

ABSTRACT BOOK

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**ICOWOBAS**

# ICOWOBAS 2021

The 8<sup>th</sup> International Conference and Workshop  
on Basic and Applied Science

August, 25<sup>th</sup> - 26<sup>th</sup> 2021



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**Abstract Book**  
**The 8<sup>th</sup> International Conference and Workshop**  
**on Basic and Applied Sciences 2021**

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## Welcoming Speech from Chairman of Conference

Assalamualaikum ww.

Dear:

Prof. Dr. Mohammad Nasih, Rector of Universitas Airlangga

Assist. Prof. Dr. Idris Hadi Salih, Head of Board of Trustees of Tishk International University, Irak

Prof. Dr. Jawhar Fattah Saeed, President of Salahaddin University Erbil, Irak

Assoc. Prof. Dr. Zaiton Abdul Majid, Dean Faculty of Science, Universiti Teknologi Malaysia

Honored speakers,

and Ladies and Gentlement

and sincere greeting to all,

It is my great pleasure to address this 8<sup>th</sup> International Conference and Workshop on Basic and Applied Science (ICOWOBAS) 2021. This conference is organized by Faculty of Science and Technology, Universitas Airlangga in collaborate with Universiti Teknologi Malaysia; Salahaddin University-Erbil; and Tishk International University, Iraq. This conference is held online and it is not only to discuss and exchange ideas among the researchers, the students, the government officers, and the industries with different multidisciplinary knowledge, for facing current health challenges and for supporting production efforts aimed at economic recovery after the covid-19 pandemic, but also the current situation with the COVID-19 is a clear indicator that countries need to strengthen their action to achieve the 2030 Agenda for Sustainable Development, which will help to recover in a sustainable way.

ICOWOBAS 2021 has 13 speakers come from Malaysia, India, Thailand, Japan, Pakistan, and Irak. More than 150 participants from around the world has been registered in this conference. ICOWOBAS 2021 is confirmed the long tradition of quality and the interdisciplinary mixture of basic and applied science papers of previous conferences, with about more that one hundred papers submitted and will be published and proceeding and journals with scopus indexed. The quality of the technical program is of course a major factor of success for a scientific conference like ICOWOBAS 2021. It represents a huge amount of work by many colleagues from our speech community.

Last but not least, I would like to express our gratitude to all the authors, session chairs, reviewers, participants, institutions, and companies for their contribution to the 8<sup>th</sup> International Conference and Workshop on Basic and Applied Science (ICOWOBAS) 2021. I hope you enjoy the conference and find the experience inspiring and helpful in your professional field. We look forward to seeing you at our upcoming conference in the future.

Thank you.

Wassalamualaikum ww.

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## Welcoming Speech from Rector of Universitas Airlangga

Assalamualaikum ww.

Dear:

Assist. Prof. Dr. Idris Hadi Salih, Head of Board of Trustees of Tishk International University, Irