosity (ASTM D445). The experimental results showed that the addition of chitosan on SLS solution can reduce the interfacial tension to be 1/5 of the one without chitosan. It was also observed that the viscosity increases as well. However, excess addition of chitosan causes precipitation to occur. Laboratory test showed that flooding with the formulated mixture can extract more oil than the one of SLS solution flooding.

Keywords: chemical flooding, crude oil, enhanced oil recovery, IFT, lifted, reservoir, SLS, surface tension, oil-water

Modification of sweet potato flour (*Ipomea batatas* L.) using steam explosion

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Dextrin produced from starch hydrolysis process of local tubers such as sweet potato can be applied for encapsulation process. However, a shortage of sweet potato flour in application as dextrin is not soluble in cold water, so it needs to be modified. Steam explosion is an alternative physical modification due to low energy consumption, low use of chemicals, and environmentally friendly. The purpose of this study was to arrange a method which is appropriate in the use of steam explosion on sweet potato flour to obtain modified flour with higher solubility. The first phase of this research is to develop methods and treatment variations to produce modified sweet potato flour based on the optimum conditions of the data obtained from the literature and preliminary research. Next, production of modified sweet potato flour with treatment variations of temperature and acidity in the process of steam explosion, and then analyze solubility, hygroscopicity, color, particle size, and the FTIR spectrum. Modified sweet potato flour with the best solubility was obtained from the acid treatment with temperature of 160°C, which has a specifications for solubility 25.28%; hygroscopicity at 96% RH 21.29%; the color is brown with ΔE 25.02; particle size 3-5 μ m; and no additional or reduction of functional groups compared to control sweet potato flour on the results of the FTIR spectra.

Keywords: acid, autohydrolysis, modification, solubility, steam explosion, sweet potato flour

Response surface methodology (RSM) on
the synthesis of carboxymethyl cellulose (CMC) from
jack bean hull (*Canavalia enciformis* L (DC)):
variation of NaOH concentration and NaMCA addition

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Jack bean hull (*Canavalia enciformis* L (DC)) is by- product from jack bean, rich in cellulose. *Carboxymethyl Cellulose* (CMC) is one of cellulose derivatives which widely used in food industries. The objectives of the study were to study the effect of NaOH concentration and NaMCA addition in the synthesis of CMC from jack bean hull cellulose, to determine the optimum condition of synthesis CMC from jack bean hull cellulose and to study the characteristic of obtained CMC. Synthesis of Carboxymethyl cellulose from jack bean hull cellulose was conducted in various NaOH concentration of 7.93%, 10%, 15%, 20%, 22,07% and various NaMCA addition of 3.58 g, 4 g, 5 g, 6 g, 6.41 g. Response Surface Methodology (RSM) was used to determine the optimum condition. CMC from the optimum region then characterized its degree of substitution (DS), yield, viscosity, lightness, purity, pH, moisture content, water holding capacity (WHC), Oil Holding Capacity (OHC), functional groups and crystallinity. From the study, the increase of NaOH concentration and NaMCA addition gave the increase of DS until the certain point and then decrease gradually with the further increase of NaOH concentration and NaMCA addition. The optimum condition of synthesis CMC from jack bean hull cellulose was obtained from NaOH 15% and NaMCA 4.77 g with the characteristic of obtained CMC were DS 0,75, moisture content 12.55%, Viscosity 120.5 cps, purity 99.7%, WHC 24.91 g water/ g sample, OHC 5.12 g oil/g sample, pH 7.21, Lightness 92.70 and can be categorised as CMC food grade.

Keywords: cellulose, CMC, jack bean hull, RSM

Cassava (*Manihot esculenta*) starch modification by steam explosion

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Cassavas (*Manihot esculenta*) is a tuber that the amount are abundant in Indonesia and have high contain of starch. Native cassava starch extracted from cassava, which also called tapioca, is inherently unsuitable in industrial applications, and therefore must be modified. The objectives of this study were to investigate the feasibility of Steam Explosion (SE) to modify the cassava starch and also to find the best processing conditions of SE. Neutral water and acetic acid (pH 4), sample:solvent ratio (1:18; 1:10; 1:12), and steam temperature (140°C; 150°C;160°C) were used as the variables. The solubility, hygroscopicity, color, and particle size of powdery SE modified cassava starch were analyzed. The best sample obtained from SE treatment was analyzed by FTIR spectrometry to differentiate its functional group with untreated cassava starch. The use of neutral water, sample:solvent ratio (1:10) and 150°C of steam temperature produced the best SE modified cassava starch with 80.37% solubility, 21.21 % hygroscopicity, and color parameter ($L=73.49$, $a=8.34$, $b=7.60$, $\Delta E=17.93$). SE caused the reduction of cassava starch's particle size that ranged from 3.78 – 6.05 μm . In addition, by the FTIR spectra qualitative analysis, SE treatment probably did not cause the functional group of cassava starch changed, but probably reduce the C-O-C bonds and increase the C-O-H bonds related to the hydrolysis effect of cassava starch by the autohydrolysis using steam explosion.

Keywords: *Manihot esculenta*, cassava starch, modified starch, steam explosion

Metal oxide supported vanadium substituted Keggin type polyoxometalates as catalyst for oxidation of dibenzothiophene

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Supported polyoxometalate $H_4[\gamma-H_2SiV_2W_{10}O_{40}] \cdot nH_2O$ with metal oxide i.e. silica, titanium, and tantalum was successfully synthesized via wet impregnation method to form $H_4[\gamma-H_2SiV_2W_{10}O_{40}] \cdot nH_2O-Si$, $H_4[\gamma-H_2SiV_2W_{10}O_{40}] \cdot nH_2O-Ti$, and $H_4[\gamma-H_2SiV_2W_{10}O_{40}] \cdot nH_2O-Ta$. Characterization was performed using FTIR spectroscopy, X-Ray analyses, and morphology analyses using SEM. All compounds were used as the catalyst for desulfurization of dibenzothiophene (DBT). Silica and titanium supported polyoxometalate $H_4[\gamma-H_2SiV_2W_{10}O_{40}] \cdot nH_2O$ better than tantalum due to retaining crystallinity after impregnation process. On the other hand, compound $H_4[\gamma-H_2SiV_2W_{10}O_{40}] \cdot nH_2O-Ta$ showed high catalytic activity than other supported metal oxides for desulfurization of DBT. Optimization desulfurization process resulted in 99% conversion of DBT under a mild condition at 70 °C, 0.1 g catalyst, and reaction for 3 hours. Regeneration studies showed catalyst $H_4[\gamma-H_2SiV_2W_{10}O_{40}] \cdot nH_2O-Ti$ was remaining catalytic activity for desulfurization of DBT.

Keywords: dibenzothiophene, keggin type polyoxometalate, metal oxide, vanadium

Hydrocracking of α -cellulose using Co, Ni, and Pd supported on mordenite catalyst

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Hydrocracking of α -cellulose has been conducted in a semi-batch reactor at 400, 450, and 500 °C with hydrogen flow (30 mL/min) for 4h. Mordenite and metal supported (Co, Ni, Pd) on mordenite were used as solid catalysts. The catalysts were characterized using X-ray Diffraction (XRD), Fourier Transform Infrared (FTIR), and Scanning Electron Microscope (SEM) to evaluate the physiochemical properties. Energy Dispersive Spectroscopy (EDS) and Inductively Coupled Plasma (ICP) were used to analyse the total amount of metal impregnated in a catalyst. The liquid products were analyzed using Gas Chromatography-Mass Spectroscopy (GC-MS). Thermal hydrocracking was also conducted at 450 °C with the total amount of liquid product was 28.87 wt. %. The total liquid produced by mordenite catalyst was 70.59 wt. % at 450 °C and the highest liquid conversion (74.93 wt. %) was reached by Pd/MOR catalyst at 400 °C.

Keywords: α -cellulose, hydrocracking, mordenite

Natural dye extraction from sappanwood (*Caesalpinia sappan L*): evaluation on optimum conditions and extractor design parameters

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Natural dyes for food coloring, such as flavonoid, beta carotene, and chlorophyll have antioxidant and antitoxin characteristics. Therefore, food coloring technology not only increases the aesthetic aspect but also give a lot of benefits. The objective of the present research is the production of natural dye for food from sappanwood. Hence, the usage of hazardous synthetic dyes can be minimized, increasing natural resources utilization as well as the country's foreign exchange, and supporting Indonesia as a natural dye producer so it can reduce the dependence of chemical import. The specific objectives of the research are: 1) To identify the optimum condition of natural dye extraction from sappanwood, 2) To determine the value of extractor's design parameters which are consist of the effective diffusivity, equilibrium constant, interphase mass transfer coefficient, and the empirical equation of the interphase mass transfer coefficient and the affected parameter. The leaching was conducted in a three-neck round-bottom flask with an additional agitator. The leaching process was conducted with varying the extraction time, solute type, temperature, solid-liquid mass ratio, and the mixing rpm. The values of extractor design parameter of mixer tank consist of effective diffusivity, interphase mass transfer coefficient, and equilibrium constant. From the experimental results, it can be concluded that: 1) The optimum time of natural dye extraction from sappanwood was around 60 minutes, 2) The extraction of natural dye from sappanwood at commercial scale is recommended to use water as the solvent, 3) The optimum ratio of solvent and solute for natural dye extraction from sappanwood is in the range of 0.001 g/ml dan 0.002 g/ml, 4) The optimum mixing velocity for the extraction is 300 rpm, 5) The effective diffusivity value of brazilin in sappanwood (D_e) is $5.69 \times 10^{-3} \text{ cm}^2/\text{minute}$, and 6) The value of equilibrium constant (H) is $1.19 \times 10^{-2} \text{ cm}^3/\text{g solvent}$.

Keywords: design parameter, leaching, natural dye, optimum condition, sappanwood

Sequential condensation and hydrodeoxygenation reaction of furfural-acetone adduct over mix catalyts Ni/SiO₂ and Cu/SiO₂ in water

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Sequential condensation and hydrogenation reaction were perform using autoclave batch reactor in the presence of water as a solvent. The condensation of furfural performed first using MgO catalyts followed by hydrogenation using mix catalyts Ni/SiO₂ and Cu/SiO₂. The catalyts was prepared by wet-impregnation method and analysed by XRD, SEM-EDX as well as BET surface. Condensation of furfural and acetone in 1:2 mol ratio was carried by reflux gave 4-(2-furyl)-3-buten-2-one and 1,5-bis-(2-furanyl)-1,4-pentadien-3-one. The product was then subjected for hydrodeoxygenation reaction using batch reactor, catalysed by mixed Ni/SiO₂-Cu/SiO₂ at 150°C and 180°C for 2 hours. The product identified as alkane with the conversion at 38.83% and 50.35%, respectively. The selectivity of hydrocarbon is 61.39% at 150°C and 16.55% at 180°C. Increasing the reaction temperature to 200°C didn't give any products except the recovery of the precursor. It showed that higher temperature enhanced the catalyts activity but the selectivity is controlled by low temperature.

Keywords: catalyts, condensation, furfural, hydrodeoxygenation, liquid phase

Hybrid of magnetite and Zn/Al layered double hydroxide (Fe₃O₄-Zn/Al LDH) for humic acid removal

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Hybrid of magnetite and Zn/Al layered double hydroxide (Fe₃O₄-Zn/Al LDH) has been synthesized through coprecipitation method using NaOH as precipitating agent and the as-synthesized hybrid material was applied as adsorbent to remove humic acid (HA) in aqueous solution. Since the pH_{PZC} of Fe₃O₄-Zn/Al LDH was 5.0 and the HA removal was optimum at pH 4.0, so the removal of HA was mainly based on the attraction of negatively charged carboxyl groups of HA on the positively charged Zn/Al LDH. The presence of well dispersed Fe₃O₄ within the lamellar structure of Zn/Al LDH made the Fe₃O₄-Zn/Al LDH magnetically active and hence the separation of the hybrid material from the aqueous medium could be done easily by using an external magnetic field. At optimum condition, the removal rate constant (k) according to the pseudo second order kinetic model was $1.52 \times 10^{-3} \text{ g mg}^{-1} \text{ min}^{-1}$ and the removal capacity (q_{max}) according to Langmuir isotherm model was 35.21 mg g⁻¹.

Keywords: Adsorbent, coprecipitation, humic acid, magnetit, Zn/Al layered double hydroxide

Extraction of essential oil from agarwood (*Aquilaria malaccensis*) using microwave hydrodistillation method

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Production of agarwood (*Aquilaria malaccensis*) oil still potential to be developed in Indonesia. Agarwood oil is one of commodity that provides an important role for the country's foreign exchange earnings because the selling price is very high. However extraction of agarwood oil is currently still using the conventional method such as hydrodistillation which takes a long time to produce oil with good quality. In this research the extraction of agarwood oil is done using microwave hydrodistillation method. The optimum yield in the extraction of agarwood oil using microwave hydrodistillation method is 1.1541%. The optimum yield is obtained on the feed to solvent (F/S) ratio of 0.4 g/mL. In the extraction of agarwood oil using microwave hydrodistillation method is performed first-order and second-order kinetics modelling. Based on kinetics modeling that has been done, it can be said that the second-order kinetic model ($R^2 = 0.9927$) can be better represent experimental results of extraction of agarwood oil that using the microwave hydrodistillation method when compared with the first-order kinetic model ($R^2 = 0.9445$).

Keywords: *Aquilaria malaccensis*, agarwood oil, extraction, kinetic modelling, microwave hydrodistillation

Bioconversion of glycerol to biosurfactant by halophilic bacteria *Halomonas elongata* BK-AG18

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The increasing demand of biodiesel for fuel is typically followed by the increasing number of glycerol as waste product. The abundance of glycerol will cause an environmental problem since it can be used for bacterial growth including pathogen's bacteria. Some bacteria that able to use glycerol as the carbon source are identified can convert it into biosurfactant. In this study, four moderate halophilic bacteria indigenous from Bledug Kuwu Mud Crater were screened based on their ability to convert glycerol to biosurfactant. We found the best candidate, which is *H. elongata* BK-AG18, that able to perform such bioconversion. The optimum biosurfactant production was achieved when the bacteria were grown in the medium containing 2% (v/v) glycerol, 0.3% (w/v) urea, and 10% (w/v) NaCl at 35°C and pH 6. The resulted biosurfactant has emulsification index about 53.6% and CMC about 275 mg/L. Preliminary structural analysis using FTIR indicated that the biosurfactant produced by *H. elongata* BK-AG18 was likely glycolipid type. The biosurfactants also have antibacterial activity against *Staphylococcus aureus* with minimum inhibitory concentration about 435 mg/L. Our study thus showed that *H. elongata* BK-AG 18 was the potential halophilic bacteria that can convert glycerol into glycolipid type of biosurfactant with antibacterial activity.

Keywords: *Halomonas elongata* bk-ag18, biosurfactant, glycerol, halophilic bacteria

Degradation of batik dye waste remazol brilliant blue using plasma electrolysis method with addition of microbubbles

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Plasma electrolysis is a process of electrolysis with DC current to form electric sparks due to the electrons that undergo plasma excitation in the electrolyzed solution. Plasma electrolysis produce hydroxyl radicals, a powerful oxidant, with greater than other advanced oxidation method. This method is used to degrade much weight organic compounds such as dye. This research aims to evaluate the degradation of batik dye waste Remazol Brilliant Blue (RBB) using plasma electrolysis method with addition of microbubbles. The addition of microbubbles can increase hydroxyl radicals production and can decrease energy consumption. The condition used are dye concentration is 150 mg/L, Na_2SO_4 0,02 M, in addition of microbubbles and FeSO_4 40mg/L applied voltage 700 volt, and anode depth 1cm. Dye degradation is known by measure its absorbances with Spectrophotometer UV-Vis. The result of this research show that the efficiency of dye degradation in addition of microbubbles is increased. The result of study showed that percentage degradation was 99,63% in 30 minutes with final concentration of dye is 0,56 mg/L, COD 45,86 mg/L and energy specific is 1,162.47 kJ/mmol.

Keywords: dye, energy consumption, microbubbles, plasma electrolysis, radicals hydroxyl, remazol brilliant blue

Synthesis of biodiesel from palm oil by using cathodic plasma electrolysis

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Synthesis of biodiesel by using plasma electrolysis is very promising. This study aims to obtain high efficiency in the synthesis of biodiesel from palm oil by using cathodic plasma electrolysis method. The raw materials are palm oil, methanol, and KOH catalyst. Variations consist of cathode depth and oil-methanol molar ratio. The highest yield of 98.76% is obtained on the condition of cathode depth of 3.5 cm and oil:methanol molar ratio of 1:24. The lowest specific energy consumption of 605 J/ml is obtained on the condition of cathode depth of 3.5 cm and oil-methanol molar ratio of 1:12. High process efficiency is proved to be obtained by the use of cathodic plasma. These results indicate that cathodic plasma electrolysis method is effective to be used in the synthesis of biodiesel.

Keywords: biodiesel, plasma electrolysis, cathode depth, molar ratio

Comparison between latent fingerprint identification using black powder and cyanoacrylates glue

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Fingerprint analysis and its identification are very important role in the activities of a criminal action and investigation in forensic science. Fingerprint analysis has been used to identify suspects and solve crimes also an extremely valuable tool for law enforcement. One of the most important uses for fingerprints is to help investigators link one crime scene to another involving the same person and helps investigators to track a criminal's record. The purpose of this study was to compare the latent fingerprint identification using black powder and cyanoacrylates glue. The study was done at chemistry laboratory, Syiah Kuala University, on March 2016. The population of this study was undergraduate students year 2013 of Chemistry Education Department, Syiah Kuala University, as many as 65 people. The samples was taken randomly as many as 30 students. The methodology used to identify latent fingerprints was the preparation of tools and materials, carry out the work and verification procedures. The results found that the latent fingerprint identification using black powder could be seen clearly (contrast) using black powder compared with cyanoacrylates glue.

Keywords: black powder, cyanoacrylates glue, latent fingerprint

Extraction of kaffir lime (*Citrus hystrix* DC.) essential oil using steam explosion process

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Steam explosion is a thermo-mechanicochemical pretreatment which allows the breakdown of lignocellulosic structural components by synergism process of heating, and shearing forces resulting in the expansion of the moisture. Essential oils are complex mixtures of volatile compounds with strong odor. The aim of this study was to determine the effect of pretreatment steam explosion on the microhistology of *Citrus hystrix* DC. leaves and the influence on the yield in essential oil extraction. The following process and material variables were used steam temperature (100-145°C) and corresponding saturated pressure (1-4 bar), and mass fraction of water 33%. The highest yield of essential oil 1.386% (w/w) was obtained at the saturated pressure 2 bar and temperature 120°C. It was increased recovered yield if compared with the untreated materials 0.791% (w/w). That can be concluded that steam explosion is promising process for application in essential oil extraction.

Keywords: *Citrus hystrix*, essential oil, steam explosion, yield

Starch nanoparticle formation via oxidation-sonication with hydrogen peroxide addition: influence some factors on particle size

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A new technique for starch nanoparticle formation was prepared by sonication which combined with hydrogen peroxide addition. Hydrogen peroxide 1% (v/v) was added to 90 ml slurry starch. Dynamic light scattering (DLS) and scanning electron microscopy (SEM) revealed that starch nanoparticle had narrow size distribution and good uniformity. Effect of some factors in the process (amplitude power, sonication time, sonication temperature, and starch concentration) on starch nanoparticle size was evaluated. The result show at all amplitude power (20%, 35%, and 50%), oxidization-sonication at low temperature (5°C) produce smaller starch particle size. At 1 hour oxidation-sonication, the higher amplitude power, the smaller particle size produced. Conversely, at 3 hours oxidation-sonication, smaller particle produce at lower amplitude power (35%). The smallest particle size is produced by oxidation-sonication at 5°C with amplitude power 50% for 5 hours (5.61 – 24.4 nm).

Keywords: nanoparticle, oxidation-sonication, starch

Synthesis and analysis characterization of nanocomposites tin oxide-graphene doping pd using Polyol method

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Tin dioxide (SnO₂) as an n-type semiconductor has been extensively applied in gas sensing. SnO₂ based nanomaterials have been widely investigated for the detection of various gases, including properties like fast-response speed, high chemical stability and prominent selectivity. Graphene a two-dimensional (2D) monolayer comprising sp²-bonded carbon atoms, has demonstrated as a promising gas-sensing material. In this paper, we reported one-pot polyol method to synthesis CO gas sensor based on tin dioxide-graphene and Pd doped nanocomposite films to improve the sensors sensing performance by designing novel nano structures. X-ray diffractometry (XRD) results indicated SnO₂ peaks appeared at 2θ values of 26.78, 34.06 in accordance with (110), (101). The Graphene peaks were showed at 2θ values of 26,64 and 42 ° in accordance with (002) and (100). Pd peaks were clearly exhibited at 2θ values of 40, 68 in accordance with (111), (220). FTIR results showed alcohol ring peak for absorption of -OH strong H-bonded (3444 cm⁻¹), aldehydes and ketones were indicated absorption of C=O strong (1751 cm⁻¹), alkenes were showed on absorption of C=C symmetric reduces intensity (1616 cm⁻¹), alkynes were showed absorption of C-H strong deformation (646 cm⁻¹), and C-H str deformation (613 cm⁻¹). The SEM and TEM results were exhibited SnO₂ particles were spread uniform on the surface of Graphene layer, and the size distribution of agglomerate Pd doped SnO₂-Graphene composite and SnO₂ particles from 0.1 – 0.5 μm and 5 – 8 nm, respectively. Finally, the composition ratio of C, O, Sn and Pd: 33.13, 25.58, 35.35 and 5.94%, respectively, indicated good mass proportion in Pd doped SnO₂-Graphene composite.

Keywords: palladium doped, polyol method, tin dioxide-graphene

Short-time synthesis of titania nanotubes

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Attractive properties of TiO₂ nanotube such as high surface area have led extensive studies on the synthesis route, especially hydrothermal synthesis. However, little studies focusing on efforts to synthesize titania nanotubes at short time. Here, pre-treatment mechanical mixing using conventional stirring to result in titania nanotube at shorter time has been proposed. The effect of various time stirring and hydrothermal treatment on the crystalline phases and morphology has been studied. It has been shown that the nanotubes can be obtained after 5h hydrothermal treatment at 150 °C. The XRD patterns of the resulted powders showed the existence of a mixture of anatase and titanate crystalline phases with increased intensity of [200] as the mixing time increasing. At the longest mixing time, the existence of TiO₂ (B) has been observed. Raman spectra have also confirmed the existence of both anatase and titanate crystalline phases with decreased intensity of anatase at increasing time of stirring. The high textural coefficient for [200] (TC₂₀₀) has indicated oriented growth of one dimensional anatase along [200]. All the resulted powders resulted at various time stirring were nanotubes, as confirmed by Transmission Electron Microscope (TEM). The longer the stirring time, the higher the surface area of the nanotubes, peaking at 90 min stirring. All the powders showed type-IV isotherm adsorption for N₂ gas, indicating the existence of mesoporous materials with tubular pores. However, long hydrothermal time induced the nanospheres formation, hence reducing the surface area. The band-gap of the resulted titania nanotubes were ranging from 3.11-3.16 eV. The photocatalytic test for degradation of methylene blue has shown higher photoactivity of the resulted titania nanotubes compared to the bulk TiO₂ under visible-light and comparable photoactivity under UV-light. These results pave a way of producing visible-sensitive photocatalyst by altering the morphology.

Keywords: TiO₂, synthesis, titania nanotubes

Synthesis 2-hydroxy-4,6-dimethoxychalcone,
2-hydroxy-4,6,4'-trimethoxychalcone,
2-hydroxy-4,6,3',4'-tetramethoxychalcone
and cytotoxicity test against
breast T47D, cervix HeLa and colon WiDr cancer cells

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Synthesis of 2-hydroxy-4, 6-dimethoxychalcone, 2-hydroxy-4,6,4'-trimethoxychalcone, 2-hydroxy-4,6,3',4'-tetramethoxychalcone from p-anisaldehyde and veratraldehyde. These chalcones has been tested their cytotoxicity against breast, cervical and colon cancer cells (T47D, HeLa and WiDr cell lines) to determine the potential of compound as a candidate of anticancer agent. The synthesis was started by converting 1,3,5-trihydroxy via two steps of reaction, i.e Hoesch asilation and methylation to give 2-hydroxy-4, 6-dimethoxy acetophenone. The chalcone (1-3) was prepared by Claisen-Schmidt condensation of 2-hydroxy-4,6-dimethoxy acetophenone with benzaldehyde and its derivatives are p-anisaldehyde and veratraldehyde. Synthesis of chalcone was carried out by stirring at room temperature for 48 hours for presence of ethanol as solvent and KOH as catalyst. The structure of all products was analyzed using FTIR, GC-MS, ¹H- and ¹³C-NMR. The cytotoxicity of chalcone derivatives were tested in vitro against cancer cells with MTT method. The result showed that 2-hydroxy-4,6-dimethoxychalcone, 2-hydroxy-4,6,4'-trimethoxychalcone, 2-hydroxy-4,6,3',4'-tetramethoxychalcone was successfully obtained as a yellow solids and yield percentage were 84.5, 82.8 and 75.58%, respectively. The cytotoxicity test indicate that chalcone 1 and 2 have moderate activity for inhibiting the growth of T47D breast cancer cells with IC₅₀ value less than 12,5 µg/mL. Chalcone 1, 2 and 3 have moderate activity for inhibiting the growth of HeLa breast cancer cells with IC₅₀ value less than 50 µg/mL. Chalcone 1 and 2 have moderate activity for inhibiting the growth of WiDr colon cancer cells with IC₅₀ value less than 10 µg/mL.

Keywords: anticancer, chalcone derivatives, MTT assay

Syntheses and antibacterial test of benzoyl pyrazolines from vanillin and veratraldehyde

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Syntheses of N1-Hydrogen and N1-Benzoyl pyrazoline derivatives and its antibacterial test have been carried out. N1-Hydrogen pyrazoline derivatives were synthesized by reacting 2'-hydroxychalcone with hydrazine monohydrate. While N1-Benzoylpyrazoline derivatives were obtained from the S_N2 reaction between N1-hydrogen pyrazoline with benzoyl chloride and glacial acetic acid as a catalyst. All of the synthesized compounds were confirmed by FTIR, GC-MS, ^1H - and ^{13}C -NMR. The results showed that N1-hydrogen A and B pyrazolines have been synthesized with a yield of 55 and 78%. Modification of N1-hydrogen pyrazoline to N1-benzoyl pyrazoline has been also successfully performed with yield 51 and 83%, respectively. Antibacterial test results indicate that the presence of N-benzoyl substituent decreases antibacterial activity and is only active in gram-positive bacteria. While the N1-hydrogen pyrazoline compounds have a good anti bacterial activity against Gram positive and Gram negative bacteria.

Keywords: antibacterial, N1-benzoyl pyrazoline, N1-hydrogen pyrazoline

Activities correlation between extracts and compounds from *Etlingera calophrys* stems toward bacteria and radical scavenger agent

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Etlingera calophrys (Zingiberaceae) is an endemic plant to South East Sulawesi which used by the people as a traditional medicine [1]. Until now, there is not research report neither chemical nor pharmacological aspects yet. This article focused on isolation and structure elucidation of secondary metabolites of *E. calophrys* stems as well as biological activities evaluation of the secondary metabolites and the extracts. The isolation of secondary metabolites were carried out by using various techniques of chromatography; Thin Layer Chromatography (TLC), Vacuum Liquids Chromatography (VLC) and Radial Chromatography (RC) were inclusive. Silica gel as adsorbent and a mixture of solvents as eluent were used during the separation processes. The compound structures were determined by spectroscopic instruments including FTIR, ¹H NMR, ¹³C NMR and NMR 2D. To support this findings, the data were matched to the corresponding data from literatures. The biological properties of these compounds and extracts were evaluated against selected bacteria that are *Salmonella typhi* YCTC, *Escherichia coli* ATCC 35219, *Pseudomonas aeruginosa*, *Staphylococcus aureus* ATCC 25923, *Bacillus subtilis* and *Streptococcus mutans* as well as DPPH (2,2-diphenyl-1-picrylhydrazyl) radical as a radical scavenging agent. The results showed that stigmasterol (**1**), *p*-hydroxyl benzoic acid (**2**), and yakuchinone A (**3**) have been isolated and identified from the sample. Two of them, *p*-hydroxyl benzoic acid and yakuchinone A are firstly reported from *Etlingera* genus plant. The extracts are active against *S. typhi*, *B. subtilis* and *S. mutans* but all compounds are inactive towards all bacteria. Moreover, the extracts, yakuchinone A and *p*-hydroxyl benzoic acid have potency to be developed as antioxidant agents. It can be conclude that there is not biological activity correlation between the compounds and the extracts against bacteria. However, yakuchinone A and *p*-hydroxyl benzoic acid supported the extract activity as radical scavenger agent.

Keywords: *Etlingera calophrys* (Zingiberaceae), antibacterial, compounds, DPPH, stems extracts

Optimization on supercritical CO₂ extraction process to improve the quality of patchouli oil by response surface methodology approach

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Until now, the patchouli oil is the largest commodity export of essential oil for Indonesia. But the price of patchouli oil are often unstable due to the quality of oil which fluctuates depending on the components. To improve the performance and quality of patchouli oil had been carried out the purification process using supercritical CO₂ fluid extraction method. Optimization conditions of the extraction process using the approach of Response Surface Methodology (RSM) and the influence of independent variables include temperature (35 - 45°C), pressure (80 – 150 atm) and the time of extraction (60 – 300 minute), and then evaluated using a Box-Behnken Design (BBD). Analysis of the components in the extract using GC-MS to detect the changes of compositions of components containing in the oil before and after extraction process. The optimum condition of supercritical extraction within experimental range of the studied variables were at 38°C, 146.35 atm and 74 minute for predicted oil yield of 6.41% and at 41.45°C, 135.17 atm and 252.62 minute and the predicted patchouli alcohol content was 25.34%. The extracted oil is enriched with the main components such as patchouli alcohol compared to the original patchouli oil. The results of RSM evaluation showed consistency between the variables contained in the experiment and the prediction.

Keywords: CO₂, patchouli oil, RSM

Synthesis and antimalarial evaluation of chalcones and flavones from vanillin derivatives

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A series of antimalarial derivatives were synthesized via Claisen-Schmidt condensation of o-hydroxyacetophenone with vanillin derivatives followed by cyclization. Two chalcones (2'-hydroxy-3-hydroxy-4-methoxy chalcone **1** and 2'-hydroxy-3,4-dimethoxy chalcone, **2**) and flavones (3'-hydroxy-4'-methoxy flavones, **3** and 3',4'-dimethoxy flavones, **4**) have been synthesized. The antimalarial activity assay was conducted using *in vitro* by heme polymerization inhibitory activity (HPIA). The results showed that chalcones **1**, **2** possess higher antimalarial potentials, with an IC₅₀ value of 0.0042 mg/mL and 0.0410 mg/mL while the flavones **2**, **3** gave IC₅₀ value of 0.0016 mg/mL, 0.0020 mg/mL for flavones respectively. Both class of chalcones and flavones revealed high antimalarial activity against HPIA assay.

Keywords: antimalarial, chalcones, flavones, vanillin

Synthesis and antioxidant activity of C-4-allyloxy-3-methoxyphenylcalix[4]resorcinarene

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The aim of this study was to synthesize C-4-allyloxy-3-methoxyphenylcalix[4]resorcinarene (AMPC) and test its antioxidant activity. This compound was synthesized through two stages of reaction, i.e. allylation reaction of 4-hydroxy-3-methoxybenzaldehyde to produce 4-allyloxy-3-methoxybenzaldehyde, followed by the synthesis of AMPC via condensation of 4-allyloxy-3-methoxybenzaldehyde with resorcinol in the presence of hydrochloride as an acid catalyst. The allylation reaction to 4-hydroxy-3-methoxybenzaldehyde produced 4-allyloxy-3-methoxybenzaldehyde in the form of a light yellow liquid with 79% in yield, then the condensation reaction of the 4-allyloxy-3-methoxybenzaldehyde with resorcinol produced the AMPC as brown solid in 78% yield having m.p. of 176–177 °C (dec.). The resulted AMPC was characterized by means of FTIR, ¹H-NMR, and LC-MS spectrometers. Antioxidant activity of AMPC was determined by scavenging effect on 2,2-diphenyl-1-picrylhydrazyl (DPPH) radicals with quercetin as a control. The presence of phenol groups caused the antioxidant activity of the AMPC became different compared to that having no phenol groups. The ES₅₀ value of AMPC was 105.877 µg/mL, while that of C-4-hydroxy-3-methoxyphenylcalix[4]resorcinarene (HMPC) was 28.208 µg/mL.

Keywords: C-4-allyloxy-3-methoxyphenylcalix[4]resorcinarene, antioxidant, DPPH, synthesis.

Characterization and purification of fatty acid methyl ester from kemiri sunan (*Reutealis trisperma*) using fraction distillation

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Kemiri Sunan (*Reutealis trisperma*) contains triglyceride that can be converted to Fatty Acid Methyl Ester (FAME) or biodiesel by trans-esterification reaction. In order to produce FAME that meet the biodiesel characteristic, purification of the FAME was needed. The research aimed to study the purification of FAME by fraction distillation. Temperature of 260 – 330°C, 330 – 348°C and 348 – 360°C with pressure of 10 mmHg and reflux of 2:1 were applied in the fraction distillation. The study showed that Kemiri Sunan FAME contained 8.65% Palmitic acid methyl ester, 12.68% Linoleic acid methyl ester, 9.42% Oleic acid methyl ester, 10.02% Stearic acid methyl ester and 49.13% Linolenic acid methyl ester. Fraction distillation process produced only two cut fraction (260 – 330°C and 330 – 348°C). Cut 1 contained 24.26% Palmitic acid methyl ester, 21.37% Linoleic acid methyl ester, 16.11% Oleic acid methyl ester and 16.4% Stearic acid methyl ester, whereas cut 2 contained 4.20% Palmitic acid methyl ester, 36.03% Linoleic acid methyl ester, 22.08% Oleic acid methyl ester and 17.86% Stearic acid methyl ester.

Keywords: biodiesel, FAME, fraction distillation, kemiri sunan

Encapsulation of curcumin in chitosan-pectin beads and its release study

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Curcumin has been the subject of hundreds of published papers over the past three decades, studying its antioxidant, anti-inflammatory, and anti-cancer properties. Although curcumin has many excellent properties, it is not widely used because of its poor aqueous solubility. Curcumin also faces serious problems like low gastrointestinal absorption, poor bioavailability, and rapid metabolism. In this study curcumin loaded beads to overcome the pharmacokinetic problems and to obtain the full benefits of the drug. Beads were prepared by using chitosan, pectin, lauric acid, and glutaraldehyde. Pectin was added to increase hydrophilic properties of the beads, while glutaraldehyde was added to crosslink the chitosan so that the beads can resist at acidic pH. The effect of pH, curcumin concentration, lauric acid, and solvent to release of curcumin from the beads was studied using UV-Vis spectrophotometer. Surface morphology of the prepared beads has been investigated using SEM and FT-IR spectrum was used to study the interaction between polymers. The result from this study indicated that the use of fatty acids could increase encapsulation efficiency of the curcumin in the beads. The concentration of curcumin, lauric acid, solvent, and pH was found to affect the release rate of curcumin from the beads. Releases kinetic of curcumin from the beads followed Korsmeyer-Peppas model with n value < 0.43 that means the release mechanism of curcumin from the beads is diffusion.

Keywords: beads, chitosan, curcumin, lauric acid, pectin, release study

Biosynthesis of silver nanoparticles from exopolysaccharides produced by *Bacillus subtilis* FNCC 0059

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In this research silver nanoparticles were synthesized by using exopolysaccharides produced by *Bacillus subtilis* FNCC 0059 as reducing agent and polyvinyl alcohol (PVA) as stabilizing agent. The characterization of silver nanoparticles has been carried out using UV-Vis spectroscopy, IR spectroscopy and transmission electron microscope (TEM). The formation and stabilization of the particles were carried out by observing surface Plasmon resonance using UV-vis spectrophotometer in time interval 0, 1, 2, 3, 5, 7, 15, 22 and 30 days. The size of silver nanoparticles was confirmed by TEM. The results showed that the absorbance peak increased along with increasing storage time. The surface Plasmon resonance peak was observed at approximately 435 nm. The colloids were stable without agglomeration for 30 days after preparation. Based on transmission electron microscope, the particles size were formed with range 5-15 nm.

Keywords: exopolysaccharides, particles size, PVA, silver nanoparticles, surface plasmon resonance

The effect of mold rotational speed on porosity of femoral stem based on neutron tomography and radiography test

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Porosity is among the material properties which determines the service lifetime of materials. The objective of this research is to investigate the porosity of the as-cast titanium femoral stem by neutron radiography and tomography. The titanium femoral stem was casted using a vertical centrifugal casting machine at the rotational speed of 35, 45 and 55 rpm in an investment casting mold. The neutron radiography results detect some large porosities in the near-surface region of rotational speed of 35 and 45 rpm meanwhile it is not detected in the 55 rpm. The neutron tomography results indicate that the porosity occurs in middle of all the femoral stems. The large porosity in near-surface region may be considered as a detrimental product. The porosity of the femoral stem decreases at the higher rotation-speed because of increase in centrifugal pressure.

Keywords: femoral stem, neutron radiography, neutron tomography, rotational speed

Electrically conductive nanocomposites polymer of poly (vinyl alcohol) and multiwalled carbon nanotubes: preparation and characterization

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Electrically conductive nanocomposites polymer of poly (vinyl alcohol)/ PVA and multiwalled carbon nanotubes (MWCNT) has been successfully synthesized. The polymer nanocomposites were prepared by mixing PVA and glutaraldehyde/GA (crosslinker) solution with MWCNT dispersion with an aid of ultrasonication homogenizer at 50°C. The content of MWCNT, in particular, was varied in order to determine the effect of MWCNT on electrical conductivity of polymer composites. The polymer mixture was casted into a disc to obtain thin film. The electrical conductivity, surface morphology, and mechanical properties of the composites film were investigated by means of four probes method, FTIR spectroscopy, X-ray diffraction, SEM, AFM, and tensile strength measurement, respectively. It was found that the optimum composition of PVA (10%): GA(1%): MWCNT (1%) was 20: 20: 3 in volume ratio. The addition of MWCNT induced the electrically conductive network on polymer matrix where the electrical conductivity of nanocomposites film significantly increased up to 8.28×10^{-2} S/sq due to reduction of the contact resistance between conductive filler. Additionally, the mechanical strength of nanocomposites polymer were significantly increased as a result of MWCNT addition. Modification of morphological structure of composite film as indicated by FTIR spectra, X-ray diffraction patterns, SEM, and AFM images verified the effective MWCNT filler network in the polymer matrix.

Keywords: electrical conductivity, nanocomposites, PVA, MWCNT

Extraction of hydroxyapatite (ha) from bovine bone and its performance in adsorbing heavy metals in water

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Water contamination caused by heavy metals is becoming a serious problem. Adding an adsorbent into the contaminated water is one of the effective method in decreasing the concentration of heavy metals. Hydroxyapatite (HA) is one of the promising adsorbent for heavy metals. In this study, HA powder was extracted from compact part of bovine bone and formed into a disc shape. SEM/EDX was used to analyze the microstructure of extracted HA. Water containing heavy metals was obtained from the waste of electropolishing process of stainless steel. FTIR was used to study the performance of HA in adsorbing heavy metals. FTIR measurement shows that HA disc is capable to adsorb heavy metals from the contaminated water.

Keywords: adsorption, FTIR, heavy metal, hydroxyapatite, SEM/EDX

Rapid synthesis of gold nanoparticles in room temperature

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Several methods have been developed to synthesize gold nanoparticles (AuNPs), but it is not effective since high temperature and long time reaction are required. This research developed rapid and simple synthesis of gold nanoparticles in room temperature using green reducing agent, ascorbic acid. AuNPs could be synthesized only in 2 s using this method. The effect of HAuCl₄ concentration, ascorbic acid concentration, and pH were investigated on nanoparticles synthesis. AuNPs were characterized with different instruments such as, UV-Vis spectroscopy, FT-IR spectroscopy, Transmission Electron Microscopy (TEM), and particle size analyser. UV-Vis spectroscopy confirmed surface plasmon resonance of AuNPs at 524-535 nm, depends on synthesis parameters. Particle size analyser revealed that AuNPs have a 62-77 nm size range and monodisperse. Transmission Electron Microscopy (TEM) showed that AuNPs synthesized have a spherical shape. The information obtained in this experiment can be used to design AuNPs synthesis without heating step. Moreover, the method is green, effective, and efficient.

Keywords: adsorption, gold nanoparticles, rapid synthesis

Forgery detection beef with mice meat (*Mus musculus*) in meatballs using real-time polymerase chain reaction (RT-PCR) primer specific for a target mitochondrial DNA ND-1 gene

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High beef prices have encouraged counterfeiting beef on processed food products such as meatballs. One meat reportedly used for adulteration of beef into meatballs are mice meat. The accurate method is needed to ensure the supervision of adulteration of food security. This study reports on the use of DNA testing to detect the presence of mice meat in meatballs with RT-PCR primer specific. PCR primers designed based on the ND-1 gene sequences of mitochondrial DNA. The sequence of a forward primer and reversed primer are 5'-CGGCATCCTACAACCATTTGC-3' and 5'-CGGCTCGTAAAGCTCCGAA-3', respectively, target 294 bp length fragment of the gene. The RT-PCR can specifically detect the presence of the mice meat in a meatball. RT-PCR to detect the presence of mice in the meatballs and meat do not detect the presence of beef, mutton, chicken, pork, and horsemeat. The method also showed good precision as expressed by the value of RSD in repeatability test at 2%, much lower than the maximum requirement of 25%. RT-PCR amplification was still able to deliver positive results for the number of total 0.5 ng DNA template which is equivalent to 0.08 copies of DNA genome of mice equal to 80-150 copies of mtDNA much lower than conventional PCR that usually needs 10.000 copies. By using standard phenol-chloroform DNA isolation technique, this method is also able to detect contamination of mice meat in meatball up to 1%. Three commercial meatballs confirmed contaminated by mice meat using the method.

Keywords: meatball, mice, mitochondrial DNA, ND-1, RT-PCR

Cytotoxicity of isolated compounds from leaves of *Aglaia odorata* L.

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Aglaia odorata L is a folk medicine plant belonging to the Meliaceae family. A phytochemical investigation of the leaves of *Aglaia odorata* L resulted in isolation of four compounds. The chemical structures were established based on spectroscopic analysis. Their structures were determined as odorine, odorinol, 3',7-dimethoxyhesperetin, and dammar-20-ene-3 β ,24,25-triol. The cytotoxicity effects of two compounds were determined using the MTT assay against human breast cancer (MCF-7) cells. The tested compounds were 3',7-dimethoxyhesperetin and dammar-20-ene-3 β ,24,25-triol and had some activity against MCF-7 cells with IC₅₀ values of 99,36 μ g/mL and 242,1 μ g/mL respectively.

Keywords: *Aglaia odorata* L, breast cancer cells, dammar-20-ene-3 β ,24,25-triol, 3',7-dimethoxyhesperetin

The use of secondary metabolites of Mexican Sunflower (*Tithonia diversifolia*) leaf as α -glucosidase inhibitor

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Diabetes mellitus (DM) is a metabolic disorder disease which affects in people in the world. It can be treated with herbal extracts. In this research, we discuss species Mexican sunflower (*Tithonia diversifolia*) in the treatment of diabetes. *Tithonia diversifolia* contain compounds that inhibit naturally activities of α -glucosidase and provide lower side effects than oral drugs so can be an alternative treatment for DM. The highest inhibitory activity against α -glucosidase by polar secondary metabolite was 48.68% at a concentration of 6.25 mg/L. Nonpolar secondary metabolite of 6.21% at a concentration of 12.50 mg/L. The polar secondary metabolites potential to be uncompetitive inhibitors.

Keywords: activity, enzyme of α -glucosidase, inhibitor, secondary metabolites

Effect of precursor concentration and soaking time on Glucosamine Palmyrah (*Borassus flabellifer* L.) seeds extraction

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Glucosamine was extracted from palmyrah (*Borassus flabellifer* L.) seeds by adding ammonium sulphate as precursor. The effect of concentration and soaking time ammonium sulfate on glucosamine extraction from palmyrah seeds were investigated. This research used randomized block design (RDB) factorial, consists of precursor concentration ammonium sulfate (3, 3,5 and 4 M) and soaking time (10,14, 18 h). The glucosamine obtained from this research were analyzed, compared and examined the best treatment in terms of content, pH, solubility, and yield. The result from this research showed that concentration and soaking time of precursor have significant effect to pH, but no significant effect on the content and yield of glucosamine from palmyrah seeds. Glucosamine extract was not soluble in methanol, but soluble in water. The best content, pH, and yield of glucosamine derived from palmyrah seed extraction using concentration of 3 M ammonium sulfate and 10 h soaking time is respectively 1809.5 ppm; 5.93; and 0.747%. Value of retention factor from Thin Layer Chromatography test were similar between glucosamine from palmyrah seed extract (0.875) and glucosamine hydrochloride standard (0.8875) from Sigma Aldrich. It showed similarities in the properties and structure of glucosamine from palmyrah seed extract compared with standard.

Keywords: ammonium sulphate, glucosamine, palmyrah

Secondary metabolites from *Cinnamomum parthenoxylon* leaves and their biological activities

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Cinnamomum parthenoxylon tree belongs to the *Lauraceae* family. In this study, flavonoid rutosides were isolated from *C. parthenoxylon* leaves and their hepatoprotective and antioxidant activity were evaluated. The EtOAc fraction of *C. parthenoxylon* leaves showed potent hepatoprotective activity on *t*BHP-induced cytotoxicity in HepG2 cells and also higher antioxidant activity. UPLC-ESIMS analysis revealed that flavonoid rutosides; rutin, nicotiflorin and isorhoifolin are major constituents in the EtOAc fraction. The catechol group on B ring in the structure of rutin holds potential for hepatoprotective and antioxidant activity.

Keywords: *Cinnamomum parthenoxylon*, biological activities, secondary metabolites

The effect of MRN complex and ATM kinase inhibitors on UVC-treated zebrafish embryonic development

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Zebrafish is an ideal animal model to study developmental biology due to its transparent embryos and rapid development stages of embryogenesis. Here we investigate the role of DNA damage proteins, specifically ATM Kinase and MRN complex during embryogenesis by inhibiting its function using specific MRN complex (Mirin) and ATM Kinase inhibitors (Ku60019 and Ku55933). Zebrafish embryos at midblastula transition (MBT) stage are treated with Mirin, Ku60019 and Ku55933 and irradiated with UVC (100-280 nm wavelengths). The DNA damage caused by the UVC radiation activates cascade of cellular recovery mechanisms, in which the double strand break (DSB) DNA damage response is most crucial. The embryonic development of the embryos was monitored at 24 hours-post fertilisation (hpf), 48hpf and 72hpf. We observed that the inhibitors (3 μ M of Mirin, 1.5 nM of Ku60019 and 3nM of Ku55933) and UVC treated embryos survive pass the hatching stage, however they are phenotypically deformed. Control or mock treatment of all embryos shows normal embryonic development. This study confirmed that DNA damage proteins are crucial during embryo development to prevent undesired abnormal biological development. We also proved that protein inhibitors are a cheaper alternative to study the role of specific protein during embryogenesis compared to genomic modification tools or transcription modification tools.

Keywords: ATM kinase, DNA damage, MRN complex, zebrafish (*Danio rerio*)

The anthocyanin content, colour changes and stability of thermally treated extract from Rosella (*Hibiscus sabdariffa* L.) petal

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This research aims to study the effects of temperature and prolonged heating of the anthocyanin content, discoloration and stability of roselle petal extract. Thermal and storage stabilities of anthocyanin showed that significantly higher temperatures and prolonged heating. Thermal and storage degradation of anthocyanin extract followed first order kinetics. The temperature-dependent degradation modelled on the Arrhenius equation. First-order degradation in the heating treatment and during storage shows the higher the temperature and the duration of the heating causing the faster the rate of damage (k-value) and the shorter the shelf life ($t_{1/2}$). The activation energy (Ea) in the heating treatment was lower than during the storage of Ea 4099.9 and 5097.07 kal / moloK respectively. Hunter L*, a*, b* values were measured to characterize colour: lightness (L*), chroma (C*), hue (H°) and total colour difference (TCD*). Visual color observations show the differences in color due to the heating, especially in the treatment with the temperature of 90 °C and 100 °C. The longer storage (7 to 35 days) at a temperature of 30 to 70 oC shows a clear distinction as well.

Keywords: anthocyanin, discoloration, *Hibiscus sabdariffa* L, stability, thermally treat

Synthesis and characterization of silica from coal bottom ash

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In order to utilize the solid waste from power plant, in this research, SiO_2 which come from bottom ash of Pacitan power plant was synthesized and characterized. The synthesis was performed by reacting the bottom ash with 3 M NaOH at a temperature of 93.5 °C for 2 hours, followed by acidification with 3 M HCl and dried at 110 °C for 3 hours. XRF analysis result shows that the synthesized solid material contains 94% of silica. IR spectra also show the presence of silanol and siloxane groups which indicates the formation of silica. XRD data conforms the amorphous form of silica as silica gel.

Keywords: characterization, coal bottom ash, silica, synthesis

Degradation of blue KN-R dye in batik effluent by advanced oxidation process using a combination of ozonation and hydrodynamic cavitation

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In the present work, degradation of 100 ppm Blue KN-R has been investigated using ozonation, hydrodynamic cavitation, and their combination for 60 min. The three configuration methods were optimized in terms of different operating parameters such as flowrate, initial pH, and dosage of ozone to get the maximum degradation of Blue KN-R. It has been found that the decolorization rate at pH 11 and 156.48 mg/h of ozone by ozonation process was 70.16%, while the decolorization rate at pH 4 by hydrodynamic cavitation was 1.79%. The highest decolorization rate by their combination was observed at pH 11 and 156.48 mg/h with 79.39% decolorization rate. TOC removal by ozonation, hydrodynamic cavitation, and their combination has been investigated resulting 14.81%, 1.85%, and 19.9%, respectively. Following the optimization of hybrid method, degradation of Blue KN-R was conducted for 120 min resulted 92.63% decolorization rate and 24.54% TOC removal. The synergetic decolorization and mineralization rate is due to the effect of mechanical and chemical effect of hydrodynamic cavitation to enhance ozone solubility and hydroxyl radicals production. Degradation of batik effluent has been investigated by optimum operational condition for 120 min. The color, COD, BOD, and TSS removal were 67.96%, 68.72%, 66.54%, and 79.84%, respectively.

Keywords: AOPs, blue KN-R, dye, hydrodynamic cavitation, ozonation

Effect of concentration and calcination temperature on the synthesis of NaOH-modified zirconia as a prospective heterogeneous solid base catalyst

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Sodium oxide zirconia ($\text{Na}_2\text{O}/\text{ZrO}_2$) as a heterogeneous solid base catalyst had been prepared by wet impregnation method between zirconia and four different sodium hydroxide concentrations (1, 2, 3, and 4 M) at five calcination temperatures (400, 500, 600, 700 and 800 °C). The purpose of this research was to determine the total basicity of $\text{Na}_2\text{O}/\text{ZrO}_2$ catalyst from those variations. Characterization of catalyst included FTIR, XRD, Hammet method for basicity determination, SEM/EDX and BET/BJH. The results of characterization showed that the absorption band at 1458 cm^{-1} corresponding to the stretching vibration of carbonate ion. The XRD pattern showed the peaks at $2\theta = 28.22^\circ$ and 31.52° were referred as a monoclinic phase of zirconia. The highest total basicity of $\text{Na}_2\text{O}/\text{ZrO}_2$ catalyst was found at 3 M NaOH and 700 °C calcination temperature with total basicity by 1.70 mmol g^{-1} . In optimum condition, the 3 M $\text{Na}_2\text{O}/\text{ZrO}_2$ -700 catalyst had granular with 18.690% weight of Na_2O content in that catalyst and also had porous structures with the value of the surface area, pore volume and pore size was $30\text{ m}^2\text{ g}^{-1}$, $0.04048\text{ cm}^3\text{ g}^{-1}$ and 26.270 \AA , respectively which indicated that it was a mesoporous material.

Keywords: calcination temperature, concentration, $\text{Na}_2\text{O}/\text{ZrO}_2$ catalyst, total basicity

Composite of magnetite-oleic acid-chitosan: sonochemical synthesis and characterization

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The aim of this research was to utilize the waste of shrimp shell as starting material in the synthesis of (magnetite - oleic acid – chitosan) composite, which could be used as an adsorbent of poisoning heavy metals. Magnetite was synthesized by coprecipitation method, in which solution of NH_4OH was added into the solution containing a mixture of $\text{Fe}^{3+}/\text{Fe}^{2+}$ (molar ratio 2:1) until pH 11.5. The black sediment of magnetite was filtered, washed and dried. The product was then modified with oleic acid. Chitosan was prepared by deacetylation of chitin, whereas chitin was extracted from shrimp shell which involved some steps, i.e.: deproteinization, demineralization and depigmentation. In the synthesis of composite, 0.5 g of chitosan and 1.5 g of modified magnetite were introduced into 100 mL of 2% acetic acid solution, followed by sonication treatment for 10 min and magnetic stirring for 20 min. Furthermore, solution of 2% glutaraldehyde was added into the mixture at temperature of 40 °C for 3 h in order to perform the cross-linkage reaction. The composite was collected by magnetic separation, and then was washed with distilled water and ethanol in a row. The product was dried and characterized by XRD, FTIR, TEM and VSM methods. The result showed that the composite has magnetic property with about 15 nm of particle size with high saturation magnetization (43.378 emu/g).

Keywords: Chitosan, composite, magnetite, oleic acid

Integrative assessment of heavy metals pollution in Porong estuaries using sediment chemistry, bioavailability and bioconcentration factor

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Integrative assessment of heavy metal pollution in the estuary ecosystem should be done based on the chemical properties of the sediment, heavy metal bioavailability and bioaccumulation in benthic. The aims of research were to determine the correlation between the physical-chemical properties of sediments estuary to the distribution of heavy metals in the sediments, to determine the potential risk of sediment to the metal bioavailability, and to determine the bioaccumulation factor of heavy metals in benthic. Fractionation of heavy metals in the sediments was carried out by the BCR sequential extraction method. Correlation of physical and chemical properties of sediment to the fraction of heavy metals in sediment was determined statistically by Pearson correlation method. Potential risk of sediment in was determined from RAC (risk assessment code) value. Bioconcentration factor was determined based on the concentration of heavy metals in benthic and the concentration of bioavailable metals from sediments. Heavy metal concentrations were measured using AAS. The results showed that the sediment of Porong estuaries containing Pb mostly as adsorbed fraction on the surface of the iron oxy / hydroxide sediment and mineral fraction while Cd was more prevalent as mineral fraction. Salinity and organic matter concentration in sediment significantly affected on the distribution of Pb and Cd, as shown by Pearson correlation test. Furthermore, Porong estuary sediments could potentially contribute to the dissolved Cd in the water body instead of Pb based on the RAC value. Bioconcentration factor indicated that the accumulation of Cd in shrimp and scallops larger than Pb. However the value was still low. Overall, it could be concluded that the level of Pb and Cd pollution in Porong estuary was still low due to heavy metals were more deposited in the sediment than dissolved in water bodies.

Keywords: bioavailability, bioconcentration, heavy metal

Electrokinetic remediation of artificially silver (Ag) contaminated soil from Kotagede area using acetic acid as electrolyte

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The electrokinetic remediation of artificially silver (Ag) contaminated soils was evaluated. In this study, natural soil sample were taken from four different points sampling at Kotagede, Yogyakarta, Indonesia. Those samples were prepared by artificially contaminated with silver (100 mg AgNO₃/Kg soil) and it was treated in 5 cycles of saturation process using de-ionized water and air-dried before being aged for five months and subjected to electrokinetic remediation (EKR) treatment. Physical and chemical properties of soil samples were characterized by X-Ray Diffraction (XRD) and soil component such as organic matter, total nitrogen, CEC and soil texture were evaluated. Desorption of silver with acetic acid (i.e 0.1, 0.5, 1.0 and 1.5 M) was also studied in batch system. EKR process was conducted by graphite electrode in constant voltage of 1 Vcm⁻¹ for 7d of treatment without electrolyte pH control. The current flow during EKR experiment was recorded by data logger for every 10 mins. All remaining silver concentration in the soil after EKR process was measured using flame-Atomic Adsorption Spectroscopy (AAS). The results showed that the high desorption of silver from soil was achieved when using 1.0 M acetic acid as electrolyte. In this regards, the EKR could remove 92.21%, 88.26%, 86.48%, 54.12 % respectively for soil A, B, C, D. Results obtained from these studies were used to predict the use of this technology for soil remediation of actual conditions in Kotagede area.

Keywords: acetic acid, electrokinetic remediation, Kotagede, silver (Ag)

Substituent effect and in vitro cytotoxicity test of chalcone and flavone derivatives against cervix (HeLa) and colon (WiDr) cancer cells

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Synthesis of chalcone and flavone derivatives and its cytotoxicity against cancer cell lines had been investigated. The chalcone **1a** [2'-hydroxy-4-methoxychalcone], chalcone **1b** [2'-hydroxy-3,4-dimethoxychalcone] and chalcone **1c** [2'-hydroxy-4-chlorochalcone] were prepared by Claisen-Schmidt condensation of 2-hydroxyacetophenone with 4-methoxybenzaldehyde, 3,4-dimethoxybenzaldehyde, and 4-chlorobenzaldehyde. Synthesis of chalcones were carried out by stirring at room temperature for 48 hours using methanol as a solvent and KOH 40% as a catalyst with 85.30, 83.33, and 84.01% yields respectively as yellow solid. Furthermore, oxidative cyclization from chalcones (**1a** - **1c**) with iodine as a catalyst in DMSO resulted flavone **2a** [4'-methoxyflavone], flavone **2b** [3',4'-dimethoxyflavone], and flavone **2c** [4'-chloroflavone] with 83.33, 85.10, and 87.10% yields respectively as pale yellow solid. The cytotoxicity test indicated that chalcone **1c** had good enough activity for inhibiting the growth of HeLa and WiDr cancer cells with IC₅₀ value 44.67 and 41.67 µg/mL respectively. While flavones (**2a** – **2c**) were not active for inhibiting the growth of HeLa with IC₅₀ value more than 100 µg/mL.

Keywords: anticancer activity, chalcone, flavone, HeLa cell lines, WiDr cell lines

Synthesis of N-phenyl pyrazoline derivatives from veratraldehyde

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Synthesis of N-phenyl pyrazoline derivatives have been carried out via cycloaddition of 1,3-diphenyl-2-propen-1-one (chalcone) with phenylhydrazine. This study aimed to observe the effect of varying substituents on the ring I pyrazoline toward their ease of reaction. The different substituents will give the different bioactivity. Chalcones 1a-c were produced by stirring the mixture of veratraldehyde and acetophenone with -H, -Cl, and -NO₂ substituent at para position while chalcone 1d from nitroveratraldehyde with chloroacetophenone. The result showed that chalcones 1a-d have been successfully synthesized in 80.93; 79.07; 75.83 and 14.85% yielded. The cycloaddition reaction yielded the pyrazolines 2a-d in 75.42; 52.90; 57.40 and 33.84%, respectively. The synthesized compounds were analyzed by FTIR, GC-MS, ¹H- and ¹³C-NMR. The result showed that reaction with -NO₂ substituent produce a low yield because it probably was decomposed.

Keywords: chalcone, pyrazoline, veratraldehyde

Dextrin production from taro flour (*Colocasia esculenta*) by steam explosion method

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Indonesia has abundant natural resources which could be a potential to achieve food self-sufficiency, such as local tubers. Actually, general tubers such as cassava and yam have been widely applied in food industrial for starch production. However starch and flour from minor tubers were rarely used because of their lack characteristics. Consequently, starch-modification is needed to obtain suitable properties for particular applications. Tuber are used in this study is taro tubers. Dextrin production by enzymatic method has been developed but not many in small industries. Enzymatic methods did not applied by small industries because more expensive and hard to applied in small production capacity. Therefore the research about dextrin production by *steam explosion* dextrin is conducted. The purpose of this study was to determine the characteristics of dextrin produced by steam explosion method. Explosion steam treatment at temperature 130°C, 140°C, and 150°C in neutral pH increased the solubility of taro flour were 39.10%; 46.49%; and 50.24%, respectively. Taro flour solubility which treatment in pH 4 temperature 130°C, 140°C, and 150°C were 46.47%; 43.61%; and 56.03%, respectively. Dextrin colour was brownish. Hygroscopicity was measured for 8 hours at 96% relative humidity and dextrin hygroscopicity were 18.54% until 21.91%. Particle size distributions of granule about 0.92 μ m until 2.22 μ m.

Keywords: dextrin, hygroscopicity, steam explosion, solubility, taro flour

Innovative method in parmesan cheesemaking: utilization of ultrafiltration membrane and non-starter lactic acid bacteria

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Conventional Parmesan cheesemaking requires a significant amount of aging time and rennet used. Those two factors hinder current Parmesan cheese production in Indonesia. Therefore, an alternative method is necessary to overcome those problems without compromising its particular flavor and aroma. This study proposes to add non-starter lactic acid bacteria (NSLAB) in order to reduce aging time required and utilize ultrafiltration membrane to reduce amount of rennet used in Parmesan cheesemaking. Produced Parmesan cheese's qualities were then compared to commercialized Parmesan cheese. Results showed increases in protein yield (from 80.62% to 89.89%) and cheese yield (from 8.54% to 10.17%). A culture concentration of 0.0106%-v/v each without aging time showed comparable qualitative parameters with commercialized Parmesan cheese. Overall it is concluded that application of ultrafiltration membrane and non-starter lactic acid bacteria addition can improve current Parmesan cheesemaking methods.

Keywords: aging, NSLAB, qualitative parameters, rennet, ultrafiltration membrane, yield

Anodic plasma depth influence on synthesis of biodiesel using plasma electrolysis method

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Plasma electrolysis is a process of electrolysis with DC current to excite electrons in the electrolyzed solution. This method is very prolific producing hydroxyl radical ($\text{OH}\bullet$), which is used to react with methanol and form a methoxyl radical ($\text{CH}_3\text{O}\bullet$). Methoxyl radical is used to break the bond of triglycerides to form methyl ester (biodiesel) and glycerol. The purpose of this study is to obtain good quality and quantity of biodiesel by the effect of drowning anode with constant contact area where the anode is the spot of plasma is formed. The solution that is used contain RBDPO and methanol with molar ratio 1:24, concentration of KOH 1%-wt. The variation of anode depth are 0.5 cm, 1.5 cm, and 3.5 cm below the surface of the solution with the 5 mm as a constant contact area. The result of this research show the improvement of efficiency and effectiveness of synthesis biodiesel with depth of the anode is increased. The maximum yield is reached at the depth of anode is 3.5 cm, which is produce 96,09% as a yield of biodiesel with 0,039%-vol water content, 0,138 as acid number, and energy effectiveness 0,909 kJ/ml.

Keywords: biodiesel, depth of anode, hydroxyl radical, plasma electrolysis

The effect of ethyl acetate solvent combination in corn silk (*Zea mays* L.) methanol extract to their potential as a natural sunscreen

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This study aims to determine the effect of ethyl acetate solvent combination in corn silk methanol extract on their content of phenolics, flavonoids, carotenoids and value of Sun Protection Factor (SPF). By knowing the SPF value so their potential as a natural sunscreen will represent. Corn silk powder was macerated with methanol to obtain methanol soluble fraction (E1), then the extract was fractionated with ethyl acetate (1:1) to obtain a soluble fraction of methanol-ethyl acetate extract (E2). The content of total phenols in E1 and E2 are 25072.54 mg/kg and 7439.34 mg/kg. The content of total flavonoids in a row are 176.03 mg/kg and 24.36 mg/kg. The content of total carotenoids in a row are 8.35 mg/kg and 35.42 mg/kg. Determination of SPF value performed by in vitro using a spectrophotometer-UV. The control were quersetin (C1) and β -carotene (C2). From the research, the SPF values of E1, E2, C1 and C2 were obtained respectively 14.75; 20.32; 38.7 and 39.15. The combination of corn silk methanol extract with ethyl acetate influence on their content of bioactive compounds like phenols, flavonoids, carotenoids content and SPF value of the extract. The corn silk methanol extract that combined with ethyl acetate showed a higher SPF values than corn silk methanol extract that isn't combined with ethyl acetate. The result showed the combination of ethyl acetate in corn silk methanol extract capable to increase the potential of corn silk methanol extract as a natural sunscreen.

Keywords: methanol extract of corn silk, natural sunscreen, SPF

Early intrauterine diagnosis and conservative treatment with silo bag for gastroschisis in Indonesia

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The management of gastroschisis still remains a challenge especially in developing countries. Gastroschisis have a good prognosis by early detection of intrauterine diagnosis and use of silo bag as conservative treatment. However, in Indonesia the prognosis is still poor because of late diagnosis that made after birth delivery, so the bowel is heavily contaminated, edema and could not fit into silo bag. In addition, silos are expensive and not available everywhere. This study aims to improve prognosis of gastroschisis in Indonesia by early intrauterine diagnosis of gastroschisis and replicate the silo bag so it could be affordable and used as conservative treatment for gastroschisis. The early intrauterine diagnosis of gastroschisis is made by examination of gen polymorfism c.677C> T metilentetrahidrofolat reductase(MTHFR) and ultrasonography (USG) examination. The replication of silo bag with silicone material will be tested as treatment in accordance with procedures to gastroschisis patients in Indonesia. After intrauterine diagnosis have been made, the birth delivery then programmed in sterile room. The fetal intestines outside of the stomach immediately put into a bag silo and then squeezing the top of silo bag daily for 2 weeks until all intestines goes into the stomach and the abdominal wall defects to navel covered with plaster. The survival rate of this treatment will be analyzed. Many studies concluded that prognosis of gastroschisis have 85 – 90% of survival rate with silo bag as conservative treatment if intrauterine diagnosis have been made.

Keywords: early intrauterine diagnosis, gastroschisis, silo bag

Isolation and characterization of cellulose from palm midrib

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The purpose of this research was to determine the effect of the concentration of NaOH on some characteristics of cellulose flour isolated from palm midrib. Cellulose isolation was done using a solution of NaOH with concentrations of 8, 12, 15, 18%. Cellulose flour obtained were analyzed water content, ash content, cellulose content, yield, WHC, OHC, lightness, functional groups, and crystallinity. Cellulose flour isolated with NaOH 15% had water content 9.3% (w.b), ash content 2.12% (d.b), cellulose content 89.63% (d.b), yield 37.32% (d.b), WHC 5.4 (g/g), OHC 2.99 (g/g), lightness value 90.83, and crystallinity 31.57%. The results of FTIR spectra analysis of commercial cellulose and cellulose from palm midrib isolated with NaOH 15% solution showed the same pattern.

Keywords: cellulose, characterization, isolation, palm midrib

Microwave assisted cationic polymerization of palm oils

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Indonesia is a major producer of palm oils, however more than 76% of the production is exported as crude palm oil (CPO) with low economic values. Chemical conversion is necessary to produce more valuable derivatives of renewable biobased material, including thermoplastic polymer. In this study, crude palm oils (CPO), refined bleached deodorized palm oil (RBDPO) and refined bleached deodorized palm oil olein (RBDPOO) were converted under microwave-assisted cationic polymerization with borontrifluoride etheral catalyst. The precursors were irradiated using commercial microwave with various reaction conditions. The raw material compositions, iodine numbers, and functional groups of the raw material and polymers were analysed by gas chromatography, titrimetry, and Fourier Transform infrared spectrophotometry, respectively. The differential scanning calorimetric (DSC) was used to observe the thermal characteristics of the polymers. The iodine number of the resulting polymer products was lower than the raw materials which indicated the decrease of the C=C bonds due to the polymerization. This result is supported with the intensity decreased of alkene bands in FTIR spectrum of product. The DSC thermogram curve proved the product of polymerization is thermoplastic polymer with the melting point ranged from 40.3 °C to 45.2 °C; and the freezing point of 22.5 °C to 28.1 °C. In conclusion, palm oils based thermoplastic polymer was successfully synthesized and characterized.

Keywords: biobased materials, cationic polymerization, microwave, palm oil

Study of physico-mechanical properties and release kinetics of eugenol on chitosan-alginate polyelectrolyte complex films as a food active packaging

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Study of eugenol's release and its release model kinetics from chitosan-alginate PEC films had been conducted. Some factors which affected the eugenol's release were also studied, including the composition of chitosan-alginate PEC and concentration of eugenol. Chitosan-alginate PEC films incorporated by eugenol were synthesized at $\text{pH} \pm 4.0$. Then, chitosan-alginate-eugenol PEC films were characterized using FTIR spectrophotometer. Investigation of films properties was also studied including morphology analysis using SEM, thermal analysis DTA/TGA, mechanical strength, transparency testing, water absorption, and water vapor permeability. Release study of eugenol was investigated through in vitro assay in ethanol 96% (v/v) for 4 days, and the concentration of eugenol was measured using UV-Vis spectrophotometer. Characterization of films using FTIR showed that the formation of polyelectrolyte complex (PEC) occurred through ionic interaction between amine groups ($-\text{NH}_3^+$) of chitosan and carboxylate groups ($-\text{COO}^-$) of alginate. Based on the result of this research, the composition of chitosan-alginate PEC and concentration of eugenol could affect the release of eugenol from PEC films. The higher concentration of alginate and eugenol could increase the concentration of eugenol which was released from the films. The mechanism of eugenol's release from chitosan-alginate PEC films followed Korsmeyer-Peppas model with n value of < 0.5 . It means that the release mechanism of eugenol was controlled by a Fickian diffusion process. Antioxidant activity assay of films by using DPPH method resulted in high RSA value of 55.99% in 4 days.

Keywords: antioxidant, eugenol, kinetics model, PEC chitosan-alginate, release

Potato starch modification by steam explosion

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Indonesia has many kinds of tuber which its starch can be used for many purposes. Potato is one of the sources of starch. However, it is rarely used because of its unsuitable functional characteristics. One of the unsuitable functional characteristics is low solubility in cold water. To optimize the use of potato starch, potato starch can be modified. There are many methods to modify potato starch. One of the methods is autohydrolysis with the steam explosion. This method is eco-friendly and low cost. Hopefully, steam explosion treatment can modify potato starch so it can be used for many purposes. The aim of this study characterized the steam explosion modify starch in different temperature and pH. In this study, potato starch was modified with steam explosion in temperature (120, 140 and 160°C) and pH (neutral and acidic). Furthermore, the modified potato starch was analyzed for its solubility, hygroscopicity, color, FTIR, the morphology of the granules. The result shows that there is different solubility for different temperature and pH. But there is no different in hygroscopicity at different temperature and pH. The highest solubility was obtained with temperature 140°C in neutral condition 56.22% with the hygroscopicity 22.57%. On the other hand, there are also changes in color and morphology of the granules.

Keywords: modified starch, potato starch, steam explosion

Catalyst screening in diimide hydrogenation of latex

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Natural rubber from particular rubber tree (*Hevea brasiliensis*) which has supreme mechanical properties compare to the synthetic rubber, is a basic constituent for nowadays modern transportation, industrial and medical equipment. Its high elasticity and plasticity contribute to its remarkable tensile strength. However, latex as the precursor of natural rubber tends to coagulate. This colloidal characteristic makes it unstable for thermal treatment such as hydrogenation and compounding, which are required for it to be processed further. Therefore, latex treatment before and during hydrogenation are necessary. In this research, 1% SDS (sodium dodecyl sulfate) as a surfactant, 200 rpm of stirring velocity, 20% of dry rubber content were used as the treatment processing parameter, where the temperature was used as the independent variable, to determine the highest turbidity and the lowest viscosity condition of the latex. After optimum processing temperature, has been obtained, the latex was then hydrogenated with and without the addition of DPNR (Deproteinized Natural Rubber) catalysis. In this case, hydrogenation efficiency measured by means of the degree of hydrogenation that represented by numbers of C double bond. It was found that the interplay between all the variables has different effects towards the colloidal stability of the latex and the effectivity of the hydrogenation itself.

Keywords: *Hevea brasiliensis*, colloidal, DPNR catalysis, hydrogenation, iodine number

Utilization of bamboo leaves silica for intermediate product of sodium silicate precursor

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Bamboo, a fast-growing grass, grows with ecological benefits. Some benefits have been investigated from its stems, but no more observation on bamboo leaves. Due to the fact, bamboo leaves consist of silica content, especially *Dendrocalamus asper* bamboo (Bambu Petung) has the silica content of 58.3%. In this study, the bamboo silica was utilized as water glass. Water glass can also be used as eco-friendly precursors for the preparation of silica aerogel. The extraction process of silica from bamboo leaves have been carried out through acid leaching and combustion process at 750°C. This paper is aimed to assess effect of two types of alkali hydroxide and its concentrations. This study was analyzed by using a 2² factorial design with six replications. The alkali hydroxide types were NaOH and KOH; and its concentration of 4M and 6M. The study was executed in several steps, i.e. pretreatment of bamboo leaves, leaching process, combustion, purification of bamboo leaves silica and synthesis of water glass. The optimum condition of water glass product was obtained at density of 1.23 g/ml and concentration of 41.08 g/L.

Keywords: bamboo leaves, potassium hydroxide, silica aerogel, water glass

Hyaline cartilage regeneration on osteochondral defects of rat's knee joints with intraarticular human peripheral blood CD34⁺ stem cells, hyaluronic acid, TGF, IGF, FGF and fibronectin injection

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The knee joint cartilage often suffers from defect and causes serious health problem. An adult human circulating CD34⁺ cells have been demonstrated to contribute for fracture healing, but its capability still unknown in hyaline cartilage regeneration. This is the first study reporting hyaline cartilage regeneration on osteochondral defect with intraarticular injection of CD34⁺ cell. The defect was created on the trochlear region of Sprague Dawley (SD) rats. A total of 30 male SD rats were random divided into 3 groups; the control group received PBS, experimental group 1 received CD34⁺ cells, and experimental group 2 received CD34⁺ and growth factors/scaffold (hyaluronic acid, TGF- β 1, IGF-1, FGF, fibronectin). Laboratory, radiology, macroscopic and microscopic evaluations were done on week 4th and 8th. At week 4th and 8th, both experimental groups showed the superficial defects fully filled with hyaline cartilage but not in control group, suggesting that CD34⁺ cells promoted cartilage regeneration. In conclusion, human peripheral blood CD34⁺ stem cells can promotes hyaline cartilage regeneration of the knee joint osteochondral defect on SD rats.

Keywords: CD34⁺, hyaline cartilage, knee joint, regenerate, osteochondral

Formulation of oleozon with *Phaleria macrocarpa* and *Cinnamomum burmannii* extract for diabetic wound treatment

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In this work, the effect of ozonation on coconut oil and mixture of coconut oil and olive oil was studied. The properties of ozonated oils (oleozon) were analytically tested by the method of iodine value, acid value, peroxide value, and FT-IR as general chemical substances. Ozonation may increase the peroxide and acid values for both oils but decrease the iodine values. The best ozonation condition is seen from an increase of 277.52% acid value, peroxide value about 114.77 meq O₂²⁻/kg oil, and decrease of iodine value up to 22%. Furthermore, ozonated oils were mixed with herbal extract and be tested the wound healing ability through antibacterial activity test. A mixture of 160 mL coconut oil that ozonated for 72 hours and 0.18 gram herbal extracts with n-hexane solvent showed the highest inhibition zone of 18.3 mm in *Staphylococcus aureus* bacteria.

Keywords: antibacterial, coconut oil, herbal extract, olive oil, oleozon

Functionalization of cellulose through polyurethanization by the addition of polyethylene glycol and diisocyanate

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Nowadays, plastics, becoming one of environmental problems, causes land pollutions due to its degradability. It has led studies to develop an environmental-friendly material to minimise the impacts of those land pollutions. Recently, the usage of cellulose to reduce the land pollution becomes popular in our societies because of its biodegradability and availability. Cellulose, the largest main component of natural fibers besides hemicellulose, lignin, and pectin, has the high strength and specific modulus and lightweight material. Hence, it can be combined into the polymeric material as a filler to improve not only the strength but also degradability of material. This research was focused to combine cellulose and polyurethane as a matrix. Unfortunately, cellulose and polyurethane have the different properties in which polyurethane is polar while cellulose is non-polar so that resulting poor compatibility. The mechanism, however, to enhance the compatibility through interface reaction between isocyanate and cellulose is known as grafting technique. A part from increasing the compatibility between two different materials, the focus of this research is to investigate the addition of diisocyanate and cellulose on the properties of hybrid polyurethane-cellulose material. The experiments were conducted by using Fourier-Transform Infrared (FT-IR) to confirm the functional functions, Simultaneous Thermal Analysis (STA) to investigate thermal stability, Scanning Electron Microscope (SEM) to examine the surface morphology and ^1H -Nuclear Magnetic Resonance (^1H -NMR) to probe the structure of hybrid material. The result reveals that the structure of hybrid material consists of cellulose as chain extender in hard segment which connect two diisocyanate compounds and polyol as soft segment. Furthermore, the addition of diisocyanate and cellulose affect the thermal stability of hybrid material in which the addition of cellulose could increase whereas the addition of diisocyanate could decrease the thermal stability.

Keywords: cellulose, chain extender, grafting technique, polyurethane, thermal stability

The efficacy of the root ethanol extract of *Acalypha indica* L. on metabolic syndrome rat model: focus on hyperglycemia and hyperuricemia

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Metabolic syndrome or *Cardiovascular Risk Syndrome* has several symptoms, such as hyperglycemia, hyperuricemia, and hyperlipidemia. In Indonesia 2004, the prevalence of metabolic syndrome was 13.3% and being increased every year. High fructose diet is once inducer of metabolic syndrome. At recent, a single drug is not already proved yet for releasing all symptoms in the same time. The first results showed that the extract of *Acalypha indica* L. (AI) was decreasing almost all lipid profiles as well as gemfibrozil significantly after inducing with high fructose and cholesterol diet (DTFK). So, AI still used to prove their efficacy as an antihyperglycemia and antihyperuricemia. Forty-eight Sprague-Dawley male rats, 12 weeks, 200-250 gram, were divided into 8 groups, randomly. Six groups were induced with DTFK that contains fructose 82.5%, 2 times daily and cholesterol 10% in standard fed for 5 weeks, two groups were normal (**A**) and normal +AI(**H**). Before treating, blood was collected for measuring glucose and uric acid concentration. **B**: negative control+CMC 1%; **C**: AI 250; **D**: AI+METFORMIN 100; **E**: AI+ALOPURINOL 30, in mg/kg.BW/day; **F**: METF; **G**: ALO. DTFK were given continuously for 4 weeks. Blood was collected from supra-orbitalis and cardiac puncture after anesthesia for measuring glucose, insulin, and uric acid concentration. The results showed that hyperglycemia and hyperuricemia of rats were achieved after inducing DTFK. AI (**C**) could not altering glucose and uric acid concentration. The insulin concentration was significantly decreased by AI; AI+METF, and METF. AI has an adjuvant effect to METF but not to ALO. In conclusion, the ethanol extract of AI has not showed their effect as an antihyperglycemia, hyperuricemia, but its lowering the insulin concentration as well as metformin, and it's could prevent the increasing of both glucose and uric acid concentration.

Keywords: *Acalypha indica* L., hyperglycemia, hyperuricemia, metabolic syndrome

Evaluation potential hazard of the fuel station existence to experimental reactor power (EPR) plant

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The evaluation of the potential hazards posed by the existence of fuel station (refueling and storage) to the EPR plant in Serpong Puspipstek Region has conducted. Fuel station is one of the stationary sources should be identified and evaluated their hazards if the EPR plant is within a radius of SDV their station. This is in accordance with the recommendations of Regulatory Head BAPETEN No. 6 of 2008 and Safety Guides IAEA NS-G-3.1 related to fire and explosion caused. The objective of research was to determine the extent of the potential hazards of fuel station (oil refueling and storage stations) to EPR plant. Research methods including data collection of fuel station around the EPR plant (radius 5 km) and determine their location coordinates, mapping and conduct the initial screening using SDV, further evaluation the hazards potential of flammable vapor fire and explosion distribution use ALOHA software. The results showed that there are 11 fuel stations within 1.94 to 12.66 km from EPR site. Based on screening distance value (SDV) is known that the EPR site is in the SDV radius of 3 fuel stations (Kademangan, Gunungsindur and Suradita). The potential hazards of explosion distribution showed that the strongest explosions (damage the building) occurred in up to a distance of 689 - 739 meters, while the weakest explosions (crack the glass) occur up to a distance of 1.8 km from the EPR site. The potential hazards of large fires occurred at a distance of 781 - 845 meters, while the small fires up to 2.2 km from the fuel oil station, so EPR site is quite safe and is still far away.

Keywords: EPR site, explosion and fire, fuel station

The blending of EPDM/NR with maleic anhydride as compatibilizer: comparing the effect of accelerators on cure characteristic and mechanical properties

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The blending of ethylene propylene diene monomer/natural rubber (NR/EPDM) needs much attention because of their incompatibility. In this work, the influence of accelerator type on cure characteristics and mechanical properties of 60/40 NR/EPDM blend was investigated. The compounds were prepared by controlling the migration of curative and used maleic anhydride as the compatibilizer. Three types of accelerators were studied: 2,2-dithiobis(benzothiazole) (MBTS), the combination of MBTS and tetramethyl thiuram disulfide (TMTD), and n-tert-butyl-2-benzothiazolesulfenamide (TBBS). The cure characteristic, mechanical properties, and morphology of the composites had been investigated by rheometer, tensile testing machine, hardness durometer and scanning electron microscope (SEM). It is observed that blending NR/EPDM with various accelerator give different composite characteristics. MBTS, used in single or binary accelerator system, provides good mechanical properties. TBBS give the longest scorch time, the lowest crosslink density and poor mechanical properties, except tear strength. Binary accelerator, MBTS/TMTD, provide the lowest processing time and the highest cure rate, but not significantly different from MBTS. Binary accelerator gives the best aging resistance and compatibility blend. These result correspond well with SEM micrograph. From the studied, it can be concluded that binary accelerator system is the proper accelerator for NR/EPDM blend.

Keywords: accelerator, compatibilizer, EPDM, maleic anhydride, NR

Nanoencapsulating coconut shell liquid smoke with coacervation and spray drying method using arabic gum and maltodextrin as encapsulant

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Liquid smoke composed by phenolic component is generally vulnerable when exposed by air. Therefore, liquid smoke covering is used, made with the nanocapsulee. The technique used is coacervation and spray drying. This experiment aims to identify the ratio of arabic gum and liquid smoke, and also by maintaining the optimal crosslinking time. nanocapsulee making process starts with mixing arabic gum into the liquid smoke on various mixing ratio. Next, the coacervation process is done by dropping encapsulant mix and liquid smoke with various concentration into glutaraldehyde . After the coacervation, next is the process of adding maltodextrin into the mix with the homogenization process and lastly, is the spray drying with spray drier. Analysis is done by observing the result of encapsulation efficiency, particle distribution, and morphology profile using SEM (scanning electron microscope). The result shows that the best nanoencapsulation efficiency is between 72.70%-82.80%. The optimum condition for the highest value of total phenolic content is on 1:3 ratio (b/v) and the optimal time for crosslinking is 15 minutes. The Result suggests that nanocapsulees had spherical shape with dips in the surface with an average size of nanocapsulees of 470.9 nm.

Keywords: arabic gum, coacervation, liquid smoke, nanoencapsulation

Synthesis of composite material based on Na-Lignosulfonate from isolation of wood sawdust to control urea release

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Urea is a widely used fertilizer because of its rich nitrogen content. However, it is easily undergoing chemical transformation resulting in 60-70% losses of total fertilizer applied. Thus, it is important to improve the efficiency and targeted delivery based on renewable sources. In this study, the Na-lignosulfonate isolation from wood sawdust, and then the composite material synthesis based on Na-lignosulfonate-Na-alginate-Tapioca for controlling the urea released was done. The Na-lignosulfonate was isolated by Kraft lignin method and was characterized by FT-IR and SEM-EDX. The composite material to control urea released was synthesized by blending urea as an active compound with composite material as carrier compound. The Na-lignosulfonate was isolated as brown solid in 16.92% yield. Three kinds of material, i.e. complete material (A), low concentration Na-lignosulfonate material (B), and material without tapioca (C) were prepared. Composite material had a spherical form with 0.79 mm radius and 2.16 mm swelled radius. Urea content inside material was 40.425 mg/g. The urea diffusivity constant for material A, B, and C were 7.27; 15.50 and 0.94 $\mu\text{mol m}^{-2} \text{h}^{-1}$, respectively. The modelling analysis of released experiment obeyed only about 15% of Korsmeyer-Peppas model, but it had a good correlation (80%) with unsteady state diffusion model.

Keywords: control release material, Na-lignosulfonate, urea, wood sawdust

An electrochemical characterization of DNA porcine biosensor utilizing screen printed gold electrode based on different supporting electrolyte

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A DNA biosensor for DNA Porcine using screen-printed gold electrode (SPGE) (from DropSens) has been developed. The system was developed based on polymeric mercapto acid to covalently immobilize DNA probe Porcine on the surface of SPGE. Cyclic voltammetry (CV) and differential pulse voltammetry (DPV) techniques were employed to characterize and optimized the detection system. The activation process before immobilization process was also carried out to increase the electrochemical activity of SPGE for a wide range of redox processes through the increase of surface functionalities and roughness or removing surface contaminants. The activation process was carried out in 0.5 M sulfuric acid with cyclic voltammetry scanning from 0 V to 1.6 V with scan rate 0.1 V/s until stable voltammograms were obtained. This process resulted on the removal of oxidation layer and the exposure of more active sites on the surface, which are beneficial for the enhancement of electrochemical performance in further analysis. Then, the characterizations of the biosensor were aimed at optimizing buffers so that sensitive, distinct, and clear current peaks could be obtained for oxidation and reduction reactions. Phosphate buffer, Tris-HCl buffer, and di-water are using as supporting electrolyte.

Keywords: electrochemical, electrolyte, DNA biosensor, porcine, SPGE

Inhibition of cancer cell invasion by novel sulfonamide derivatives

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Rab27a, a RabGTPase, and its multiple effectors are involved in exocytosis of lysosome-related organelles and play a major role in malignancy, which prompts Rab27a to be the target of drugs aimed to inhibit invasive growth and tumor metastasis. We synthesized several derivatives and their effects identified by virtual screening were investigated using MDA-MB231 and A375 cells. (E)-N-(3-chlorophenyl)-6-(2-(3, 4-dihydroxy benzylidene) hydrazinyl) pyridine-3-sulfonamide and (E)-N-benzyl-6-(2-(3, 4-dihydroxy benzylidene) hydrazinyl)-N-methylpyridine-3-sulfonamide significantly inhibited the invasiveness of both tumor cell lines. These two derivatives also decreased the levels of signature extracellular matrix marker proteins (fibronectin, collagen, and α -smooth muscle actin) and representative mesenchymal cell markers (N-cadherin and vimentin). These results suggest that novel sulfonamide derivatives have anti-metastatic activity in breast and melanoma cancer cell lines and may be used as therapeutic agents to treat malignant cancer.

Keywords: cancer, sulfonamides, MDA-MB231 cells, A375 cells

Antiseptic formulation of libo extract (*Ficus varieagata* Blume)

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Libo (*Ficus varieagata* Blume) is a wild plant in East Kalimantan. Secondary metabolites of Libo were alkaloids, flavonoids, steroids, terpenoids, and tannins. Libo extracts have potential as an antibacterial. The aim of this research was to a formulation of libo extracts as antiseptic. The formula of antiseptic was Libo fruit extract, tween 20, Sodium Lauryl Sulphate, NaCl, Propylene glycol, and aquadest. The antiseptic was tested by pH, viscosity, density, and performed with the national standard of Indonesia. The best antibacterial activity of antiseptic from libo fruit extracts was F3 formula.

Keywords: Libo (*Ficus varieagata* Blume), antiseptic, extract, formulation

Study the production of bioethanol from organic waste dried leaves

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University of Indonesia with total area of 359 hectares has the potential of dry leaf litter of 4 ton/month. Trash the potential to be transformed into bioethanol. Bioethanol can be used among other things as a raw material pharmaceutical industry, alternative energy sources and for laboratory purposes. A dry leaf litter lignoselulosa material consisting of lignin, hemicellulose and cellulose. The production process of bioethanol from lignocellulosic materials are pretreatment, hydrolysis, fermentation and distillation. In this study, using immersion Pretreatment with ammonia 32% for 24 hours using room temperature. Hydrolysis and fermentation using SSF (simultaneous saccharification and Fermentation). The microorganism used is *Trichoderma viride* and *Zymomonas mobilis*. Levels of ethanol produced by fermentation for 3 days the temperature of 32 °C is equal to 0.0139%, temperature 35 °C at 0.2151%, temperature 38 °C at 0.2064%. Fermented for 4 days at a temperature of 32 °C 0.0012%, temperature 35 °C of 0.0874% and a temperature of 38 °C at 0.0189%.

Keywords: *Trichoderma viride*, *Zymomonas mobilis*, bioethanol, lignocellulose, SSF

Termiticidal activity of *Toona sinensis* wood vinegar against *Coptotermes curvignathus*

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Termiticidal activity of wood vinegar from *Toona sinensis* (TS) sawdust has been evaluated against *Coptotermes curvignathus*. TS wood vinegar was produced at 250-300°C pyrolysis temperature, and a no-choice test was employed for evaluating termiticidal activity with thirty-three active termites. The concentrations of TS wood vinegar in the dried filter paper was prepared to 0% (solvent only), 2%, 4%, 6%, and 8%. The TS wood vinegar showed strong termiticidal activity and that concentrations of wood vinegar significantly influenced mortality of termite. The termite mortality increased when the concentration of wood vinegar increased, at a concentration of 8% all termites dead after 3 days tested. Forty constituents were characteristic on the basis of GC-MS data, and 33 components were identified. The organic compounds in TS wood vinegar were classified into carboxylic acids, phenols, ketones, amides, aldehydes, furans, esters, alcohols, sugar derivative, and ether, and among of this components, acetic acid comprised 57.43%. The contents of organic fraction of TS wood vinegar and largely acetic acid might be responsible for the termiticidal activity. Base on physicochemical properties, TS wood vinegar has a good quality as well.

Keywords: *Toona sinensis*, GC-MS, termiticidal activity, wood vinegar

The comparison of patchouli oil extraction using conventional hydrodistillation and microwave hydrodistillation methods

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Essential oils is one of the important commodity for Indonesia. But there are still many obstacles faced by producers essential oils in Indonesia related to the effectiveness of the extraction process. In this study conducted a study on the potential of microwave for the extraction of patchouli oil. The materials used in this study is dried patchouli leaves with leaves-to-water ratio of 1:10. The study was conducted by comparing the extraction process of patchouli oil using hydrodistillation and microwave hydrodistillation methods. The results showed that the microwave hydrodistillation method able to shorten or reduce the extraction time of patchouli oil when compared with hydrodistillation method. In addition, microwave hydrodistillation method is also able to reduce energy consumption and can be regarded as a green technique for extraction of patchouli oil. The microwave hydrodistillation method also offers the possibility for better reproduction of the natural aroma of the patchouli oil than that obtained using hydrodistillation method.

Keywords: *Pogostemon cablin*, extraction, hydrodistillation, microwave hydrodistillation, patchouli oil

Bioconversion of palm oil into biosurfactant by *Halomonas meridiana* BK-AB4 for the application of corrosion inhibitor

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Biosurfactant is environmentally friendly surfactant produced by certain microorganism in a lipid rich medium. In the previous study, we have found the potential of a moderate halophilic bacterium, *Halomonas meridiana* BK-AB4, in converting olive oil into biosurfactant. In the present study, we evaluated the effect of changing the carbon source from olive oil into cheaper and more abundant vegetable oil, which is palm oil, for production of the biosurfactant. The study began by optimizing the production medium with varying the nitrogen source, concentration of palm oil and pH. The optimum condition of biosurfactant production was observed in the medium consisted of 1% urea, 2% of palm oil and pH 9. The resulted biosurfactant was stable at pH 7-10 and in the salt concentration of 6-15%. Biosurfactant activity in lowering air-water surface tension was measured using the Du Nouy ring method and the value of CMC (Critical Micelle Concentration) was observed at 233 ppm. At this point, the surface tension of water dropped from 68.3 to 49.8 dyne/cm. Preliminary structural analysis by using FTIR technique suggested that the resulted biosurfactant has -OH, -C-H aliphatic C=C, H-C-C and C=O groups in its structure, which is similar to that of fatty-acid type of biosurfactant. The potential of biosurfactant as a metal corrosion inhibitor was evaluated by using an electrochemical impedance spectroscopy (EIS) method that operated at 30°C. The measurement revealed that the highest inhibition level was observed at the biosurfactant concentration about 233 ppm that correspond to the inhibition level about 53.23%.

Keywords: *Halomonas meridiana* BK-AB4, biosurfactant, corrosion inhibitors

Biosorption of chromium (III) on natrium hydroxide biosorbent activated of coconut coir fiber

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This study describes the adsorption of Cr (III) by the use of coconut coir fiber activated with natrium hydroxide (NaOH). Some parameters investigated were the base optimum concentration, biosorbent surface acidity, specific surface area, optimum pH, optimum contact time of biosorption, isotherm type, and the adsorption capacity of biosorbent to Cr (III). The result show that the natrium hydroxide optimum concentration for activation coconut fiber was 1,2 M. The surface acidity of BAN (biosorbent activated of natrium hydroxide) and BOO (biosorbent control) were $9,99 \pm 0,17$ and $3,17 \pm 0,21$ mmol/g respectively. The surface specific BAN and BOO were 20,21 and 19,14 m²/g respectively. The optimum pH of biosorption Cr (III) on BAN and BOO biosorbent was 3 and the contact time were 30 and 120 minutes. Biosorption capacity of coconut coir fiber increase with the use natrium hydroxide. The biosorption capacity of BAN and BOO by activation were 0,4198 and 0,0155 mg/g respectively. Type of isotherm adsorption for the biosorption of Cr (III) on BAN and BOO biosorbent were near the isotherm S.

Keywords: adsorption, biosorption, coconut coir fiber, chromium (III), natrium hydroxide-biosorbent activated

The effect of alum addition on the shrinkage temperature, chemical properties and morphology in the manufacture of vegetable-tanned leather

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Vegetable-tanned leather has several disadvantages, which one of them is low thermal stability due to insufficient cross-linking with the collagen. The addition of aluminium sulfate in the vegetable tanning process will strengthen the cross-linking between the polyphenol and collagen, as well as forms the matrix in collagen. Thus, it will improve the thermal stability. The research aimed to figure out the addition of mimosa and aluminium sulfate on the shrinkage temperature, chemical properties, and morphology of leather. The research was conducted by using a variation of mimosa concentration (15%, 20%, 25% w/w) and aluminium sulfate concentration (3%, 6%, 9% w/w). The results showed that the treatment influenced the chemical properties and shrinkage temperature. The optimum treatment was the addition of 9% (w/w) aluminium sulfate to 25% mimosa which resulted to shrinkage temperature of 99,33° (rise 18,34%); nitrogen content ($8,00 \pm 0,0141$)%; raw skins substance content ($44,46 \pm 0,0778$)%; tannin bound content ($28,29 \pm 0,0424$)% and the degree of tannage ($62,93 \pm 0,0141$)%. Based on the SEM image, the addition of aluminium sulfate after mimosa has made the collagen fiber structure to be dense, which indicates the improvement of the cross-linking between the polyphenol and collagen.

Keywords: alum, degree of tannage, shrinkage temperature, tannin content, vegetable-tanned leather

Dispersing agent of KCl salt and reinforcing agent of microfibrillated cellulose of bamboo in preparation of biocomposites-sago starch based affecting mechanical property

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Sago starch based bioplastics as food packaging can be observed due to availability and high content of amylopectin. This paper explains improvement of sago starch-based bioplastics by reinforcing with microfibrillated cellulose (MFC) of bamboo. However, homogeneous of MFC as reinforcement denotes as ultimate in preparation of bioplastic releasing good mechanical property. Therefore, this paper investigates tensile strength of bioplastic-sago starch based reinforced MFC of bamboo aided dispersing agent, i.e. potassium chloride, assisted by ultrasonic homogenizer. In this study variables used were MFC concentration of 1%, 3%, and 5% w/w; KCl concentration of 1%, 2%, and 3% w/v. Sago starch-based solution was prepared from 4% w/v. The mixed solution was gelatinized at temperature of 90 °C. The result showed that the 5% of bamboo MFC increased tensile strength of sago starch-based bioplastics due to purpose of bamboo MFC as reinforcement of sago starch. Further, additional of KCl reduced the dispersing time for 1 hour. Optimum result in this preliminary experiment was obtained at bamboo MFC of 5% w/w and KCl concentration of 1% w/v resulting tensile strength of 17.99 MPa.

Keywords: bamboo, dispersing agent, microfibrillated cellulose, potassium chloride, sonication

Functionalization of cellulose through polyurethanization by the addition of polyethylene glycol and diisocyanate

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Nowadays, plastics, becoming one of environmental problems, causes land pollutions due to its degradability. It has led studies to develop an environmental-friendly material to minimise the impacts of those land pollutions. Recently, the usage of cellulose to reduce the land pollution becomes popular in our societies because of its biodegradability and availability. Cellulose, the largest main component of natural fibers besides hemicellulose, lignin, and pectin, has the high strength and specific modulus and lightweight material. Hence, it can be combined into the polymeric material as a filler to improve not only the strength but also degradability of material. This research was focused to combine cellulose and polyurethane as a matrix. Unfortunately, cellulose and polyurethane have the different properties in which polyurethane is polar while cellulose is non-polar so that resulting poor compatibility. The mechanism, however, to enhance the compatibility through interface reaction between isocyanate and cellulose is known as grafting technique. Apart from increasing the compatibility between two different materials, the focus of this research is to investigate the addition of diisocyanate and cellulose on the properties of hybrid polyurethane-cellulose material. The experiments were conducted by using Fourier-Transform Infrared (FT-IR) to confirm the functional functions, Simultaneous Thermal Analysis (STA) to investigate thermal stability, Scanning Electron Microscope (SEM) to examine the surface morphology and ^1H -Nuclear Magnetic Resonance (^1H -NMR) to probe the structure of hybrid material. The result reveals that the structure of hybrid material consists of cellulose as chain extender in hard segment which connect two diisocyanate compounds and polyol as soft segment. Furthermore, the addition of diisocyanate and cellulose affect the thermal stability of hybrid material in which the addition of cellulose could increase whereas the addition of diisocyanate could decrease the thermal stability.

Keywords: cellulose, chain extender, polyurethane, thermal stability, grafting technique

Crystallinity-mechanical property relationship of polypropylene/starch blends

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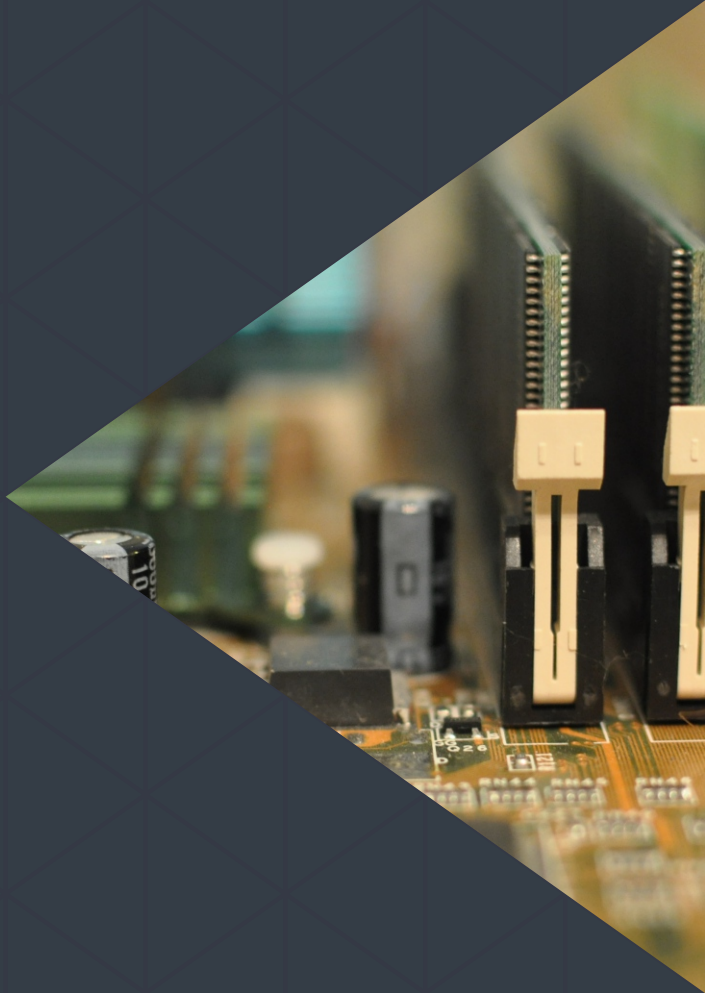
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The influence of crystallinity on mechanical property of several Polypropylene/starch blends (PP/Starch) of varying composition was studied. The blends prepared on the composition of PP/starch 50/50 and 60/40 with the addition Amylopectin-g-poly (Hexyl methacrylate (Ap-g-PHMA) at 0,6 and 1%. The samples were characterized by Simultaneous Thermal Analysis (STA), mechanical properties and melt flow index. It was found that the addition of starch to PP increases its thermal stability, the effect of actuality better when the Ap-g-PHMA as compatibilizer is added. Starch act as nucleating agent increasing the crystallization temperature and degree of crystallinity. And also the particle size of starch increased with the increasing volume fraction, perhaps due to the agglomeration and formation of aggregates of starch granule. The mechanical properties and viscosity of the blends decrease with increasing starch volume fractions.

Keywords: Ap-g-PHMA, crystallinity-mechanical properties, polypropylene, PP/starch blends, starch

Computer



The wireless energy transfer recharging system based on the ultra-high frequency by using Yagi-Uda directional antenna

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In the near future, the Wireless Energy Transfer (WET) will be widely used, especially for electronics recharging in the human organ implantations. WET has been researched intensively by some researchers, but the low efficient energy transfer is still a problem. In order to figure out the efficiency of the energy transfer, the experiment had been conducted in Laboratory of Sensor and Telecontrol Systems. The complexities of the measurement system setup and assessment of the sufficient energy both transmitter and receiver will also be discussed. The experiment results deliver the new design of the WET, empiric data of the energy transfer, and the sufficient antenna model as well. In this research, The UHF transmitter generated radio frequency with output energy of 39.00-watt energy source. Range of various frequencies in this paper is 400 MHz to 489 MHz and the SWR is 1.2. The transmitter unit and the antenna were connected with the 50 ohm-coaxial cable. In order to transfer the energy, the transmitter system consisting Yagi-Uda model antenna was applied. The results show that the efficiency maximum of the measured energy transfer is 0.36%. In our investigations, the efficiency of the result also depends on the polarity of the Yagi-Uda Antenna used in the experiment. According to the results, the angle that the maximum energy transferred is 60°, on the contrary the angle of 150° gives the lowest efficiency results. We found that the distance between the transmitter and receiver antenna contribute significantly to the amount of energy transferred of the system. In this case, the energy can be calculated from the current and voltage measurement. The energy transfer versus distance relationship shows that a specific trend was obtained. This specific trend seems effected by the antenna characters used in the experiment. Based on the experiment results, the wireless energy transfer could be done by utilizing UHF radio wave. Even though the efficiencies were still relatively low, but it can be used for some specific purposes i.e., in the electronic human organ implant recharging and applicable for the general electronic devices in the special areas. This experiment data are very useful for the scientists, practicing who work in the WET research field.

Keywords: antenna, electronic human organ implant, radio transmitter, ultra-high frequency, wireless energy transfer

Data service orchestration for law enforcement
and open criminal justice data interoperability:
National Crime Information Center,
Indonesian National Police Case Studies

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Information communication and technology (ICT) adoption in law enforcement service has been transformative and shifted from the system application oriented to the open data oriented, where information can be more easily exchanged among law enforcement organizations. Therefore, interoperability is an essential requirement for open data service provision that progresses towards higher levels of integration among government levels and branches to enhance the quality of public services, transparency, accountability, cost-effective service provision and government operation, optimization of public policies for better outcomes and integrated government processes. In this paper, we proposed a proof of concept of data service orchestration for law enforcement that aims to integrate internal and external agencies of the criminal justice information system. Through this system, the law enforcement agencies could provide exchange services environment with greater ease and deliver public value through open criminal justice data initiatives to increase prestige as well as institutional transparency and accountability.

Keywords: data service orchestration, interoperability, law enforcement, open criminal justice data

High-resolution automated Fugl-Meyer assessment using sensor data and regression model

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Motor function assessment is a critical component in post-stroke rehabilitation program. Fugl-Meyer Assessment (FMA) is regarded as the most comprehensive tool to describe post-stroke patient's motor function and is widely utilized. However, the FMA scoring system classifies patient's motor function within only three levels (0, 1, and 2) for each assessment item. It's difficult to observe minor improvement in patient's motor function. Thus, a high-resolution scoring system is proposed in this research. Utilizing several regression algorithms, six learning models are built for six upper-extremity FMA assessment items. These models are trained by data gathered from Microsoft Kinect sensor and customized glove sensor. These models are able to predict FMA scores with the resolution of 14 fractional digits. The predicted scores are proven to have higher correlation scores with the actual kinematic variable than the defined FMA scores. In other words, the high-resolution scoring system proposed in this research represents subjects' motor function better than the classic FMA scoring system. In addition, the Neural Network regression algorithm outperforms the other algorithms in terms of representativeness. The ability to observe the change in patient's motor function in detail helps therapists providing more responsive treatment and could likely increase the patient's adherence toward the given treatment.

Keywords: Fugl-Meyer assessment, Kinect sensor, machine learning, regression algorithm

The prediction of energy-absorption on the car crush box

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This paper describes a computationally aided design process of a thin-walled structure of a retail car crush box subjected to a dynamic crushing in longitudinal axial direction. The study was broken up into three phases: (1) digitizing of the existing retail car crush box structure, (2) the crush simulation of the structure using dynamic explicit formulation (3) the verification of the crush simulation. In the digitalization phase of this structure, the perimeter of the cross section, the shape, the length and the thickness of profile was made the same as the OEM (Original Equipment Manufacturer) product of a compact car found in the local market. The crushing procedure and parameter follow the New Car Assessment Program (NCAP) by National Highway Traffic Safety Administration (NHTSA). It was found that the value of energy absorbed by the crush box was 5.91 KJ. The energy absorbed per unit mass of material (the specific energy absorption) is 21.53 KJ/kg. The crush force efficiency is 0.54. The simulation method, that was verified using square tube structure, resulting in the value that match to the existing simulation done by other researcher.

Keywords: car crush box, crush, energy absorption, finite element, longitudinal axial impact

Machinery equipment early fault detection using artificial neural network based autoencoder

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Machinery equipment early fault detection is still in an open challenge. The objective of this paper is to introduce a parametric method Artificial Neural Network based Autoencoder implemented to perform early fault detection of a machinery equipment. The performance of this method is compared to one of the industry state of the art nonparametric methods called Similarity Based Modeling. The comparison is done by analyzing the implementation result on both artificial and real case dataset. Root Mean Square Error (RMSE) is applied to measure the performance.

Keywords: autoencoder, fault detection, nonparametric, parametric, similarity based modeling

A review on driver drowsiness based on image, bio-signal, and driver behavior

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The ratio of accident caused by drowsiness, increases slightly year by year. The most victims of this case are young adult and mostly happens in developed country. Therefore, to reduce the number of accidents caused by drowsiness, researchers around the world develop some methods for detecting drowsiness on driver's face automatically. They propose various features such as visual, non-visual, and vehicular. Visual features are extracted from driver's face and recorded by camera. Non-visual features are signals emerged from driver's body and to acquire those signals, they use special sensor attached to driver's body. Vehicular features are obtained by observing behavior of driver during driving. From those features which are proposed by researchers, we discussed 3 ideas that can be considered as guidance to lead researcher in developing drowsiness detection. First idea is creating the dataset of drowsiness facial expression because it can predict drowsiness and fatigue. Second idea is to combine those techniques into one for better accuracy. And last one is developing wearable hardware for drowsiness detection which are easy to use and user friendly.

Keywords: bio-signal, driver behavior, drowsiness detection, image processing

Cost-based power distribution optimization scheduling in microgrid

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Renewable energy is one of the solutions of energy limitation problem in the world. It often works with some independent plants of renewable energy that work together under the circumstances of center control. The renewable energy system (RES) such as photovoltaic (PV), wind turbine (WT) has a serious lack of stability power output or uncertain power. Because of that, the microgrid system (MGs) is built to optimize the power flow and minimize the impact of energy fluctuation. Not only about the power flow, but also the cost analysis is important in order to find the optimized power resource combination to reduce cost. This paper proposes a cost-based power distribution scheduling optimization in a microgrid. The power resource conducted from PVs, WT, biomass, and storage system performed by 0-1 Knapsack problem formula. In order to find the optimized cost, genetic algorithm (GA) is used. The output shows the optimized cost, output power which depends on energy load and true power resource combination of microgrid scheduling.

Keywords: 0-1 Knapsack problem , cost-based, genetic algorithm, microgrid scheduling, optimization, renewable energy

Performance comparison of SISO and MIMO-OFDM based on SDR platform

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Due to requirement of reliable high-speed wireless communication, OFDM combined with multiple antennas system (MIMO) is a key technology for next-generation wireless communications to improve transmission performance. In this paper, we conduct field experiment for SISO and MIMO-OFDM using USRP N210 hardware as SDR platform. The research is conducted in LOS and NLOS environment with 16-QAM modulation technique. The result shows that MIMO-OFDM achieves better performance than SISO-OFDM. MIMO spatial diversity with Alamouti STBC algorithm gives 2 dB diversity gain at BER of 5.10^{-4} in LOS scheme and 6.7 dB in NLOS scheme.

Keywords: BER, LOS, MIMO-OFDM, NLOS environment, SDR platform, STBC

Real time monocular visual odometry using optical flow: study on navigation of quadrotors UAV

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Navigation is an important thing in so many intelligent systems. Nowadays, without any hesitation Global Positioning System (GPS) is the most common method for navigation. Nevertheless, in certain environments, GPS will become inaccurate due the multi-path problem. In this paper we propose a deadreckoning system for quadrotor using feature-based monocular visual ordometry to overcome that problem. The visual odometry design will be implemented into the fix bottom camera which is monocular camera in quadrotor. The algorithm is validated by performing several tests. The results of the tests verify that the visual odometry algorithm can determine the position and orientation with good accuracy

Keywords: monocular camera, navigation, optical flow, visual odometry

Comparison of machine learning algorithms for soil type classification

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Machine Learning Algorithm can be applied for automating soil type classification. This paper compares several machine learning algorithms for classifying soil type. Algorithms that involve SVM, Neural Network, Decision Tree, and Naïve Bayesian are proposed and assessed for this classification. Soil dataset is taken from the real data. Simulation is run by using RapidMiner Studio. The performance observed is the accuracy. The result shows that SVM, with the use of linear function kernel, outperforms the others algorithms.

Keywords: accuracy, classification, soil type

Web engineering education through blended learning

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Web technology is growing with one website deployed per second, it can be said that any business will have a website. Therefore, web developer become an essential part to make it happen. However, web technology is not simple, there are more than 50 web frameworks that can be used to develop a website. There are more than 10 web programming languages that can be chosen to develop a website. This paper proposes an idea to accelerate learning curve for new web developers. The paper uses ADDIE framework to develop an e-learning that will support the classroom as a blended learning experience. Accordingly, this article proposes learning plan namely Web Engineering Education (W2E). W2E proposes structured blended learning approach and capstone design course model to achieve the body knowledge of web developers. This paper will describe the body knowledge for web engineering, the learning curve that proposed for a new developer, and evaluation technique that can be used to evaluate the web engineer.

Keywords: blended learning, web developers, web engineering education, web technology

Linking dimensions to support tourism recommender system

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Utilization trend of information technology has made it easier for service providers and users to share information. However, the trade-off ease of generating may result information overload. This makes it difficult to search, sort, and select of information. Therefore, to cope with the surplus information, it is necessary to do the filtering through the recommendation system. Two-dimensional recommendation system defines the interaction user and items, however, it has several limitations, such as cold start problem, limited content analysis, sparsity, and scalability. To overcome this, the solution is a recommendation with a multidimensional approach taking into account the additional contextual information, consist of location, time, and social activities. Preparation of multidimensional recommendation system is conducted through a literature review. Related to tourism's context, in this paper, the proposed conceptual model of multidimensional context-based recommendation systems considers several important aspects such as tourists (users), destination (items), location, time, social, and weather.

Keywords: contextual information, filtering, information overload, multidimensional, recommendation systems

Mango leaf image segmentation on HSV and YCbCr color spaces using otsu thresholding

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Research detection of mango tree type that hasn't yet-fruitful needs good result of image segmentation. This is due it use color, texture, and shape as feature. Especially shape feature, we have to produce good image segmentation result as input of feature extraction. For color and texture, we need image segmentation result to be some region of interest in the feature extraction. In this research, we use segmentation by thresholding with Otsu method. We apply Otsu thresholding on Hue, Saturation, Intensity (HSV), and Luminance, Chromaticity Blue, Chromaticity Red (YCbCr) color space for mango leaves. All components of color space are used except Luminance. Segmentation is done by converting input image Red, Green, Blue (RGB) into color space required, then use the color components required, then applying Otsu threshold method, then use several morphology steps to produce good segmentation results. Then the results are compared with ground truth images. Performance testing of color space components provides the best performance component, it is Cr, then Saturation, Cb, Intensity, and Hue respectively. We use Precision, Recall, and F-measure as performance measurement. Precision is a percentage of positive detected in detection result. The Recall is the percentage of real positive detected. While F-measure is weighted harmonic mean of Precision and Recall. The results of empirical testing on components Cr, the average performance of segmentation obtained as follows: Precision is 0.995, Recall is 0.971, and F-measure is 0.983. This performance proves Cr as the right color space component for image segmentation of mango leaves by thresholding.

Keywords: analysis, HSV, mango leaves, performance, segmentation, threshold, YCbCr

The application of wavelet recurrent neural network for lung cancer classification

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Lung cancer is one of the deadliest types of cancer in the world. Lung cancer detection is necessary to determine the next steps in dealing with the patients. One of the methods that can be used for lung cancer detection is classification method based on lung cancer image. Most of the models for lung cancer classification based on lung cancer image are various types of neural network model with binarization image pre-processing. As an image is containing noise, it is needed to remove the noise from the original image before the binarization process. Wavelet is a model that can be used to remove the noise from the original image, i.e. image denoising process. Recurrent Neural Network is neural network development model which is able to accommodate the network output to be re-input of the network. The architecture of Recurrent Neural Network uses Elman network that has feedback link from the hidden layer to the input layer. The combination model of Wavelet and Recurrent Neural Network, called Wavelet Recurrent Neural Network, can be used for lung cancer classification by applying Wavelet for lung image denoising process and Recurrent Neural Network for classification process. Classification of lung cancer using Wavelet Recurrent Neural Network provide results with sensitivity, specificity, and accuracy were respectively 93.75%, 66.67%, and 84% for training data and 88.24%, 75%, and 84% for testing data.

Keywords: image processing, recurrent neural network, wavelet, wavelet recurrent neural network

Parallel implementation of genetic algorithm for searching optimal parameters of artificial neural networks

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Genetic algorithm is a population-based evolutionary optimization approach, and this has been used to train artificial neural networks successfully. When a large number of individuals make up the population, however, the running time of the algorithm often becomes very long. Parallel computation is a technique that can potentially be used to address this issue. This research investigates the adoption of parallel genetic algorithm for searching optimal parameters of artificial neural networks (multilayer perceptrons). Parallelization is conducted using Message Passing Interface, where sub-populations (and their fitness values) are exchanged between processors while selection, crossover, and mutation processes, which are necessary to generate new sub-populations, are performed independently between processors. Experiments of this research show that parallelization has indeed reduced the running time of genetic algorithm. The proposed method produces an average running time of 2.066, 2.656, and 47.788 seconds/generation for the game of Tic-Tac-Toe, car evaluation, and game of chess (King- Rook vs. King-Pawn) datasets, respectively. For comparison, the average running time of the serial version of the algorithm is 14.397, 12.961, and 350.963 seconds/generation for the same three datasets, respectively.

Keywords: artificial neural networks, backpropagation algorithm, genetic algorithm, message passing interface, parallel computation

Long distance automatic number plate recognition under perspective distortion using zonal density and support vector machine

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Automatic Plate Number Recognition is one of computer vision applications to extract information in vehicles plate number. Nevertheless, perspective distortion is unavoidable when taking pictures of plate number. Another factor that causes inaccuracy is the distance of camera from the plate number. To solve these problems, we propose a new method to automatically detect and recognize vehicle plate number with regards to perspective distortion and distance of capturing plate number. We used zonal density with Support Vector Machine (SVM) as classifier. We tested our algorithm on 21 vehicles plate number with 1, 3, and 5 meter of capturing distance. Our method yields accuracy of 91.98%, 83.33%, and 51.85% for 1, 3, and 5 meters capturing distance, respectively. Compared with previous work, our method is able to preserve high accuracy when segmenting characters of plate number taken from 5 meter distance

Keywords: automatic plate number recognition, machine learning, perspective distortion, support vector machine (SVM), zonal density

Research of university sites internal links distribution

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The article covers the university websites webpages distribution analysis in terms of the number of incoming internal links. Papers by A. Broder and R. Kumar (2000), Barabasi and Albert (1999) represent, that the distribution follows a power law with the exponent of around 2.1. However, we have recently developed a method that allows to size up website's webpages by studying just 10% of the site itself. Within the research we came across the idea, that university sites have particular characteristics, therefore they have a different exponent. This article contains the description of the experiment results conducted by the article authors, the experiment includes 97 university sites from top 500 Webometrics ranking. Power approximating curves, that describe incoming links distribution, have been drawn for each site. The average exponent among all sites is about 1.8.

Keywords: incoming links, power law distribution, university sites, web graph, web-pages

Performance comparison of caching strategy on wordpress multisite

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The usage of http accelerator for web server are common, meanwhile Object cache on wordpress multisite can be stored using redis database. By utilize http accelerator and redis as cache combination strategy on wordpress multisite we can maximize the wordpress client capacity. The conducted experiment already done show us that the most stable setup for cache combination is by separating object cache by its type. For static object such as image, css, and js suitable to be cached in http accelerator using varnish cache and for database activity object cache can be stored on database cache using redis cache.

Keywords: apdex, benchmark, object cache, redis, varnish, wordpress

Robustness of PD control for transporting quadrotor with payload uncertainties

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Considering its agility and capability to vertical take-off and landing, quadrotor is beneficial for transporting mission. In this paper, we present a model of a transporting quadrotor with payload uncertainties, as well as its corresponding proportional-derivative (PD) control on Special Orthogonal-3. Practically, it is a challenging problem to compensate the inertia perturbation due to the uncertainties of the payload that being transported. It is where our proposed control law comes to urge. Finally, numerical simulation and results are presented to verify the effectiveness of our proposed control law.

Keywords: model, PD control, quadrotor, simulation

Servo state feedback based on coefficient diagram method in magnetic levitation system with feedback linearization

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The challenge of servo state feedback controller design is how to determine the parameter value of integral and state feedback gains. This paper proposes CDM (Coefficient Diagram Method) to determine gains of servo state feedback controller. We apply this controller in the nonlinear plant, magnetic levitation system, and firstly transform the system to be linear using feedback linearization. CDM is one of the polynomial methods in a control system that based on the equivalent time constant and stability index. The simulation observes the performance of the system with various stability index beside the standard parameter and also compare the CDM with another method i. e. LQR. The simulation shows that the standard parameter of CDM can give a good performance of the system so that can avoid the effort of trial and error.

Keywords: coefficient diagram method (CDM), feedback linearization, LQR, magnetic levitation system, servo state feedback

Simulation of modified tubular linear permanent magnet generator for wave energy conversion in Indonesia

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Conventional tubular linear permanent magnet generator (LPMG) is composed of permanent magnets which are placed in translator, and stator which is made of iron. However, this topology suffers from relatively huge cogging force due to interaction between the magnet and the iron, also large core losses from hysteresis and eddy current. To reduce the force and the losses, modified design of LPMG was proposed by reducing iron proportion of the stator. The modified tubular LPMG would be applied for 1 kWp wave energy power plant in south coast of Java, Indonesia. The reduction of the iron was then compensated by increasing number of stator winding turn to maintain the output power as desired. Resulted design was then simulated by using finite element magnetic software of FEMM to check the output values based on magnetic flux distribution. The results of the simulation showed that the modified design needs 11.4% more stator winding turn to produce equal power. However, the cogging force and the mechanical loss decreases by 24.7%. The design also reduces 57.2% of both hysteresis loss and eddy current loss, and 57.1% of weight.

Keywords: cogging force, conventional design, modified design, tubular linear generator

Analysis of ferrite effect in axial flux permanent magnet generator using magnetic circuit approach

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In this paper, four models of AFPMG (Axial Flux Permanent Magnet Generator) are analyzed and compared to get the best model correspond to highest magnetic flux density that produced by those generators. Before analyzing performance of those models, leakage flux are modeled and analyzed by using magnetic circuit approach to define optimal distance of magnet to magnet on the rotor disk. Therefore, optimal size of AFPMG are determined according to optimal distance of magnet to magnet. Analytical results show that AFPMG with ferrite core and ferrite ring has the highest value of magnetic flux density. By addition of ferrite material in AFPMG, it can increasing the value of magnetic flux density. On the other hand, it is also can decreasing leakage flux value.

Keywords: AFPMG, ferrite, flux, magnetic circuit

Evaluation of spatial and regional planning map using remote sensing and GIS in East Lombok Indonesia

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Temporary of preservation regional planning map need to evaluate and renewable execute so deviate possibilities can be prevented. This study is conducted to evaluate the regional planning map in East Lombok based on potential land-use using directive and existing land-use map. Directive land-use map is made by overlaying of some parameters, such as the slope, soils, and rainfall using GIS. Existing land-use map produced by visual interpretation utilizing Landsat 8 OLI satellite imagery. The field survey did use stratified random sampling to validate parameters of directive land-use map, accurate test of the existing land-use map, and interviews. Result or field survey used to reinterpretation models and make suitability models of regional planning map.

Keywords: directive, existing, land-use, regional planning map

Development of orthosis design for spastic cerebral palsy through biomechanical approach

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CP patients in Indonesia is estimated at around 1-5 per 1,000 live births to 80% is a type of Spastic CP. In patients with Spastic CP legs stiffness that causes the formation of abnormal posture, walking gait, and decreased motor skills which can be treated by wearing the orthosis. HKAFO often used as a device for therapy and AFO used for daily. Control posture patients in daily activity be most important point in increasing gross motor function. To maximize the use of orthosis for daily activity needed design development with the approach biomechanical aspect. Approach which includes power of motion feet, angles motion joints, and adjustment to the different character of CP Spastic.

Keywords: biomechanical, cerebral palsy, orthosis

Design and implementation of surveillance embedded ip camera with improved image quality using gamma correction for surveillance camera

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The need for a security improvement of an area generally associated with the assets which is located in that area. The protection mechanism of these assets creates the need for a device which can be used as a monitoring tool. A surveillance camera is a popular device for monitoring an area. For the purposes of data integration, the camera surveillance based on IP (Internet Protocol) is widely used. However, the maintenance of a file server and the provision of the data storage require substantial funding and effort. In addition, if the surveillance activity is carried out in the indoor room, sometimes the lack of lighting in the room can make data retrieval becomes not clearly visible. Thus it creates the need for restoring the data by improving its image quality. This study is going to design a device such as IP surveillance camera which based on embedded system, with improved image recording feature by using gamma correction and data storage feature which integrates with cloud service through a network based on IP (Internet Protocol). In the image correction mechanism, the measurement of image quality improvement is executed by using a histogram. The measurement of image quality improvement based on the human perspective is also provided.

Keywords: cloud, embedded system, gamma correction, image correction surveillance camera, Internet Protocol

Low cost switched array-wide band antenna for search and rescue disaster management

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The activity of SAR (Search and Rescue) is an activity that requires speed in finding the location point. Successfully search for victims can save many lives. Direction finder is proposing to accelerating search survivors. Direction finder can detect the direction and track the radio transmitter using Doppler function. The design, measuring, testing and integrating wideband switched parasitic antenna for direction finder application are conducted in the research. In this paper direction finder antenna made with simple devices and the materials can be found in Indonesia. The proposed architecture has advantages for cost-effective, easy to design and to integrate. The antenna design successfully reaches maximum gain by simulation and field test. The antenna success passes S11 measurement, in accord with international standards of antenna manufacturing. The antenna successfully tracks the transmitter using zero cross detector software.

Keywords: S11, antenna, direction finder, disaster management, doppler, SAR, tracking, victims, VSWR

Combination of DNS traffic analysis: a design to enhance APT detection

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Activity of Advanced Persistent Threat (APT) are very dynamic. A single detection method, will be ineffective. New modus and technique are being developed rapidly and overcome all of the effort to acknowledge it. This design proposed a new approach through combination of previous successful detection method based on DNS traffic analysis altogether, to address today's APT challenges. Preliminary experiment shows promising and better accuracy of APT recognition and faster response.

Keywords: anomaly detection , APT, DNS, traffic analysis

Parallelization of modular exponentiations of polynomials

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Modular exponentiations are very important in many field of computer science, including network security protocols. Modular exponentiations of polynomials are a type of modular exponentiations, where the base and modulus are polynomials. In this paper, a parallel modular exponentiation algorithm, which was proposed by Lara et al., is extended to solve modular exponentiations of polynomials in parallel, and further compared to two other proposed parallel algorithms. Essentially those algorithms differ only in their load-balancing methods. The result is, for exponents of length up to 2048 bits, the implementation of Lara et al.'s algorithm results in 28.01% faster running time compared to the implementation of the sequential algorithm. The result also shows that this algorithm is more efficient than the two other proposed algorithms.

Keywords: load-balancing method, message-passing interface , modular exponentiation, parallel computation, polynomials

Lung detection using adaptive border correction

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Juxta-pleural is one of the lung nodules types that attached to the chest wall and has the same intensity. The presence of this type of nodules can be a mistake in lung segmentation. We propose a method for lung segmentation with bidirectional peak detection method that gives the result of lung border to be a solution to the problem. The method we propose has been tested with 140 3D CT images from ILDC-IDRI dataset which only contains juxta-pleural and juxta-vascular nodules, result shows only 14.3% of under-segmentation. We have compared with another two methods which are Morphological Closing and Adaptive Border Marching (ABM). The proposed method achieved the fastest computation level at 0.18 sec/slice or three times faster than the speed of morphological methods (0.56 sec/slice) and 40 times faster than the speed of ABM method (7.12 sec/slice). The propose method has potential to be implemented in embedded systems.

Keywords: CAD, lung, nodules, segmentation

A systematic review: b-cell conformational epitope prediction from epitope characteristics view

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B-cell conformational epitope identification is the crucial issue in vaccinology. Limitation on experimental methods in the biological side and dataset and computational resource availability in computing sides, open a chance on developing prediction method which can accelerate epitope identification. A number of methods have been developed but their performance is still medium. Epitope prediction is a knowledge-based method. Presenting the statistical or computational based epitope characteristics together with epitope prediction method will facilitate the newcomer on identifying importance feature, improve the existing feature and propose the new feature. To reach the goal of the review, the research papers is collected from both epitope analysis research and epitope prediction methods research. The prediction methods are evaluated on what characteristics of epitope have implemented on feature representation and are shown in a mapping table.

Keywords: 3D structure based feature, conformational epitope prediction method, epitope characteristics

Monte carlo simulation and clustering for customer segmentation in business organization

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Utilizing data for segmentation analysis can bring a streamlined way to get potential insight as of decision making support in a business organization. Using appropriate data analytical technique help the organizations in profiling their customer segments accurately. The result brings an effective marketing strategy. However, there are times in doing data analytic, the organization needs another variable of data where the value is unavailable, for example: customer's income data which mostly hard to collect. By using Monte Carlo simulation, the value of customer's income can be generated and then compared with customer spending to construct customer segmentation model. An unsupervised learning for customer segmentation model using K-Means clustering enables us to see the grouping patterns of customer's income towards their spending. Clusters of the dataset might be interpreted as a group of customers that having a similar character. This paper shows us how to generate customer's income data and create data cluster to optimizing customer potential by utilizing data. Furthermore, the result brings us insight into which group of the customer might unserved properly considering their average income with their spending behavior.

Keywords: clustering, customer segmentation, data mining, k-means, monte carlo simulation

Semantic search with rule reasoning for scholarship information search

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Tendency to pursue graduate study has become a positive trend in Indonesia. This is supported by the growing number of agency or institution that organizes a postgraduate scholarship program with a wide range of requirements. Generally, finding information through the Internet is done by pattern-based search engine which possibly gives several irrelevant results and relies on user's ability in selecting keywords. This research aims to provide an alternative by building semantic search system for finding scholarship information that allows natural language sentence instead of keywords. It implements rule reasoning to obtain implicit knowledge by defining the rules from basic knowledge that explicitly defined. Among the rules that are used in this system, data range restriction is used to determine data based on certain thresholds. The test results show that system is able to perform rule reasoning process to obtain implicit knowledge and among 105 sample sentences, 74.29% can be answered correctly.

Keywords: data range restriction, rule reasoning, scholarship, semantic search

Direct comparison method of information dissemination using legacy and social network analysis

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Big data is a new phenomenon that force organization to find new way to process, to storage and to analysis data in variety forms. Big data challenge is getting bigger and faster but also the opportunities of harvesting from it. People prefer using big data's technology for many aspects such as, it is cheaper, effective, efficient and faster than previous system. In some research area, there are conflicting approach to solve the problem by using legacy methodology or by using big data approach. One of the fastest methodology in big data approach is Social Network Analysis. One of research area measured as research object in this paper is information dissemination. Therefore, this paper compare information dissemination measurement using legacy method and social network analysis. Legacy method draw up a questionnaire to obtain the data. Meanwhile, Social Networkk Analysis use conversational data in social media. We pick a popular information hub twitter account as a case study. Both legacy and social network methods are applied. The result shows there are differences on how to collect the data, how to pose the research question and what issue answered by each methodology. In the end, we conclude whether both methods are competing or completing each others.

Keywords: information dissemination, legacy method, social network analysis

Big data analytic for estimation of origin-destination matrix in bus rapid transit system

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In the field of transportation, origin-destination matrix is one of the main and important component, especially in analyzing, planning, and managing a public transport network. Traditional survey can be used to determine passengers travel patterns and generate origin-destination matrix, but it is inefficient and cost a lot of resources. In the recent years, various methods has been studied to estimate origin-destination matrix to reduce costs and increase the accuracy of passengers flow. Many of them take advantages from big data technology to gather passengers travel information, mostly using smart card data. In this paper, we perform origin-destination matrix estimation using information from smart card that were collected from automatic fare collection systems in Jakarta's Bus Rapid Transit. There are approximately 160 million records from 20 months of transactions between June 2014 and January 2016. This study utilized trip chaining algorithm that generates 610 daily OD matrices, 87 weekly OD matrices and 20 monthly OD matrices. The analysis is performed at station and line level, with addition of passenger behavioural pattern

Keywords: automatic fare collection systems , big data , origin-destination matrix

Construction inverted index for dynamic collections visualization in thematic virtual museums system

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Thematic virtual museum system main goal is providing more relevant information based on user characteristic, behavior and desire. Thematic exhibition as our unique feature very consider on users' whole activities. Barry and Maria define creation of new knowledge, transformative and self-directed experiences, engagement with the full diversity of visitors, and transparency as the source of viewpoint of the exhibition as museum specific evaluation criteria. Museum exhibition is not book on the wall rather than leading visitors to new attitudes, values and ideas even they are very different cultural backgrounds or religious beliefs. The system with interactive information in thematic exhibition which have been processing and delivering to the user will be leading them to better understanding by traveling in similar fields. In order to perform and accomplish those tasks, we have constructed virtual thematic museums inverted index to gain fastest retrieval document collections. We are using special architecture and multi system indexing in virtual museum inverted index. This index can manage collection in many forms of data structured, semi structured or unstructured which have processed by our data access layer engine. We have shown a design and modification of inverted index which suitable for our thematic virtual museums system and sample of exhibition visualization to get more precision by embedding method.

Keywords: document collections, exhibition, inverted index, thematic virtual museums, visualization

Geomaritime



Oligocene-Pleistocene paleogeography within Banyumas Basin and implication to petroleum potential

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This study attempts to reconstruct paleogeography of Banyumas Basin in association with magmatic arc evolution and its implication to petroleum potential. Based on the volcanic rocks distribution, their association and relatives age, there are three alignment of magmatic arc, that are: (1) Oligo-Miocene arc in the south (2) Mio-Pliocene arc in the middle (3) Plio-Pleistocene arc in the north. The consequences of magmatic arc movement were tectonic setting changing during Oligocene to Pleistocene, as well as their paleogeography. During Oligo-Miocene where magmatic arc existed in southern part, the Banyumas tectonic setting was a back-arc basin. This tectonic setting was changing to intra-arc basin during Mio-Pliocene and subsequently to fore-arc basin since Plio-Pleistocene until today. Back-arc basin is the most suitable paleogeography to create depositional environment for potential source rocks. Exploration activity to proof existence of source rocks during Oligo-Miocene is needed to reveal petroleum potential in Banyumas Basin.

Keywords: Back-arc Basin, Banyumas Basin, petroleum potential, paleogeography

Ship detection in Madura Strait and Lamong Gulf using Sentinel-1 SAR data

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During the recent years, maritime surveillance has been receiving a growing interest. Ship detection and identification are parts of maritime surveillance in order to dealing with illegal fishery, maritime traffic, sea border activity, or oil spill detection and monitoring. Nowadays, Synthetic Aperture Radar (SAR) as one of active remote sensing technology provide signals to penetrate cloud, can be advantage to be used in tropical region with the intention to monitor sea objects on the sea surface from the space. The availability of Sentinel-1 as SAR imaging mission, providing continuous all-weather, day-and-night imagery, makes it ideal for precise cueing and location of ship activities at sea. Utilization of CFAR (Constant False Alarm Rate) algorithm provided by SNAP (Sentinel Application Platform) software from ESA show rapid detection of ship in the study areas (Madura Strait and Lamong Gulf). Compared with manual ship extraction method, it gives sufficient results.

Key words: CFAR, SAR, Sentinel-1, ship detection

Geomaritime strategies of Indonesia maritime routes confronting Thailand's Kra Canal plan

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This research aims to conceptually examine the impact of Kra Canal development in Thailand to Strait Malacca's littoral states especially Indonesia; then formulate a new maritime strategy as manifestation of Indonesia vision as global maritime axis. Through literature and documents review along with regional complex approach this paper explores some factors which directly or indirectly affecting Indonesia due to development Kra Canal as a competitor of Malacca Strait in term of efficiency route. The results are some identification of potential problems as implication of Kra Canal to Indonesian maritime routes, then a future maritime connectivity is proposed after taking into consideration the accessibility of this new maritime route.

Keywords: Indonesia, kra canal, Malacca Strait, maritime axis, maritime connectivity

Spatio-temporal characteristics of sea level anomaly in the Indonesian water

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Indonesia is an archipelagic country in the equatorial region that lies between Indian and Pacific oceans. Its geographical setting will affect variabilities of sea level anomaly (SLA) in the Indonesian water. SLA is one of the oceanic parameters that play a crucial role in the ocean dynamic and its possible hazards. In this research, we study spatio-temporal characteristics of long-term SLA based on 30 years of sea-level data derived from multi-mission of satellite Altimetry. We found that the characteristics differ considerably from one place to another, depending on the bathymetric depth and type of sea. In closed, narrow and shallow seas like those in the Eastern part of Indonesia, long time-series of SLA is less sensitive to the effects of El Niño and La Niña as well as global sea level rise. On the other hand, global sea level rise significantly affects the characteristic of SLA over open and deep seas. Unfortunately, we also noticed that the derived SLA values are still affected by inaccurate altimetric wave-form due to reflection from near coastal areas. It is therefore our results should be further assessed to get more precise description of SLA variabilities in the Indonesian water.

Keywords: altimetry, Indonesia, sea level anomaly

Sustainable and contextual utilization of underground river in the arid area

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Many people living in dry areas for example the karst region. Clean water is a major issue. Many studies are conducted in the karst area, but they are limited to geological studies, for example geoarchaeology (Drake et.al, 2011), and study of the development of karst region (Heggen, 2015). Other studies are models of conservation of the karst area (Ogunbode et.al, 2016). The objective of this study is to analyse the karst hydrogeology and to plan the utilization of underground water sources. The problem is how to determine the flow of underground rivers and create detailed engineering design for using the water from the underground river. The research methodology includes: detailed geological mapping, geophysical measurements, drilling, well construction, pumping tests, water sample analysis, social survey, pipelines and electrical surveys. The geological analysis is used to consider the direction of the trajectory of geoelectric measurements. The results are used to determine the drill point for a production well. The geological structure and saturated zone analysis are used to develop the water utilization of the underground river. The analysis of pumping tests produces water discharge calculations. Pipelines and electrical analysis were conducted to calculate the total cost of the utilization of water resources. The case studies were carried out in Banyutowo area, Wonogiri Indonesia. Based on the pumping test of drilling depth of 100 m, the water debit from the underground river is 5 m³/sec. This study provides a source of clean water for around 3,000 inhabitants living in the arid region.

Keywords: arid area, karst, underground river

Remote sensing analysis to assess the impact of sea-cage aquaculture intensification to benthic habitat condition in Lampung Bay

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Benthic habitats provide various important function to maintain the integrity of marine ecosystem and ecological services. Located on the transitional boundary of land and sea, benthic habitats encounter several disturbances caused by anthropogenic factors, climate changes, and natural processes such as point source and non-point source pollutants. Therefore, mapping the condition of benthic habitats is essential to assist coastal management activities. The vast development of Lampung Bay, especially the increase of sea-cage aquaculture hipotetically affects the condition of marine ecosystems, including benthic habitats. This hipotesys was built from the fact that fish-feeding process may decrease the quality of water, which may adversely affect the sustainability of these benthic habitats. This paper describes the impact of increasing sea-cage aquaculture activity to the condition of benthic habitats in Lampung Bay. Remote sensing approach was used to perform change detection analysis of benthic habitats. This study uses high spatial-resolution imagery such as WorldView-2 and Quickbird acquired at different years to obtain benthic habitats map before and after the flourish of sea-cage aquaculture activity. Sentinel-2 image was used to model the spatial distribution of water quality using empirical modeling. Information of benthic habitats and water quality were analyzed with the change of sea-cage density to find the trigger and explain the change in benthic habitats condition. The result of this study indicates how the increase of sea-cage aquaculture activities may have an adverse impact on the benthic habitats condition and water quality.

Keywords: benthic habitats, Quickbird, sea-cage aquaculture, water quality, WorldView-2

Granulometry analysis of Ngrayong Sandstone, Tempuran Area, Rembang Zone, North East Java Basin

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The study area is located near Tempuran Village, Rembang Zone, North-East Java. Ngrayong sandstone is a famous reservoir in north-east Java, mainly composed of sandstones which are exposed along east-west trending along the southern flank of Pakel Anticline. Eighteen samples from four different facies from eight outcrops conducted for granulometry analysis. The objective of this paper is to predict the reservoir potential base on granulometry analysis especially grain size and sorting. The study area is still needs to confirm about reservoir quality. Ngrayong Formation consists of laminated to thin bedded sandstone facies, thick bedded to massive sandstone facies, calcareous sandstone facies and cross-bedded sandstone facies. According to the analytical results, sandstone facies are composed of very fine to fine, poorly sorted to very well sorted sandstones. Base on the results of analyzed samples, Ngrayong sandstone have good porosity and permeability, thus Tempuran area can be considered as a prospective reservoir.

Keywords: granulometry, Ngrayong Sandstone, reservoir quality, Tempuran Area

Facies analysis of coal bearing formation in the Tamu Area, upper Chindwin Basin, Sagaing Region, Myanmar

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Upper Eocene Sedimentary rocks of Yaw Formation consists of thickly bedded sandstone alternating with shales and coal seams are well exposed in Tamu Township, Sagaing Region, Myanmar. Geologically, its lies within the Upper Chindwin Basin. The succession of sedimentary rocks are characterized by thickly bedded sandstone with thickness varies from 10 – 70cm, planar and through cross-beds sedimentary structures, while shales have thin to medium of thickness with plain beds sedimentary structures. Coal strata and rooted carbonaceous horizons are very common deposited within shales succession. The thickness of coal seams ranges from 6 cm to 3 m. The sandstones are interpreted as fluvial channels and their associated crevasse splays environment, while shales are majority interpreted as a flood plain setting, where coal layers may develop in the continental swamp environment. Based on the detailed sedimentologic logs, carried out in four stream sections, four lithofacies association represent depositional environments can be identified mainly on the basis of their physical characteristics. The lithofacies association are 1: distributary channel facies association, 2; overbank facies association, 3; crevasse splay facies association and 4: undifferentiated facies association. Facies analysis suggests that the investigated area was deposited on fluvial up to upper delta plain where numerous major distributary channels possible to overpassing the swampy or marsh area in the floodplain on the distributary channel area. In that area, there were shallow interdistributary marsh, which were deposited sediments form a combination of crevasse splays and overbank flood from channels.

Keywords: coal, depositional environment, yaw formation

Microzonation of landslide vulnerable area using horizontal to vertical spectral ratio (Hvsr) by shear strain analysis method of microseismic data in Giritirta Village, Pejawaran District, Banjarnegara Regency

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One of most extensive disasters in Indonesia is landslide. At 2014, a landslide occurred in Jemblung Village, Banjarnegara, Central Java, Indonesia, killing 93 people with 23 people missing. In the same province, during a heavy rain which triggered flood in Bogowonto River, landslide also happened in Purworejo. This disaster killed 11 people, while several people reported as missing. Meanwhile, landslide in Ciregol Village, Brebes Regency, had caused more incident such as the severe damage of Tegal-Purwokerto main road. From the condition exposed, we can conclude that preventive effort to reduce the impact of landslide disaster, is needed. In this condition, microseismic method can give advantageous role by determining vulnerable areas of a certain research area, in this case: Giritirta Village, Banjarnegara Regency—which adjacent to Jemblung Village. To analyze potential of landslide in Giritirta Village, Banjarnegara, acquisition of microseismic method was implemented on 25-30 August 2016. By using Horizontal to Vertical Spectral Ratio (HVSR) method, raw data is processed, then result the parameter of dominant frequency and amplification. From this parameter, shear strain can be calculated to classify the landslide hazard vulnerable area, by involved other parameters, slope data of targeted area, and land-usage map. Through this research, concluded that the North part of Giritirta Village has high potential of landslide disaster.

Keywords: HVSR, landslide, microzonation, microseismic, shear strain

Geomorphological condition analysis of Pramuka Cay, Kepulauan Seribu, Jakarta, Indonesia

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The impact of climate change on various aspects of human life are expected to increase. One of the areas that will have a major impact is a small island. In addition to estimating the impact that may occur, understanding the characteristics of Geomorphology is very important to look at the environmental response will occur and their impact on resources and geomorphological hazards in the region. This study aimed to analyze the geomorphological conditions of Pramuka Cay, Kepulauan Seribu, DKI Jakarta, Indonesia. The analysis showed that the Pramuka Cay is an island formed by sediment bioclastic on a patch reef with the kind of pinnacle reef. Pramuka Cay geomorphology consists of Pramuka Cay, Reef Flat, Reef Edge, Reef Slope and Regolith Mound in Front of Reef Slope.

Keywords: geomorphology, Pramuka Cay, small island

Regression model accuracy comparison for mangrove canopy density mapping using NDVI, MSAVI, and MSARVI

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Mangrove canopy density conditions are often taken into consideration in the management of the coastal environment, so that the accurate data of spatial distribution of mangrove canopy density is needed. The condition causes need to be studied further related to methods in the mangrove canopy density mapping. However, not much research to do a comparison of mapping accuracy mangrove canopy density using the vegetation index and a combination of statistical regression models, especially in the use of the Sentinel 2A satellite imagery. The purpose of this study is to compare an accuracy of mangrove canopy density mapping using NDVI, MSAVI, and MSARVI with a combination of linear regression, quadratic regression, logarithmic regression, and exponential regression applied to Sentinel 2A satellite imagery. Mangrove canopy density data resulted from a field survey in Jor Bay and Kecebing Bay, East Lombok. The result of accuracy analysis represents that NDVI is the best vegetation index in the mapping of mangrove canopy density compared MSAVI and MSARVI with an accuracy above 80% (linear regression analysis of NDVI: 81.66%, quadratic regression analysis of NDVI: 80.83%, exponential regression analysis of NDVI: 80.71%, logarithmic regression analysis of NDVI: 80.67%). Mapping the mangrove canopy density through the combination of another vegetation index (MSAVI and MSARVI) with four regression model has an accuracy of between 70% to 80%, except a mangrove canopy density mapping accuracy with quadratic regression between MSARVI value and field data, only reaches 62.78%.

Keywords: canopy density, mangrove, regression model, Sentinel 2A, vegetation index

Logistics cost structure cold and non-cold supply chain of catchment sea-fish in coastal areas, Java Island, Indonesia

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Recently, the increasing of catchment sea-fish production in Indonesia is not supported by good distribution process. Fish as a perishable product requires good handling process through cold supply chain management. Application of cold supply chain (SC) is closely related to the costs incurred, so the analysis of logistics cost structure helps to optimize the profit earned by stakeholder. This study aims to compare the logistics cost of cold SC with non-cold SC in the distribution of catchment-sea fish. Convenience sampling and snowball sampling were used as the sampling methodology. In-depth interview was employed to collect information from 64 respondents in the coastal area of Java. The result shows that transportation cost is accounted for the highest portion for both cold (43.57 %) and non-cold SC (42.91%). The second highest portion is procurement cost with 35.87% in cold SC and 34.18% in non-cold SC. The transportation cost in both SC is dominated by trader, while procurement cost is only owned by fishermen. Efficient supply strategy is thus recommended to minimize the logistics cost. Traders and fishermen should consider Full Truck Load delivery and delivery schedule, while collaborating with third parties may minimize the transportation cost during peak season. Moreover, strengthening the role of group of fishermen may enhance the bargaining power of fishermen. Looking for alternative fuel may help fishermen to reduce the fuel consumption during fishing time. The use of simple freezer may reduce the defect product and extend the fishing time for non-cold SC.

Keywords: catchment fish, cold supply chain, logistics cost, supply chain strategy

Study of fresh-saline water interface in correlation with groundwater chemical type in coastal area of Cilacap, Indonesia

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Interface is a contact zone of saline water from the sea and fresh groundwater in coastal area. Interface is a dynamic zone influenced by the rate of groundwater extraction, seasons and tides. This study was conducted to (1) analyze the dynamics depth of interface, (2) analyze the chemical types of groundwater, and (3) analyze the relationship between the interface depth with the groundwater chemical type. In determining the interface depth it was conducted geoelectric sounding by Schlumberger Arrangement, whereas the groundwater chemical type was determined using the classification of Stuyfzand. Analysis of the relationship between the interface depth and the groundwater chemical type was a descriptive quantitative. The results showed that over time, the interface depth is changed in several places of the city of Cilacap. Places that were not detected the existence of interface in 1977, were detected interface in 1996. Nevertheless, there were also places that were detected interface in 1977 and 1996, they did not have interface anymore in 2013. Distance from the shoreline would determine the interface depth, the closer from the shoreline the shallower the interface depth. In reality, this phenomenon did not affect the groundwater chemical type because in general, the groundwater chemical type in the study area was $F/2/Ca^{2+}/HCO_3^+/+$, which meant that the detection of the interface did not affect the groundwater in public wells.

Keywords: Cilacap coastal area, interface, saline groundwater

The effect of difference polynomial order on the geometric correction of very high resolution satellite imagery to delineation of coastline

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Very high resolution satellite imagery is widely used for large scale mapping activities. Satellite imagery only can be used if the correction has been performed. Correction performed to eliminate various errors that exist in the satellite image namely the distortions caused by lens, the distortion caused by platform, and the distortion caused by objects on Earth's surface that has a height. To eliminate the distortion, correction was carried through the orthorectification process. There are two kinds orthorectification method namely rigorous models and approximation models. Orthorectification using approximation models perform by using Rational Polynomial Coefficient (RPC) data. How the effect of the polynomial order on geometric correction of very high resolution satellite imagery to delineation of coastline is not known with certainly. This research was conducted to find it out. The study was conducted in Coastline of Ambon region. Eight GCP was used to perform orthorectification process on the satellite imagery. Orthorectification performed on 3 order polynomial degree as first order polynomial, second order polynomial and third order polynomial. Twelve ICP is used to evaluate the results of orthorectification process. The evaluation results indicate a differences in the result of the correction of the image with various degrees of polynomials. The different results lead to differences in the delineation of coastline.

Keywords: delineation of coastline, geometric correction, polynomial order, RPC, satellite imagery

Analysis of suitability and carrying capacity for coastal tourism in Siung Beach and Wediombo Beach, Gunungkidul

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Coastal area is a transitional area between terrestrial and marine ecosystem which has a rich habitat with one part of the productive area is coastal front area or beach. Beach can be used for coastal tourism activities. Siung Beach and Wediombo Beach included in the ranks of Geopark Gunung Sewu that located in Gunungkidul. Geopark Gunung Sewu has the potential as a tourist destination and also the concept based on the pillars of conservation, education and the growth of local economy as a model for sustainable management of the area. This research aim to analyze the suitability of Siung Beach and Wediombo Beach as coastal tourism, and analyze the carrying capacity of Siung Beach and Wediombo Beach as coastal tourist areas. The method used is quantitative approach. Suitability defined by multiplying scores and weights were obtained from each parameter are depth, type of beach, width of beach, brightness, current speed, basic materials waters, observation dangerous biota, and availability of freshwater. For carrying capacity is calculate with the potential ecological, area that can be utilized, the time provided, the standard unit of area each activity and the time generally spent. Collecting data from each parameter done with directly survey, in-depth interviews and with the support of secondary data. The results of this research are expected to show the level of suitability of Siung Beach and Wediombo Beach as coastal tourist areas, and activities that can be conducted on the area to adjust the carrying capacity of the area.

Keywords: Coastal, coastal tourism, suitability, carrying capacity

A simple approach for radargram pattern recognition: identification of metal and non metal object

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Ground Penetrating radar is an active geophysical methods which is mostly used to interpret objects buried under the surface or to determine the distribution of shallow subsurface sediments. Radargram as one of digital recording signals forms on GPR is often analysed using variety of mathematics and physics attributes to determine subsurface objects. The recorded signal is the reflection of the electromagnetic wave with a specific parameter that depends on the antenna frequency. Metals such as steel (Fe_3C), iron (Fe_2O_3) and aluminium (Al_2O_3) can be visibly distinguished from non-metal on the surface, but when the object lies below the surface, it is very difficult to perform identification for each object, this research is done to see changes in patterns on radargram, by performing mathematics and physics approaches to identify changes of frequency, amplitude, velocity and density of the recorded signal wiggle, this study uses survey data with objects containing metal buried deep as 1-2 m and non-metal objects (sedimentary rock) that are in the same relative depth. Each wiggle processed by time-shifting (MST), de-wow, Gain, Filtering, background removal until the object become clearer than before (until the best resolution obtained). Visual interpretation of peak-trough which formed on the wiggle function of distance and depth can help accelerating the identification process so that the distinguish process between metal and non-metal can be easily performed. The results appear on the hyperbole pattern radargram for metal objects but not for non-metal objects.

Keywords: GPR, pattern recognition, radargram, wiggle.

Mapping of tidal flood affected areas and discovering the community adaptation strategies in Demak Regency, Central Java

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Coastal area of Demak regency has been known as one of the tidal flood-prone area in Central Java. Such environmental conditions has triggered the people living in that area to develop a variety of adaptation strategies. Discovering this adaptation strategies is essential in order to study the possibility of applying it to different location with same environmental conditions. The main objectives of the study were to identify the area affected by tidal flood and to discover the community adaptation strategies. Coastal area of Demak Regency which affected by tidal flood was taken as study area. Mapping of tidal flood-affected area was performed by means of image interpretation, field survey and community participatory mapping. Adaptation strategies of the community in study area were identified trough interview using questioner. There were four sub districts in study area which considered as mostly affected by tidal flood. Those districts were Sayung, Karangtengah, Bonang and Wedung. Three community adaptation strategies were discovered in study area i.e. survival, accumulation and consolidation. Among those adaptation strategies, survival was the mostly adopted.

Keywords: Community adaptation, mapping, tidal flood

Analysis access and utilization of icts by farmers in coastal area of rural Yogyakarta, Indonesia

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Coastal area is a transitional area between terrestrial and marine ecosystem which has a rich habitat with one part of the productive area is coastal front area or beach. Beach can be used for coastal tourism activities. Siung Beach and Wediombo Beach included in the ranks of Geopark Gunung Sewu that located in Gunungkidul. Geopark Gunung Sewu has the potential as a tourist destination and also the concept based on the pillars of conservation, education and the growth of local economy as a model for sustainable management of the area. This research aim to analyze the suitability of Siung Beach and Wediombo Beach as coastal tourism, and analyze the carrying capacity of Siung Beach and Wediombo Beach as coastal tourist areas. The method used is quantitative approach. Suitability defined by multiplying scores and weights were obtained from each parameter are depth, type of beach, width of beach, brightness, current speed, basic materials waters, observation dangerous biota, and availability of freshwater. For carrying capacity is calculate with the potential ecological, area that can be utilized, the time provided, the standard unit of area each activity and the time generally spent. Collecting data from each parameter done with directly survey, in-depth interviews and with the support of secondary data. The results of this research are expected to show the level of suitability of Siung Beach and Wediombo Beach as coastal tourist areas, and activities that can be conducted on the area to adjust the carrying capacity of the area.

Keywords: coastal area of rural Yogyakarta, farmers, icts

Land use priority assessment based on evaluation of land capability, landslide hazard and population pressure on agriculture land analysis in Blukar, Bodri, and Blorong Watersheds, Central Java, Indonesia

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Blukar, Bodri and Blorong watershed is located in a part of Kendal, Semarang, Temanggung, and Wonosobo Regency. The study area has some problems of landslides and misuse of land. The research was proposed to determine the regions having priority of land use assessment based on the land capability, landslide hazard and population pressure analysis. The aim of this research was to find better criteria for land capability based landslide hazard for land use priority in Blukar, Bodri, and Blorong watersheds. This research was carried out using field survey. The field survey was based on stratified random sampling of landform unit as area sampling unit. The LCLP software was applied for land capability classification. The Soemarwoto's method was applied for the evaluation of population pressure on the agriculture land. Landslides classification is to determine landslides hazard by classification and rating on each factor that influences to landslide and multiplied by weight on that each factor. The results shows: (1) land capability in the study area was varies from class II – class VII with limitation factors of slope, soil erodibility, soil texture, soil permeability, drainage and soil efektif depth, (2) the most of the study area (64.68%) has $TP < 1$, it means in arable land does not have population pressure of agriculture land, (3) The result of landslide hazard showed that Class I and V is low and Low, Class III and IV is medium and high, and Class VI and VII is high, (4) Land use priority of class I is for very intensive agriculture, class II is for intensive agriculture, class III is for extensive agriculture, class IV is for marginal agriculture, class V is for grassing and aqua-agriculture, class VI is for limited grazing/plantation, and class VII is for production forest, (5) From this research, it can be known that high landslide hazard happened in class VI until class VII. Actually in the field, it indicates that land use in class VI until class VII is unsuitable with their land capability.

Keywords: land capability evaluation, landslides hazard mitigation, land uses priority assessment, population pressure on agriculture land

Mangrove forest change monitoring using multitemporal image in Karimunjawa and Kemujan Island

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Mangrove ecosystems are important for nursery ground, sediment trap, and coastal protection. Karimunjawa Islands are a group of islands which have mangrove forest as conservation area, particularly in Karimunjawa and Kemujan Island. This study aims to map the extent of mangrove forest in multiple years, and examine their changes. We used multitemporal ASTER VNIR images which recorded in different year. We used maximum likelihood algorithm to classify each image into some classes such as building, open land, pond, mangrove forest, and non mangrove vegetation. Overall accuracy of the images classification is 81,63% with the value of kappa index equal to 0,8105. Images analyses showed that during 12 years, there was 27,8775 ha of land conversions occurred from mangrove to open land; 28,735 ha from mangrove to building; and 27,8775 ha from mangrove to fishpond. Mangrove forests change were caused by illegal logging, improper utilization of mangrove area, and economic factor.

Keywords: mangrove monitoring, maximum likelihood, remote sensing

Investigating the role of rainfall variability in the hydrological response of small tropical upland watershed prone to land degradation

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Hydrological response of upland catchment prone to land degradation is an important issue in the Central Java, Indonesia. Excessive soil losses found in many upper basins in Java which causing severe problem in the lowland areas due to extreme hydrological response. Bompon watershed (3 km²) which is located in the upper Bogowonto basin is chosen as a study area. The objective of this research is to study the role of rainfall variability (spatial variability and different intensity and duration) in the hydrological response of small tropical upland watershed. In order to investigate the hydrological response of different rainfall variability, LISEM is used. Three scenarios of comparison were designed: different rainfall interpolation (zonation based on elevation differences of the stations and inverse distance weight), different direction of rainfall movement (lower to higher elevation and vice versa), high intensity-short duration and low intensity-long duration rain. 4 weather stations were installed to cope with this scenario. Sensitivity analysis was carryout to check the most sensitive parameter to total discharge and peak discharge. Simulation with rainfall zonation, down to top rainfall movement and high intensity-short duration rain shows more discharge than its comparators. Initial moisture content (thetai) was found as the most sensitive variable for all indicators when all input variables value increased. When the input variables values decreased, thetai was found as the most sensitive variable for changing in total discharge, whereas saturated hydraulic conductivity (Ksat) was the most sensitive variable for changing in peak of discharge.

Keywords: hydrological response, land degradation, rainfall, upland watershed

Mangrove vegetation inventory in Bogowonto Estuary

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Bogowonto estuary is a coastal region with various of natural resources. Mangrove forest is as one of ecological resource that continues to grow there. Mangrove ecosystem is as one of elements that support the development of estuary ecosystem and provide several ecological and economical ecosystem services like coastal erosion protection, water infiltration, reduce the rate of sedimentation, as the place of spawning fish, tourism place, etc. Mangrove inventory is important to know the mangrove ecosystem existing, so it can be used as consideration for mangrove development policy. Remote sensing imagery is one of geospatial tool for detecting object in earth surface, including mangrove vegetation and it can be used to spatio-temporally analysis. This research aims to conduct inventory of mangrove vegetation in Bogowonto estuary by remote sensing. Temporally analysis is carried out by using Landsat 7 TM 2005 and Landsat 8 OLI 2015 imagery to inventore mangrove in the study area. Each imagery is corrected radiometrically until the data present at surface reflectance level. Multispectral classification procedure is performed by Maximum Likelihood algorithm to determine the spatial mangrove distribution. Spatio-temporal analysis is used to determine the development of mangrove between 2005 and 2015. This research shows that in 2005 the large of mangrove is 181.1 hectares and 622.54 hectares in 2015. The increasing between the two perodes is 441.44 hectares. This research shows that Bogowonto estuary is a potential site for mangrove vegetation.

Keywords: estuary, inventory, mangrove

Recent coastline dynamic along northern coast of Java (PANTURA) Indonesia and their driving forces

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Bogowonto estuary is a coastal region with various of natural resources. Mangrove forest is as one of ecological resource that continues to grow there. Mangrove ecosystem is as one of elements that support the development of estuary ecosystem and provide several ecological and economical ecosystem services like coastal erosion protection, water infiltration, reduce the rate of sedimentation, as the place of spawning fish, tourism place, etc. Mangrove inventory is important to know the mangrove ecosystem existing, so it can be used as consideration for mangrove development policy. Remote sensing imagery is one of geospatial tool for detecting object in earth surface, including mangrove vegetation and it can be used to spatio-temporally analysis. This research aims to conduct inventory of mangrove vegetation in Bogowonto estuary by remote sensing. Temporally analysis is carried out by using Landsat 7 TM 2005 and Landsat 8 OLI 2015 imagery to inventore mangrove in the study area. Each imagery is corrected radiometrically until the data present at surface reflectance level. Multispectral classification procedure is performed by Maximum Likelihood algorithm to determine the spatial mangrove distribution. Spatio-temporal analysis is used to determine the development of mangrove between 2005 and 2015. This research shows that in 2005 the large of mangrove is 181.1 hectares and 622.54 hectares in 2015. The increasing between the two periodes is 441.44 hectares. This research shows that Bogowonto estuary is a potential site for mangrove vegetation.

Keywords: estuary, inventory, mangrove

ConnectiFarm: android mobile field support as a DSS tool for agriculture technology investments in developing countries

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By 2017, there are 138 countries which are classified as developing countries, in which between 50 percent and 90 percent of the population employed by agriculture for farming. Farming is not as easy as it should be for these countries have a low Human Development Index (HDI) and less developed industrial base relative to other countries. There are complex seed protection prescriptions, equipment telematics, field productivity analysis, and precision farming system as the technology innovations in farming industry. Farmers forced to simultaneously proficient across many analytic systems which is constantly changing. On the other hand, there are farmers' advisors who need more efficient way to support their farmer-customers in the field. Of the issue, the right solution is to enable farmers and advisors to hold 'see-what-i-see' field level support discussions. This principle is applied in "ConnectiFarm" android application to utilize the mobile video chat technology. The application provides the ability for farmers to connect with multiple advisors from different companies to submit and receive support in real-time via video. As the result, ConnectiFarm will help farmers and the people they rely on connect better to make farming less complicated and more productive with less expense through visual remote support.

Keywords: Android, ConnectiFarm, decision support system, developing countries

The usefulness of multi resolution landsat image for detecting urban sprawl

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Understanding the usefulness of multi spatial resolution of satellite images for detecting urban sprawl that take place in non-urban built up areas is the main idea of this research. The aims are: (1) to measure the usefulness of multi spatial resolution of landsat satellite images for detecting the urban sprawl phenomenon; and (2) to examine some factors which are significantly influencing the weakness of multi spatial resolution of landsat satellite images. This research used digital satellite image interpretation methods with applying V-I-S models in order to identify the urban function objects. Research location is administrative areas of Yogyakarta City and some subdistricts of Sleman dan Bantul regencies that indicated as urbanized areas. By using V-I-S triangle model, the objects on the land surface are identified based on the percentage of vegetation, imperfeous surface, and soil reflection. The most important findings of this research are: (1) V-I-S can increase the usefulness of different spatial resolution of landsat satellite images significantly in order to detect urban sprawl process occured on urban area; and (2) factors that influenced the weakness of multi spatial resolution of Landsat satellite images are (a) size of landuse objects; (b) complexity of landuse objects; and (c) the season when the urban landuse are recorded by satellite image. The smaller objects of urban landuse, the more difficult to identified precisely. The more diverse of urban landuse objects, the more complicated to identified properly. Furthermore, the different season of satellite image time recording , the more difficult to identified exactly.

Keywords: Landsat satellite images, models, multi spatial resolution, sprawling process, urban sprawl, V-I-S

Inundation flood evaluation in North Kalimantan Province's coastal area based on watershed factor

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Watershed is an area that can accommodate, store and drain rainwater towards the outlet which flows to the lake or the sea naturally. Coastal conditions in a watershed are heavily influenced by some factors of watershed such as the landform, morphology, morphometry and land use. Factors of the watershed can reveal the character and nature of the watershed as well as the potential for floods in coastal areas. Remote sensing as a science and technology can help in understanding the factors of the watershed that affect to inundation flood and potential of inundation flood that could occur in coastal areas. Kayan watershed in North Kalimantan province, floods often occurs both in upstream and downstream. Coastal areas are likely to become the center of public economic activities, making it susceptible to flooding. The purpose of this research was to determine the factors of the watershed that affect the inundation flood and zoning for the potential of inundation flood in coastal areas with remote sensing data. Methods for obtaining the factors watershed is the interpretation of remote sensing data and geographic information system analysis. The results of this study are the description of the various factors of the watershed that affect to inundation flood and level of inundation flood potential in coastal areas based on the whole watershed. Inundation flood zone in coastal areas are flood-prone areas with 81,738.54 Hectares and very prone to flooding with 87,375.43 Hectares.

Keywords: evaluation, inundation flood, North Kalimantan Province's coastal area, watershed factor

Strengthening the global maritime fulcrum concept through the inclusion of bioecoregion connectivity aspects: case study the south coast of West Java, Indonesia

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Connectivity bioecoregion linking conditions the landscape of every a different region to simplify the process of natural resource utilization into high economic value. In the development global maritime fulcrum, this aspect is important especially for developing the potential of coastal resources such as the shipping industry, the production fisheries, marine tourism and marine transportation improvements. This research aims to formulated the applications of the idea of inclusion aspect bioecoregion connectivity on the design development of global maritime fulcrum, which is based on a case study on the South Coast of West Java, that was conducted in January until April 2017. The research approach applied in this research is quantitative descriptive by using primary and secondary data, obtained through the survey respondents were selected purposive sampling. The data is were tested for validity and reliability and analyzed using Structure Equations Modeling (SEM). Based this research connectivity aspects that must be considered include the variable fisheries, marine tourism potential, local knowledge of coastal communities have an influence on the global maritime fulcrum connectivity with the value of the data validity and reliability high. Inclusion bioecoregion connectivity aspect in strengthening the global maritime fulcrum through collaboration with the human resource potential of the region. For the case of the South Coast of West Java, with conditions bioecoregion available, implementation the concept global maritime fulcrum the South Coast of West Java needs to be strengthened by (1) the handling of aspects of educations for the public about the connectivity potential of fisheries and other resources, (2) marine institutinal community ; (3) the arrangement of infrastructure for fisheries, the fishing industry and the development of marine tourism and (4) the marine market driven product.

Keywords: bioecoregion, connectivity, maritime, SEM

Infrastructure Technology



Full height rectangular opening castellated steel beam with diagonal stiffener

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The full height rectangular opening castellated steel beam failed in Vierendeel mechanism. This makes the flexural capacity of castellated steel beam is lower than the original IWF section. This paper discusses analysis and test result of full height rectangular opening castellated steel beam with diagonal stiffener. The diagonal stiffener used in this research has a purpose to prevent Vierendeel mechanism. This research used two specimens, a short span specimen to study shear behavior, and a long span specimen to study flexural behavior. Test results show that the long span specimen can avoid Vierendeel mechanism and increase the yield moment capacity by 1.6 times of the original IWF section. The failure of the short span specimen is combination of shear failure and Vierendeel mechanism as in elastic condition, the diagonal stiffener, flange, and web post were worked and failed together. Based on the test result, truss analysis method can be used to calculate the flexural capacity of full height rectangular opening castellated steel beam with diagonal stiffener. Theoretical calculation of yield moment capacity of the long span specimen has 8.25% difference from the real yield moment capacity.

Keywords: castellated, diagonal stiffener, rectangular opening

Hypocenter analysis of aftershocks data of the Mw 6.3, May 27th 2006 Yogyakarta earthquake using oct-tree importance sampling method

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Yogyakarta earthquake, Mw 6.3, May 27th 2006 had killed 5.571 victims and destroyed more than 1 million buildings. This incident became the most destructive earthquake disaster over the last 11 years in Indonesia. Earthquake mitigation plan in the area has been carried out by understands the location of the fault. The location of the fault is still unclear among geoscientists until now. In this case, analysis of the aftershocks using oct-tree importance sampling method was applied to support the location of the fault that responsible for the 2006 Yogyakarta earthquake. Oct-tree importance sampling is a method that recursively subdividing the solution domain into exactly eight children for estimating properties of a particular distribution. The final result of the subdividing process is a cell that has a maximum Probability Density Function (PDF) and identified as the location of the hypocenter. Input data consists of the arrival time of the P wave and S wave of the aftershocks catalogue from 3-7 June 2006 and the coordinate of the 12 seismometers, and 1D velocity model of the study area. Based on the hypocenter distribution of the aftershocks data with the proposed method show a clearer trend of the fault compared with the aftershocks distribution calculated with the classical *Hypo71* program. The fault trend has a strike orientation of N 42° E with dip angle of 80° parallel with the fault scarp along the Opak's River at the distance of about 15 km to the east. This fault trend is similar with the fault orientation obtained by Anggraini (2013) that using the Double Difference Algorithm.

Keywords: aftershocks, oct-tree importance sampling method, probability density function (PDF)

Cost estimation model for i-girder bridge superstructure using multiple linear regression and artificial neural network

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One of owner's usual problem before excuting construction projects is the complexity in estimating the project cost in an early stage. Inaccurate cost estimate will require owner to do further arrangement to the project budged. This study aims to develop an initial cost estimation model for superstructures of Precast I-girder Bridge. Cost estimation model was developed based on 13 data of detail engineering design of I-girder bridge in Daerah Istimewa Yogyakarta (DIY). Factors influencing cost of the superstructures of the I-girder bridge were identified. Bridge span and width, size of the sidewalk, and railing's type are considered as variables affecting the cost of superstructures. These variables are then arranged into two different analysis Multiple Linear Regression (MLR) analysis and Artificial Neural Network (ANN), in order to obtain the best estimation model. The results of analysis showed that corelation value of bridge span is 89,0%, bridge width is 74,2%, size of the sidewalk is 66,1%and railing's type is 46,1% as identified factors that affect on the cost of superstructure. Comparative model of two approaches shows that the ANN has better accuracy than that of MLR, although the difference were not significant.

Keywords: ANN, cost estimation, linear regression, superstructure

The investigation on setting time and strength of high calcium fly ash based geopolymer

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Fly ash based geopolymer normally gets the optimum strength by heat curing. This is considered as a hindrance to in-situ applications. Therefore, development of fly ash based geopolymer that suitable for ambient curing will widen the application to the concrete structure. This paper reports the results of an experimental study on setting time and development of compressive strength of class C fly ash based geopolymer paste produced in ambient curing condition. The main synthesis parameters such as water to the geopolymer solid ratio, alkali to cementitious ratio and molarity of NaOH were varied to understand their individual effect on setting time and the mechanical properties of the resulting geopolymer. The results suggested that generally the setting time increased with the NaOH molarity and the compressive strength of 59 MPa was obtained for geopolymer mixture cured at ambient temperature for 28 days with alkali to a cementitious ratio of 0.35 and 10 M NaOH. The results will be useful for developing the knowledge of the use of high calcium fly ash in producing geopolymer and this would be beneficial to the understanding the future applications of this material as new binding material.

Keywords: compressive strength, geopolymer paste, high-calcium fly ash, setting time

Development of batch photocatalytic solar reactor into a continuous system to degrade peat water into clean water

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TiO₂ film has been applied as UV-TiO₂ photocatalytic batch reactor to degrade total organic carbon (TOC) in peat water for prolonged use. TOC was degraded as 99% after irradiation for six hours and water became neutral. In this study, solar UV-TiO₂ photocatalytic reactor continuous system has been designed as the development of a batch system. Five reactor batches each are coated with TiO₂ film that arranged vertically, filled with peat water. Peat water is drained from the top batch of reactors to the reactor batch underneath continuously by vertical pumps. The vertical pump is equipped with flow rate regulating valve due to peat water can interact optimally with TiO₂ films in each batch during the reaction. Humic compounds in peat water that absorb on TiO₂ films can be degraded photocatalytically by the energy of photons from sunlight (solar). Solar continuous reactors system will be very effective and efficient to be developed to degrade peat water into clean water, for saving energy and water degradation products free of harmful chemicals due to green process.

Keywords: continuous system, peat water, photocatalytic, solar reactor, TiO₂

Microbiological quality assessment of drinking water in Teros Village, East Lombok District, West Nusa Tenggara Province, Indonesia

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Although the source of drinking water are abundantly available in East Lombok District its quality raises a public health concern. The East Lombok District, especially Teros Village at Labuhan Haji District is mainly characterized by several springs and very shallow water levels. Teros village communities regularly use water from springs or from dug wells to meet their daily needs. The springs are scattered and located in the middle of densely populated settlements. This results in high possibility of groundwater contamination or pollution by human activities. This research primarily aims at studying the microbiological water quality of drinking water at Teros Village, and to review household water treatments methods employed by the local population and also the sanitation condition. Eight water samples were taken from six dug wells and two springs and were analyzed with measured microbiological parameters namely coliform and fecal coli. It is revealed that there is significant degree of microbiological pollution of drinking water in this area owing to domestic waste water and poor sanitation condition. The population of Teros Village in 2016 is about 4547 people, with 1321 households [1]. By using purposive sampling technique, 100 respondents (Head of Family) were selected to collect qualitative data regarding local household water treatment methods. This amount based on the reason that one house with one water source is usually inhabited and used by some families, so that the number of respondents is considered enough to represent the existing conditions. Field observation was conducted to find out the sanitation condition. Local residents were familiar with several household water treatments methods, although they only knew about limited physical characteristics of water improvement.

Keywords: groundwater, microbiological pollution, sanitation condition, springs, water treatment

Rain behaviour at Mt. Merapi area as observed by XMPR and ARR

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Short duration rainfall information has now become one of many important aspects to support the development of warning criteria for disaster mitigation. Similar importance is also found in the development of warning criteria against the lahar flow disaster at Mt. Merapi area. The rainfall information obtained from the radar observation has also become a new challenge since the last decade in line with the rapid growth of information and communication technology. However, the accuracy of its estimation needs to be evaluated by considering the correlation between radar rainfall and rain gauge rainfall. In case of radar rainfall can be precisely estimated, this information will contribute to generate an appropriate warning criteria. This study was carried out as the first attempt to evaluate the rainfall information as performed by the X-Band Multi Parameter Radar (XMPR) that was installed at Mt. Merapi in the mid-August 2015. Several ground rainfall data obtained from Automatic Rainfall Recorder (ARR) have been adopted to analyse the aforesaid radar rainfall information, and estimated errors between the two are presented. Evaluation on the radar estimated error value as a function or range is taken through a Fractional Standard Error (*FSE*) index that quantify the differences between ground rainfall measurement (*G*) and radar rainfall estimation (*R*), also the *G/R* ratio characteristics. The result shows there was a poor correlation between radar estimated and rain gauge measured rainfall located over 14 km from radar. Radar bias (*M*) is suitable for correcting radar rainfall amount, yet inappropriate for fractional values.

Keywords: behaviour, radar rainfall-rain gauge rainfall relationship, rainfall

Impact of sedimentation counter measure on the performance of flood control: a case study of Wonogiri Reservoir

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The Wonogiri Reservoir with 1.343 km² catchment area has a major problem of sedimentation. To overcome this problem, a new spillway has been built and closure dike is being constructed to localize sediment inflow from the Keduang watershed. Study on the effect of the closure and overflow dike on the reservoir operation in flood period is necessary to evaluate the performance of flood control related to the flood risk in the downstream area of the reservoir. For this purpose, the reservoir routing simulation model was developed under two condition, namely old condition and new condition with the new spillway and closure dike. The reservoir routing simulation was conducted for three inflow hydrographs of 60 and 500 years return period, and probable maximum flood (PMF). The results show that the presence of closure dike causes the peak outflow discharge increases to 1.45%, 75.18% and 56.28% for inflow hydrograph of 60 years, 500 years return period and PMF, respectively. Furthermore, the maximum water level also increases by 0.3 m, 1.9 m and 0.9 m for those three new design floods respectively. In order to reduce the dam overtopping failure chance of the 500 years return period flood, it is recommended to operate full opening of the new spillway gate when the water level reaches elevation +135.6 m MSL.

Keywords: closure dike, flood risk, reservoir flood routing, sediment storage reservoir

Simulation of angular flow in a shallow basin triggered by a rotating vertical cylinder by SPH method

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A simple numerical model has been generated for developing a code of SPH method. Those will be modified and used for future reasearch. In this research computational domain is a square that consist of real particle and virtual particle as the boundary treatment. In the initial condition particle occupy a certain position. Circular flow has been generated by a rotating vertical cylinder to generate shear velolity to the real particle. The particles movement has been observed during time integration. A physical model has been constructed to compare the numerical model. The movement of real particles on the numerical model agree with the movement of water particles on the physical model.

Keywords: model, particle, SPH, velocity

Universitas Gadjah Mada Drinking Water Supply System (UGM-DWSS) potential on supporting green campus program in Universitas Gadjah Mada

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Green Campus is a campus environment that is designed to increase energy efficiency, preserve resource and improve the quality of the environment. One of the important elements to support the green campus program is the existence of drinking water supply system. Universitas Gadjah Mada Drinking Water Supply System (UGM-DWSS) is a drinking water or potable water supply service to supply drinking water for the campus. This research aims at analyzing UGM-DWSS potential and its performance to support Green Campus. This research was based on primary data collection in UGM campus. Data collection techniques consist of observation of UGM-DWSS facilities, interview with UGM-DWSS water managers and users, and questionnaires distribution to UGM academic community. The daily water production of UGM-DWSS was 10 l/s drinking water. Everyday the water discharge distributed from UGM-DWSS to 49 water fountains and 12 water dispensers was 1.71 l/s, while the estimated daily water consumption rate was 0.07 l/s. It is assumed that those who did not consume water from UGM-DWSS facilities bought plastic drinking water bottle. Everyday, it is estimated that the number of generated plastic drinking water bottle waste was 19,168 bottles with capacity 600 ml/bottle. Indeed, by comparing to the total water production capacity being produced daily, the idle capacity was 99.3 %. The tendency of negative response from the majority of UGM inhabitants for using UGM –DWSS was due to hesitation about water quality, continuity of water supply, and ease of access to the nearby water fountains and water dispensers. Improvement of UGM-DWSS facilities that is supported by massive socialization programs including innovation to utilize produced drinking water are recommended to optimize the role of UGM-DWSS to create Green Campus.

Keywords: Universitas Gadjah Mada Drinking Water Supply System (UGM-DWSS), green campus, plastic waste

Campus drinking water supply system performance analysis Universitas Gadjah Mada of Yogyakarta

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The decent quality, quantity and continuity of Drinking Water Supply System (DWSS) is needed to support the activities of a campus. Universitas Gadjah Mada drinking water supply system (UGM-DWSS) in the form of 49 Water Fountains (WF) and 12 Water Dispensers (WD) supports daily activities for all the campus community. This research aimed at figuring out the performance of the existing UGM-DWSS against the existing service pipeline distribution network so that the technical condition of the pipes' pressure, the water consumption's discharge and the pumps' use can be identified. The method used for analyzing is by implementing simulating the network performance using WaterNet program version 2.2 by which pipes network and its facilities performance including optimization of pipe diameter can be described. The simulation indicated that there was 80% idle capacity of the available water capacity. It is uneconomical to make any changes to the existing pipes' condition considering the very expensive cost of the pipeline construction. Therefore, pump replacement was considered more feasible optimization approach. To obtain the optimal results, the pump should be replaced with 4 m³/hours capacity with 20 meters pump design head.

Keywords: distribution of pipeline network, universitas drinking water supply system, WaterNet 2.2

Policy analysis of Clean Water Supply System (CWSS) development: case study of Kotamobagu's CWSS

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CWSS in Kotamobagu has various problems such as, pipe water network that has not been operated optimally since its completion in 2012. The number of house connections was merely 424 out of 7,600 targeted until 2016. Other problems in Kotamobagu were related to the supply, backwash, insufficient electrical power supply, no water meter, reservoir leakage, and intake pipes leakage in Poyowa and Bilalang. This research aims to find the root of the problem in terms of Clean Water Supply System (CWSS)'s network system, organization, regulation, and management. The research focused on Poyowa Besar's CWSS and Bilalang-1's CWSS networks in Kotamobagu. The research methods included observation, survey, and policy analysis where respondents were required as sources of information. The respondents were from Sia's and Pontodon's CWSS that represented 162 house connections. Additional respondents representing 30 house connections were selected randomly at Poyowa Besar's and Bilalang-1's CWSS for comparison. The results indicated that the community, CWSS managers, and the Central Government support the existence of Kotamobagu CWSS management. The 30 house connections at Poyowa Besar's and Bilalang-1's CWSS have never been served with water but the respondents positively hope that the matter will be solved in the near future. They were willing to keep waiting for the water network of Kotamobagu's CWSS. The root of the problem in the Poyowa Besar's and Bilalang-1's implementation were due primarily to network system that was built by the Ministry of Public Works for the Municipal Government of Kotamobagu was reportedly not in accordance with procurement regulation. There was a disagreement between the Ministry of Public Works and Housing (MPWH) and the CWSS managers related to the items that have to be fulfilled for network infrastructure handover.

Keywords: clean water supply system (CWSS), development, Kotamobagu, management

Study on hydraulic flow in stratified pipe performed by numerical simulation

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An idea of introducing an underground floodway inspired by Storm-water Management and Road Tunnel (SMART) in Malaysia is considered attractive to minimize land utilization regarding to the flood problem in Jakarta. This research was aimed to know the flow behavior of this modified tunnel due to sudden transitions, pressure losses and loss coefficients using numerical modeling. The simulation was conducted in three dimensional model using FLUENT Software which was divided into three models, i.e. contraction, enlargement, and straight pipe model. The simulation model was followed the geometrical design of SMART which the area ratio between smaller and larger pipe, A_1/A_2 varied, namely 0.20, 0.50, and 0.80. Standard $k-\varepsilon$ and equilibrium wall function were used in straight pipe model, while contraction and enlargement model used $k-\varepsilon$ modified and non-equilibrium wall function. The effect of different Reynolds number was also studied in this research. The result of simulation showed that hydraulic parameters and area ratio of sudden transitions pipe give significant effect towards losses along pipe. FLUENT simulation result gave a good agreement with Darcy-Weisbach formula. The results indicate that loss coefficient decreases with the increase in pipe area ratio. The increase in pressure head loss was incurred by severe separated regions in the vicinity of pipe transition which was proved by typical flow pattern. Variation of Reynolds number also showed different area of separation flow, yet the flow pattern was somewhat similar.

Keywords: loss coefficient, pressure head, separation, turbulence model

Comparison of wind load analysis results based on Indonesia minimum design loads standard SNI 1727:2013 inputted automatically and manually by using SAP2000

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This paper presents the results of a comparison study of the internal forces applied in the structure due to wind load determined based on SNI 1727: 2013 that is inputted manually and automatically using ASCE 7-10 wind load feature in SAP2000. The wind load reviewed in this study is the wind load that calculated by following the Directional Procedure stated in SNI 1727:2013. The study shows that the wind load calculated based on SNI 1727:2013 when the internal pressure coefficient GC_{pi} is defined as 0.18 is 12% higher than the wind load calculated automatically by applying ASCE 7-10 wind load feature provided by SAP2000 when the wind parameters is assigned based on SNI 1727:2013.

Keywords: wind load, SNI 1727:2013, wind load feature, directional procedure

Numerical investigation on buckling failure of slender member with cutout presence

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The buckling is one of the dramatic structural failures. A one-dimensional buckling formulation cannot satisfied the needs of a compression member analysis with cutout presence or other imperfections. The 3D model will become famous when it has considered how important it is to know the effect of the presence of defects on a structure. Eigen value and nonlinear solutions have also been developed in this study. Nonlinear statics has involved the influence of the P-delta and Ritz methods. The proposed model discriminates on a 3D tubular member, adding a relatively stiffer dome as a place of the joints at both ends of the member. The models were consisted in small and large model. Small model represented seamless pipe SCH40 with 0,50 inch for its diameter. Large model consisted seamless pipe SCH40 and SCH80 with 2,00 inches for its diameter. This study also formulated the problem into the problem of eigenvalues and nonlinear solutions to solve critical buckling loads (P_{cr}), along with buckling modes. The results showed that the Eigen value analysis gives the critical load value for the perfect model (without holes) better. The presence of hole on the model need nonlinear solution to verified the results. The procentage of different results showed in 2,96% - 14,01% for eigen value (linear buckling) and 21,53% - 25,19% for nonlinear static analysis. The nonlinear solution with small displacement gives the lowest P_{cr} value which approximates than eigen value analysis, correspondetly 5,59%, 19,62%, and 21,40%. The modulus elasticity (E) has significant effect on the large of difference results.

Keywords: buckling, cutout, eigen value, nonlinear, numerical

OMICS:

from Genomics to Metabolomics



Metabolite profiling of black rice (*Oryza sativa* L.) after infection *Xanthomonas oryzae* pv. *Oryzae*

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To benefit the high anthocyanin content, black rice has been promoted and consumed as a functional food. However the black rice production faces several disease problems like bacterial leaf blight (BLB) caused by *Xanthomonas oryzae* pv. *oryzae* (*Xoo*). Previous study using several local black rice cultivars has been able to identify Pari Ireng with a higher resistance character on BLB compared to others. This current study aimed to determine the metabolite response of black rice to *Xoo* infection. Two local black rice cultivars, Melik and Pari Ireng, and white rice cultivars IR64, Java14 and IRBB21 were treated with *Xoo* pathotype IV and physical damage (mock). Two replicates of each treatment were measured using Gas chromatography-mass spectrometry (GC-MS) for metabolite profiling analysis, while total phenols concentration (TPC) and total flavonoids concentration (TFC) were measured by spectrophotometer at 650 nm and 450 nm, respectively. In general, primary metabolites including sugars, sugar alcohols, fatty acids, glycerol, and some of organic acids were observed in all cultivars after *Xoo* infection. In Melik and Pari Ireng, sugars including fructose, mannose, and gluco-hexodialdose showed a higher concentration compared to before infection. Total phenols increased after *Xoo* infection, cultivars with highest total phenol was Java14 followed by Pari Ireng, Melik with moderate concentration and IRBB21 with the lowest TPC. Pari Ireng had higher total phenol than Melik after *Xoo* infection. The highest TFC were observed in black rice cultivars (Melik and Pari Ireng) after *Xoo* infection.

Keywords: black rice, bacterial leaf blight (BLB), GC-MS, metabolite profiling, *Xoo*

Expression of haloacid dehalogenase gene and its protein characterization from *Klebsiella pneumoniae* ITB1 for bioremediation of organohalogen pollutants

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Organohalogen compounds have massive application in industries, agricultures, and used as flame retardant and refrigerant in households. As consequences, accidental and deliberate release of large quantities of organohalogen to the environment were occurred. Therefore, these compounds became the most significant pollutants. Recent advanced of biotechnology provides reliable, simple, and green technology to threat organohalogen contaminants. Previous study has been successfully subcloned a 690 bp of haloacid dehalogenase gene (*hakp1*) from *Klebsiella pneumoniae* ITB1 into pET-30a(+) expression system to get high enzyme productivity. IPTG was used as inducer to express pET-*hakp1* recombinant clone in *E. coli* BL21 (DE3). The molecular mass of haloacid dehalogenase Hakp1 protein was 30 kDa as determined by SDS-PAGE. Zymogram analysis showed that this recombinant protein has dehalogenase activity as shown by the formation AgCl white precipitate. Quantitative assay of haloacid dehalogenase Hakp1 gave specific activity of 84.29 U/mg with the optimum temperature of 40°C at pH 9. Predicted three-dimensional structure of Hakp1 showed α/β motif folding which comprised of cap and core domain. The predicted active sites of Hakp1 were Asp8, Glu10, Leu22, Phe23, Trp90, Ser125, Ser126, Lys159, and Asp184 with Asp8, Glu10, Ser126, and Lys159 act as binding residue. This recombinant haloacid dehalogenase clone provide an alternative agent for effective bioremediation of organohalogen pollutants.

Keywords: *Klebsiella pneumoniae* ITB1, haloacid dehalogenase, organohalogen

Profile of triiodothyronine (T3) and thyroxine (T4) of female Bali breed cattle transported by traditional vessel from Sumbawa to Pontianak

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Transportation of livestock using traditional vessel is one of traditional method used to fulfill the needs of beef. It requires precise handling because it may cause stress in animals. Transportation stress causing 8-11% of animal death, decreasing the body weight up to 8% and decreasing reproductive performance of animals. This study aimed to determine the profile of triiodothyronine (T3) and thyroxine (T4) hormones in 1-2 years old female Bali breeding cattle transported from Sumbawa to Pontianak for 120 hours using 100 GT traditional vessel with two floors and a capacity of 300-400 heads. Five cows were selected by purposive sampling. Blood samples were taken three times: before transportation (at Sumbawa Animal Quarantine Installation), during loading (at traditional vessel) and after transportation (at Pontianak Animal Quarantine Installation) then tested by ELISA to determine the profile of triiodothyronine (T3) and thyroxine (T4). The result showed that there was a decline in triiodothyronine (T3) and thyroxine (T4) concentration, they increased during loading, decreased during docking, and decreased further when the livestock were at Animal Quarantine Installation. Therefore, transportation affects the profile of triiodothyronine (T3) and thyroxine (T4). It would be concluded that transportation affected hormone of T3 and T4.

Keywords: thyroxine (T4), traditional vessel, transportation, triiodothyronine (T3)

Simultaneous clustering analysis with molecular docking approach for discovery of type 2 antidiabetic compounds in network pharmacology

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The database of drug compound and human protein is an very important role to identify the target protein and the compound in drug discovery. In recent years, a network pharmacology approach was established by updating the research paradigm from the current “one disease-one target-one drug” to a new “drug-target-disease networks”. Molecular interaction of ligand-protein can be analyzed quantitatively using simultaneous clustering and molecular docking approach. The docking methods estimated the affinity and binding mode of a ligand for the protein receptor of interest quickly and cheaply in structure-based virtual database screening. Simultaneous clustering grouped similar objects of compound and protein that have a strong relationship in two dimensions simultaneously by using the binding free energy (ΔG) scores from the molecular docking results. The ΔG of the docking shows the bond strength between molecules or the magnitude of ligand-protein interaction. The increasing of negative ΔG value means that the binding of molecules is more stable or the ligand-protein interaction is stronger. This study is focused on the interaction between the 306 compounds from medicinal plants (*Tinospora crispa*, *Zingiber officinale*, *Momordica charantia*, *Blumea balsamifera*), synthetic drugs (FDA-approved) and the 21 significant human proteins associated with type 2 diabetes. The medicinal plant compounds which group with the synthetic drug compounds can possible be developed as an antidiabetic drug candidates. Likewise, the proteins which assembled each other and which have a high association with a particular group of compounds can be seen as a target protein that plays a role in type 2 diabetes.

Keywords: molecular docking, network pharmacology, simultaneous clustering analysis, type 2 diabetes

The discovery of secondary and tertiary structure of cervical cancer lncRNA biomarker

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The cervical cancer is one of the primary causes of mortality for women due to HPV (Human Papilloma Virus) infection. The fingerprint of HPV infection could be detected on long non-coding RNA (lncRNA) biomarker. The primary structure or sequences of RNA should be annotated within conventional bioinformatics tools. Therefore, this study aimed to determine the fine-grained 2D and 3D structure of lncRNA PVT1 and its respective siRNA inhibitor. lncRNA PVT1 sequences from *Homo sapiens*, *Mus musculus*, and *Rattus norvegicus* were retrieved from Genbank NCBI. Predicting the 2D structure and interactions of the lncRNA and siRNA were analyzed using Vienna RNA Package. 3D structure of the RNA was computed using to simRNA and modeRNA software. The result showed that lncRNA PVT1 from *Homo sapiens* and *Mus musculus* had conserved region. But, the conserved 2D structure analysis of lncRNA PVT1 was low. The data showed that both lncRNA PVT1 had a short half-life in the cell. 3D model of lncRNA PVT1 showed the stability and the role of molecules and siRNA-lncRNA of PVT1 interaction analysis revealed that the molecules could bind well. The 2D and 3D structure of both lncRNA PVT1 and its siRNA could be utilized as biomarkers and potential therapeutic agents for cervical cancer.

Keywords: biomarker, cervical cancer, HPV, lncRNA, transcriptomics

Gold mining waste effect on superoxide dismutases activity of mahagony (*Swietenia mahagony* (L.) Jacq.) in Kalirejo, Kulon Progo

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Traditional gold mining activities in Kalirejo, Kulon Progo use mercury amalgamation to obtain the gold. This method leaves tailing which contain mercury. Mercury is toxic metal that capable to induce free radical production called Reactive Oxygen Species (ROS) and have chlorosis effect to the leaves. Within a plant cell, the superoxide dismutases (SOD) constitute the first line of defence against ROS (Alscher *et al.* 2002) . It can be catalyzed by SOD to molecular oxygen and H₂O₂. The aim of this study is to investigate the SOD activity and total content of chlorophyll in mahagony leaves that grow in gold mining area. Root, stem, and leaf of mahagony were analyzed for their SOD activity using Giannopolitis and Ries method (1977) while the chlorophyll content was measured using spectrophotometry technique. The mercury concentration of leaves, roots, stems, soil and water also measured using mercury analyzer. The enzyme was present in the stems, roots, and leaves of mahagony. The SOD activity in root was 410.58 units.mg⁻¹ while in leaves was 383.74 units.mg⁻¹ and in stem was 392.26 units.mg⁻¹. The total chlorophylls content was 1.82 mg.g⁻¹. The mercury concentration found in roots was 4.36 mg.kg⁻¹, in leaves was 2.54 mg.kg⁻¹, in stems was 0.90 mg.kg⁻¹, in soil was 54.26 mg.kg⁻¹ and in water was 18.74 mg.kg⁻¹. The result showed that the highest oxidative stress occur in roots, then in stem, and the lowest is in leaves of mahagony.

Keywords: *Swietenia mahagony* (L.) Jacq., chlorophyll, gold mining, mercury, superoxide dismutases

Cloning and sequencing of acetyl-CoA acetyltransferase gene from *Halomonas elongata* BK-AG18 and its protein in silico analysis

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Previous study had successfully isolated and characterized *Halomonas elongate* BK-AG18 from Bledug Kuwu mud crater, Central Java, Indonesia as a producer of polyhydroxybutyrate (PHB). Bacteria accumulate PHB in their cells as carbon and energy reserve because of unbalanced growth conditions. PHB is biodegradable polymer that could be used to substitute petrochemical plastics. In some bacteria, there are three PHB biosynthetic genes, known as *phbA* (acetyl-CoA acetyltransferase), *phbB* (beta-ketoacyl-ACP reductase) and *phbC* (PHB polymerase). In this study, *phbA* was successfully amplified from chromosomal DNA of *Halomonas elongata* BK-AG18. The obtained *phbA* amplicon was 1176 bp. This fragment was cloned into pGEM-T Easy cloning vector and transformed into *Escherichia coli* TOP10. The recombinant colonies were selected by blue-white screening, confirmed by size screening, reconfirmed by re-PCR, and sequenced. When *phbA* sequences aligned with *Halomonas elongata* DSM2581 chromosome using BLASTN, this sequence showed 99% identity. The deduced amino acid sequences of this cloned showed 100% identity to PhbA of *Halomonas elongata* DSM2581, suggests that the obtained cloned fragment is a *phbA* gene. The PhbA 3D structure predicted by I-TASSER showed high similarity to acetyl-CoA acetyltransferase structure from *Ralstonia eutropha* H16. Analysis using Sequence Annotated by Structure (SAS), Catalytic Site Atlas (CSA), and literature suggests that PhbA possesses three catalytic residues, which are Cysteine (C88), Histidine (H348), and Cystein (C378).

Keywords: *Halomonas elongata* BK-AG18, acetyl-CoA acetyltransferase, polyhydroxybutyrate

Phenotypic identification and numerical taxonomy of pigmented bacteria isolated from marine and freshwater aquatic at Yogyakarta, Indonesia

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Numerical phenetic analysis was used to compare phenotypic data obtained from 6 isolates of pigmented bacteria strains taken from marine and river aquatic. Each strain was tested for 120 characters were analysed using the simple matching (SSM) and Jaccard (SJ) similarity indices with unweighted pair-group method with arithmetic mean (UPGMA) clustering method. All of the strains classified into two clusters, cluster A were marine pigmented bacteria and cluster B were river pigmented bacteria. Differences were observed between the dendrograms derived from the SSM and SJ. Presence of bacteriochlorophyll-*a* (Bchl-*a*), carotenoids, as well as other biochemical tests of three marine pigmented strains were in match with key characters of the genera *Roseobacter*, *Erythrobacter*, and *Roseateles*. Three of river pigmented strains were identified as *Xanthobacter*, *Flavobacterium* and *Pseudomonas*. It was proved that the marine and river pigmented bacteria isolates showed a relative phenotypic distance. It was clearly seen that the phenetic approach was a necessary tool to delimitate and identify the pigmented bacteria from different habitats.

Keywords: bacteriochlorophyll-*a*, carotenoids, Jaccard similarity, simple matching

Detection of bacterial leaf blight resistance gene *Xa4* and transcriptomic analysis of its gene in black rice after infection of *Xanthomonas oryzae* pv. *oryzae*

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Black rice is one of rice plants that has a higher nutrition than a non pigmented rice because of its anthocyanin content which benefit to health. However, productivity of black rice is decreased by bacterial leaf blight caused by *Xanthomonas oryzae* pv. *oryzae* (Xoo). *Xa4* is one of the most widely exploited resistance gene in many Asian rice breeding programs and conferred durable resistance gene in many commercial rice cultivars. This research aims to detect *Xa4* gene and its transcriptomic analysis in black rice after infection of Xoo. The black rice Pari Ireng and Melik cultivars are used in this research and white rice IR64 cultivar as a susceptible control, while Java14 is used as resistant control. The research is started by DNA isolation, that followed by Xoo inoculation to rice plant by the leaf clipping method. Then, analysis of transcriptomic done by isolating RNA of rice leaves, *Xa4* gene amplification with a Two Step RT-PCR, visualization with electrophoresis, and estimation of the level of *Xa4* gene expression with software ImageJ. The results of this research showed that *Xa4* detected on various band that are 150 bp ('Melik') and 136 bp ('Pari Ireng'). It can be concluded that both cultivars have *Xa4* but only *Xa4* can be expressed at 24 hours, 96 hours and 14 days after infection Xoo in Melik cultivar.

Keywords: bacterial leaf blight, black rice, transcriptomic, Xa4 gene, Xoo

GC-MS based metabolomics study on pigmented rice (*Oryza sativa* L.) resistant to rice ear bug (*Leptocorisa oratorius* F.)

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Pigmented rice has been developed as a functional food for its high anthocyanin content. The production of this rice still faces several problems including pest and pathogen. Several pigmented rice has been screened for their resistance against rice ear bug. There is no previous study reporting the chemical compounds responsible on the resistant against rice ear bug on pigmented rice. This research aimed to compare metabolomic profile between resistant with susceptible pigmented rice (black rice) against rice ear bug. We used choice bioassay of six cultivars was performed on Pari Ireng, Melik, CIS, Cempo Ireng Sleman, ciherang and IR 64 . Samples subjected to metabolomics study were the panicle, leaf flag before and after infestation for induction defense mechanism, the panicle and leaf without infestation for a constitutive defense mechanism. Metabolite profiles were analysed using Gas Chromatography-Mass Spectrometry (GC-MS), followed by a multivariate data analysis using Principal Component Analysis (PCA). The result of the score plot of PCA showed that Melik as the resistant cultivar was not clustered between before and after infestation for both panicle and leaf flag. However the susceptible cultivars, Pari Ireng and IR64 were separated between before and after infestation. According to loading plot of the PCA, metabolites detected higher in the panicle of resistant cultivars were that have role for resistant against rice ear bug which belong to sugars are trehalose, galactose, psicose, mannose, fructose and amino acid is tryptophan. Metabolites detected in leaf flag are galactose, sucrose, alanine, alanylalanine which known as plant defence. The susceptible cultivar we found ribose, tryptophan, phenylalanine, histidine, lysine, aspragine, serine and shikimic acid.

Keywords: GC-MS, metabolite, PCA, pigmented rice

NMR metabolite comparison of local pigmented rice in Yogyakarta

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Pigmented rice may have a black or red color due to their higher anthocyanin content in its grain. Anthocyanin is known as a natural antioxidant, and many studies have reported its benefits for human health. Thus, people are developing the pigmented rice as a functional food. The earlier study of our group showed that aside from the color, these two type of pigmented rice also differ in their resistance to pest and pathogen. Therefore, this study aimed to compare the metabolite profiles between black rice and red rice. Three black rice cultivars and two red rice cultivars were used, namely Melik, Pari Ireng and Cempo Ireng Sleman for black rice and Inpari 24 and RC 204 for red rice cultivars. The grains were collected at 4-5 month. After husk removal, the sample was ground in liquid nitrogen and dried with freeze dryer. The dried samples were extracted using 50% MeOD₄ (in D₂O phosphate buffer pH 6 containing 0.01% TSP as an internal standard). Analysis of metabolome was done using 500 MHz NMR followed by multivariate data analysis. We applied an orthogonal partial least-squares-discriminant analysis (OPLS-DA) model after PCA to discriminate between the five different cultivars using. The result showed that the OPLS-DA score plot exhibited a good separation between black and red rice. The metabolites that could influence the separation of red rice and black rice are valine, threonine, alanine, glutamate, galactinol, β -glucose, α -glucose, raffinose and fumaric acid.

Keywords: metabolite comparison, *nuclear magnetic resonance* (NMR), pigmented rice

Identification of cytotoxic compounds from torbangun leaves by metabolomics approach

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Plectranthus amboinicus Lour (PA) is one of Indonesian medicinal plants originated from North Sumatra. Its main traditional use is to be served as a soup to stimulate lactation for breastfeeding women. PA was also reported for other health benefit functional properties such as antibacterial and anti-inflammatory activity. This research aiming at identification of cytotoxic compounds from PA against WiDR colon cancer cells. We established a comprehensive extraction method coupled to NMR-based metabolomics for high throughput screening of functional compounds. We applied this method to rapidly and effectively identify immune-modulatory compounds from PA. A mixture of freeze-dried PA powder (1 g) and sea sand was put in a metal column ($l=5.0$ cm, d 2.0 cm) for extraction. Three solvents combination (n-hexane, acetone, water) was delivered in gradient using a pump into the column to provide 15 PA fractions with different polarity. The extraction was repeated three times and each fraction was divided into two; for NMR analysis and for cytotoxic effects estimation. The results of orthogonal projection to the last square analysis (OPLS) showed that several triterpene acids previously identified in PA were among the compounds responsible for the plant's cytotoxic activity. Chemical validation by testing the reference compounds prove this prediction. Further work in elucidating cytotoxic mechanism of these triterpene acids are currently under progress.

Keywords: cytotoxic compounds, metabolomics approach, torbangun leaves

Cloning and expression of haloacid dehalogenase gene from *Bacillus cereus* IndB1

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Organohalogen compounds are widely used as pesticides in agricultures and solvent in industries. These compounds could cause environmental pollution and health problems due to its toxicity and persistence. Studies about biodegradation of organohalogen compounds had been done for a long time, particularly using dehalogenase enzyme from bacteria. Haloacid dehalogenase is group of enzymes that breaks the carbon-halogen bond in halogenated aliphatic acids. Gene encodes haloacid dehalogenase from *Bacillus cereus* IndB1 has been successfully isolated and characterized, named the *b CFD1* gene. This gene was subcloned into an expression vector and characterized through heterologous expression in *E. coli* BL21 (DE3). High expression of *b CFD1* was obtained by inducing the culture at OD₅₅₀ 0.8-1.0 using 0.01 mM IPTG as determined by SDS-PAGE. Zymogram analysis proved that the recombinant protein possessed dehalogenase activity. B CFD1 activity toward monochloroacetic acid (MCA) showed specific activity of 37 U/mg at 30 °C, pH 9. The predicted three-dimensional structure of B CFD1 showed that this protein has α/β -hydrolase folding motif with two domains, namely cap and core domains. The B CFD1 active site was located on the interface area between these two domains.

Keywords: *Bacillus cereus* IndB1, haloacid dehalogenase, heterologous expression, organohalogen

The expression of growth factors signalling gene from different donor age of human adipose derived stem cell during in vitro maturation

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Many studies have applied co-culture systems using various cell types to restore the follicular microenvironment during in vitro maturation (IVM). Adipose derived stem cells (ASCs) secrete high levels of several growth factors which have roles on oocytes maturation (IGF1, FGF2, TGF β 1 and TGF β 3). The objective of this study was to determine the expression of growth factor signalling genes in porcine oocytes maturation. The human ASCs (from 2 young and 2 old donors) were seeded 1×10^5 cells into 12 well plate with AMSC medium (Rmedica-stemcell, Korea) and used for IVM co-culture system. Maturation rate was examined base on polar body extrusion. The expression of growth factor signalling genes from human ASCs, oocytes and cumulus were measured by qPCR (Applied Biosystems, USA). All data were analysed using ANOVA continued with Tukey test in GraphPad Prism5. The expression of h-IGF1 signalling genes from human ASCs cells showed similar values and h-FGF2 expression were higher in young than old donors. The p-FGF2, p-FGFR2 and p-TGF β 1 expressions in matured oocytes and only p-IGFR in cumulus which co-cultured with young donors showed higher value than old and control groups. Apoptotic ratio (p-BAX/p-BCL2) from oocytes and cumulus in co-cultured groups also resulted lower level than control. Oocyte maturation rates were significantly increased in all co-cultured groups (Y1 (82.5 \pm 1.6%), Y2 (89.7 \pm 2.2%), O1 (79.8 \pm 2.5%) and O2 (87.5 \pm 1.9%)) than control (71.9 \pm 1.5%). Although expression of growth factors signalling genes from young and old ASCs donors had variation, those gene activities might support oocytes maturation and increase the efficiency of porcine IVM.

Keywords: gene expression, human ASCs, maturation

Detection of *Strongyloides Stercoralis* using single polymerase chain reaction method in Hookworm-positive fecal samples

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Strongyloidiasis is an infectious disease caused by roundworm *Strongyloides stercoralis*. The prevalence of global *Strongyloides stercoralis* infection ranges from 2-20% in endemic areas. According to current epidemiological data, 100-200 millions of people spread in 70 countries are presumed to be suffering from the parasite. In Indonesia itself, the prevalence of *Strongyloides stercoralis* infection has not yet been clearly reported. This may be due to several diagnostic difficulties, including classifying *Strongyloides stercoralis* infection into hookworm infection. Such error is frequently found since both *Strongyloides stercoralis* and hookworm egg and larval morphology are similar microscopically. To determine the ability of single PCR method in the detection of *Strongyloides stercoralis* in hookworm-positive fecal samples that were 6-months-preserved in 70% ethanol. The research is a descriptive analytic study. Fecal samples used in the study were obtained from Central Celebes, Indonesia, and have been undergone identification using direct smear and Kato-Katz method. As many as 86 hookworm-positive fecal samples were tested using single PCR method in order to detect the presence of *Strongyloides stercoralis* infection. These fecal samples were already preserved in 70% ethanol for the period of 6 months in the Department of Parasitology, Faculty of Medicine Universitas Gadjah Mada. After underwent analysis using single PCR method, the results showed 41 samples (47.7%) were positive for *Strongyloides stercoralis* infection, whereas 45 samples (52.3%) were negative for *Strongyloides stercoralis* infection or positive for hookworm infection. Positive results for *Strongyloides stercoralis* infection in 86 hookworm-positive fecal samples will be acquired if a band is generated on 115 bp during electrophoresis. Single PCR method is able to be utilized in the detection of *Strongyloides stercoralis* infection in hookworm-positive fecal samples that were 6-months-preserved in 70% ethanol.

Keywords: detection of *Strongyloides stercoralis*, single PCR, hookworm-positive fecal samples

Edible biofilm formation from guava seed waste fermentation

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Guava seed is by-product from the consumption of guava fruits. We interested to explore further the potential of guava seed waste using fermentation method. The purpose of this research was to determine the ability of biofilm formation produced from fermentation of guava seed. Fermented guava seed was prepared by solid-state fermentation method using banana leaves wrap at 37°C for 72 hours. It were then continued with isolation and screening of bacteria from the fermentation products, preparation of bacteria cultures to be used in biofilm formation, and formation of biofilm by glass slides and broth cultures methods. The edible biofilm formation by glass slide method was observed by light microscopy using 0.5% Crystal Violet dye, while biofilm formation by broth cultures method was observed by transmission electron microscopy (TEM) using *phosphotungstic acid* 2% dye. The results show that there were 3 (three) strains lactic acid bacteria (LAB) candidates isolated from fermented guava seed waste product (J6, J7, and J8 strains). The observation by light microscopy showed that J7 strain was the only strain which was unable to form biofilm by glass slide method. All the strains showed the ability to form biofilms in different stages by broth cultures method. Thus, guava seed fermentation was able to produce edible biofilm but the LAB strains still need to be identified further.

Keywords: edible, biofilm, fermentation, guava seed

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Field of Interest

- Structural Dynamics & Earthquake Engineering
- Nonlinear Finite Element Analysis
- Experimental Modelling
- Structural Health Monitoring System
- Forensic Engineering

Education

1979 Ir. Civil Engineer, Universitas Gadjah Mada
1985 M.Sc. Civil Engineering, Michigan State University, USA
1989 Ph.D. Doctor of Philosophy, Michigan State University, USA
1996 Post Doctor. Michigan State University, USA



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Field of Interest

- Synthesis of sulfur ligands and complexation
- Chemical crystallography
- Collaborative research

Education

1974 Bachelor degree in Chemistry from University Malaya

1977 Ph.D. from King's College, London University

1984 Postdoctoral under Association of commonwealth Universities at Essex University

Scientific positions

1977- 2017 Lecturer in Chemistry at Universiti Kebangsaan Malaysia

1990 Visiting fellow under Association of commonwealth Universities at Oxford University with Prof. Malcolm Green

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Field of Interest

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Education

Ir (engineer) Universitas Gadjah Mada

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Awards

- Chartered professionl engineer (highest level) of the Institution of Engineers Indonesia
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Field of Interest

- Synthetic organic chemistry
- Organic aspects of coordination chemistry
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Awards

- RACI Rennie Medal 1970
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- Leighton Medal 2004



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Field of Interest

- Development of small organic molecules as anticancer, antimalarial, and antimicrobial agents

Education

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Publication

- Decarboxylative Coupling Strategy to Afford N-Heterocycles Driven by Silica-Nanosphere-Embedded Copper Oxide (Cu-SiO₂-NS), *ACS Sustainable Chemistry and Engineering*, vol. 5, no. 6, pp. 4672–4682, 2017.
- N-Piperonyl substitution on aminoquinoline-pyrimidine hybrids: Effect on the antiplasmodial potency, *European Journal of Medicinal Chemistry*, vol. 131, pp. 126–140, 2017.
- Chemoselective Hydrazine-mediated Transfer Hydrogenation of Nitroarenes by Co₃O₄ Nanoparticles Immobilized on an Al/Si-mixed Oxide Support, *Chemistry - An Asian Journal*, vol. 12, no. 7, pp. 785–791, 2017.
- Synthesis, antimalarial activity, heme binding and docking studies of N-substituted 4-aminoquinoline-pyrimidine molecular hybrids, *European Journal of Medicinal Chemistry*, vol. 129, pp. 175–185, 2017.
- Marine peptides as anticancer agents: A remedy to mankind by nature, *Current Protein and Peptide Science*, vol. 18, no. 2, pp. , 2017.
- Design, synthesis and evaluation of 4-aminoquinoline-purine hybrids as potential antiplasmodial agents, *European Journal of Medicinal Chemistry*, vol. 126, pp. 675–686, 2017.
- CuO/Fe₂O₃ NPs: robust and magnetically recoverable nanocatalyst for decarboxylative A3 and KA2 coupling reactions under neat conditions, *Tetrahedron Letters*, vol. 57, no. 40, pp. 4468–4472, 2016.



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Field of Interest

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- 1980-1985 Ir in Department of Geodesy, Bandung Institute of Technology, Indonesia
- 1986-1989 M.Sc.Eng. in Department of Surveying Engineering, University of New Brunswick, Fredericton, Canada
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Award

- Indonesian Young Scientist Award 1994 (in the category of Technology and Engineering)
- ASEAN Young Scientist and Technologist Award 1995
- ITSF (Indonesia Toray Science Foundation) Science and Technology Award. Presented in Jakarta, 20 March 1996.
- PII (Persatuan Insinyur Indonesia) Adhicipta Rekayasa Award. Presented in Jakarta, 14 June 1996



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Field of Interest

- Testing on concrete structure (non-destructive test)
- Structure vibration
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Education

1973 Civil Engineer (Ir) from Universitas Gadjah Mada
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1992 Doctor of Philosophy (Ph.D.) in Civil Engineering,
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Field of Interest

- Design, synthesis and evaluation of calixarene based molecular receptors for recognition and sensing of biomolecules and ions
- Development of natural products for personal sophistication, supracosmeceuticals, sunscreens
- Devising strategies for regulating nitrogen delivery to plants

Education

1974 Ph. D. degree from University of Delhi, Delhi, India
1981-1982 Post doctoral Fulbright scholar with Prof. Alfred Hassner at State University of New York at Binghamton

Awards

- Lockheed-Martin Gold Medal for best innovation
- Burhani foundation-NEERI (CSIR) award for outstanding socially relevant environment friendly technologies
- NRDC award for Best Societal Invention
- Prof. M. N. Desai award for Organic Chemistry Research
- Intellectual Ventures Patent award for work on mercury sensing
- Fulbright Travel award and Intellectual ventures awards for catalyst for macrolactonization and a zinc sensor
- Recipient of Professor TR Seshadri memorial lecture award from Delhi University
- Recipient of Professor V Krishna moorthy memorial lecture award
- Cosmoprof Asia lectrue award(Hongkong)
- Recipient of Active Ingredients award lecture in Paris



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Field of Interest

- Geodetic/Technical Aspects of the Law of the Sea
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Education

- 1996-2001 Undergraduate, Geodetic Engineering, Universitas Gadjah Mada, Indonesia
- 2004-2006 Master, Surveying and SIS, University of New South Wales, Australia
- 2008 Doctor, Australian National Centre for Ocean Resources and Security, University of Wollongong, Australia

Award

- UN-Nippon Foundation of Japan Fellowship, UN-Nippon Foundation, 2007
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Field of Interest

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Education

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- 1990 Master, University Maseda, Japan
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Award

- Lecture Note Award for Physical Chemistry Laboratory Work Handout, QUE-Project CSP Gadjah Mada University, 1999
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- National Publication Award, QUE-Project CSP Gadjah Mada University, 2003



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Field of Interest

- Separation engineering

Field of Specialization

- Environmental conscious materials and recycle
- Properties in chemical engineering process/Transfer operation/Unit operation
- Analytical chemistry
- Functional solid state chemistry
- Polymer/Textile materials

Education

1990 Department of Applied Chemistry, Graduated

1992 Department of Organic Synthesis, Master Course

Award

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Education

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Publications

- H.Sakamaki, T.Uchida, L. W. Lim, T. Takeuchi, "Evaluation of column hardware on liquid chromatography-mass spectrometry of phosphorylated compounds," *J. Chromatogr. A*, **1381**(2015) 125-131
- Rahayu, L. W. Lim, T. Takeuchi, "Preparation of hybrid monolithic stationary phase with allylsulfonate for the rapid and simultaneous separation of cations in capillary ion chromatography," *J. Sep. Sci.*, **38** (2015) 1109-1116
- N. Takayama, L. W. Lim, T. Takeuchi, "Retention behavior of inorganic anions in hydrophilic interaction chromatography" *Anal. Sci.*, **33** (2017) 619-623
- Kawase, L. W. Lim, T. Takeuchi, "Investigation of chromatographic performance of hyperbranched amine-modified stationary phases in ion chromatography" *Chromatography*, **38** (2017) 9-14.

Awards

- IUPAC International Congress on Analytical Sciences 2001, Best Poster Award(2001)
- Young Scientist Award, Central Region of The Japan Society for Analytical Chemistry(2008)
- Award of Encouragement, Ion Chromatography Discussion Group, The Japan Society for Analytical Chemistry, Japan(2009)
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Publications

- H. Sakamaki, T. Uchida, L. W. Lim, T. Takeuchi, "Evaluation of column hardware on liquid chromatography-mass spectrometry of phosphorylated compounds," *J. Chromatogr. A*, **1381**(2015) 125-131
- Rahayu, L. W. Lim, T. Takeuchi, "Preparation of hybrid monolithic stationary phase with allylsulfonate for the rapid and simultaneous separation of cations in capillary ion chromatography," *J. Sep. Sci.*, **38** (2015) 1109-1116
- N. Takayama, L. W. Lim, T. Takeuchi, "Retention behavior of inorganic anions in hydrophilic interaction chromatography" *Anal. Sci.*, **33** (2017) 619-623
- Kawase, L. W. Lim, T. Takeuchi, "Investigation of chromatographic performance of hyperbranched amine-modified stationary phases in ion chromatography" *Chromatography*, **38** (2017) 9-14.

Awards

- IUPAC International Congress on Analytical Sciences 2001, Best Poster Award (2001)
- Young Scientist Award, Central Region of The Japan Society for Analytical Chemistry (2008)
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- Award of Encouragement, The Society for Chromatographic Sciences, Japan (2014)
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Field of Interest

- Controlling cell differentiation for regeneration medicine.
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Education

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1992-1995 Ph.D. Mie university, Mie, Japan

Awards

1994 Industrial Technology Award on Sialic Acid Research
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2001 Incentive Award in Synthetic Organic Chemistry,
Japan Tokai Branch on Novel Selenium-Containing
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by The Society of Synthesis Organic Chemistry, Japan, Tokai Branch

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Professional Experience

1985-1987 Research Associate, Gifu University, Gifu, Japan

1987-1996 Central Research Laboratories, Taiyo Kagaku Co., Ltd. Mie, Japan

1997-2003 Assistant Professor, Gifu University, Gifu, Japan

1999-2000 Visiting Assistant Professor, The University of Iowa, USA

2003-2009 Associate Professor, Gifu University, Gifu, Japan

2009-now Professor, Gifu University, Gifu, Japan

2013 Head of the Department of Chemistry and Biomolecular Science, Gifu
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Publication

- The Development of Mercury Ion Selective Electrode With Ionophore 7,16-Di-(2-Methylquinolyl)-1,4,10,13-Tetraoxa-7,16-Diazacyclooctadecane (DQDC)
- The Development of Innovative Chemistry Learning Material for Bilingual Senior High School Students in Indonesia



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Field of Interest

- Contact lens research, specifically understanding the etiology of adverse events and comfort during contact lens wear.

Education

1983 BSc (hons) in Applied Biological Sciences University of the West of
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2015 DSc in Biology of the Ocular Surface at University of New South Wales



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- Controlling cell differentiation for regeneration medicine.
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Education

- 1990–1994 Department of Agricultural Chemistry,
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- 1994–1999 Graduate School of Biological Sciences,
Nara Institute of Science and Technology
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Scientific positions

- 1999–2004 Post-doctoral associate in Department of Pharmacology,
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Supervisor: Professor Jochen Buck
- 2004–2006 Research associate in Molecular and Bio Science Research Group,
Materials Science Laboratory, NTT Basic Research Laboratories
Nippon Telegraph and Telephone Corporation
- 2006–2010 Research associate in Graduate School of Materials Science,
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- 2010–2012 Postdoctoral scientist at the Cancer Institute of Japanese Foundation
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- 2012–2012 Assistant professor in Graduate School of Biological Sciences,
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Field of Interest

- Bacterial biofilms
- Bioremediation
- Green wealth utilization

Education

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Publications

- Rajesh Sawhney (2016): Green Pharmacy to combat bacterial biofilms: an overview. Advance Pharmaceutical Journal 1(5):114-118. (ISSN: 2456-1436)
- Ashutosh Pathak, Rajesh Sawhney, Arun Karanwal, Manjula Sharma (2015): Mushrooms as antimicrobial agents: an overview. Indian Journal of Mushrooms. 33 (1): 19-22

Book

- Rajesh sawhney (2015): Introductory Bacteriology. Sara Book Publications, Gujrat (India). (ISBN: 978-1630403478)



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Field of Interest

- Natural products chemistry
- Development of new synthetic methodologies for the preparation of biologically important natural products and their analogues
- Novel antimicrobial biomaterials
- Heterocyclic chemistry. Medicinal chemistry. Design and synthesis of quorum-sensing inhibitors.

Education

1983 Doctor of Philosophy (Ph.D. Microbiology) in Organic Chemistry, Wollongong University

Publications

- Nizalapur S, Kimyon O, Biswas NN, Gardner CR, Griffith R, Rice S, Manfield M, Willcox M, Black DStC, Kumar N., Design, synthesis and evaluation of *N*-arylglyoxylamides derivatives as structurally novel bacterial quorum sensing inhibitors, *Organic & Biomolecular Chemistry*, 2016, **14**, 680-693
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Publications

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- Amol P. Jadhav, V. U. Bhaskara Rao, P. Singh Rajesh G. Gonnade and Ravi P. Singh, Asymmetric Vinylogous Michael Reaction of Cyclic Enones with Silyloxy Furans *Chem Commun.* 2015, DOI: 10.1039/C5CC05617A



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M.Sc. (Chemistry Hons School) Panjab University, Chandigarh (1999)

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- Derivative UV-Vis Absorption Spectra as an Invigorated Spectrophotometric Method for Spectral Resolution and Quantitative Analysis: Theoretical Aspects and Analytical Applications: A Review, Ankush Parmar, **Shweta Sharma**, Trends in Analytical Chemistry, 77, **2016**, 44–53 (Impact Factor-7.483)
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- Synthesis, Characterization and Structural Study of New Ethyl Thiourea Compounds and the Preliminary Naked-eye Sensors for Mercury (Hg) and Argentum (Ag) Metal Ions. *Oriental Journal of Chemistry*. 2017, Vol. 33, No. (2) xx - xx
- 1,1-(Ethane-1,2-diyl)bis[3-(4-chlorobenzoyl)thiourea] *Acta Crystallographica Section E: Structure Reports*. Salima M. Abusaadiya, Bohari M. Yamin, Fadzlee Ngatiman and **Siti Aishah Hasbullah**. 2016 ;1, x160927
- 1-(4-Fluorophenyl)-4,4,6-trimethyl-3,4-dihydropyrimidine-2(1H)-thione. *Acta Crystallographica Section E: Structure Reports*. Aisyah Kadir, Normyzatul Akmal Abd Malek, Hamizah Mohd Zaki, **Siti Aishah Hasbullah** and Bohari M. Yamin. 2016 ;x161189
- Separation of Geraniol from Citronellol by Selective Oxidation of Geraniol to Geranial (Pengasingan Geraniol daripada Sitronelol mela lui Pengoksidaan Memilih Geraniol kepada Geranial). *Sains Malaysiana*. Daniel Chong Jun Weng, Jalifah Binti Latip, **Siti Aishah Binti Hasbullah** & Harjono Sastrohamidjojo, 44(8)(2015): 1183–1188

Patents

2012 P1200644556- An Apparatus for Detection of Formal Using Stacked Membrane System Potentiometric Biosensor and Method to Prepare Thereof (Patent certificate -MY-146256-A)

2014 Synthesis of Novel Natural Rubber as Hydrophobic Absorbance for the Removal of Oil Spill (Copyright)

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- S. C. Sahoo, R. Kataria and **S.K. Mehta**, Book Chapter “Copper and its complexes: Perspectives on biological role and pharmaceutical sciences” Chemical Drug Design (2016), De Gruyter ISBN: 978-3-11-036882



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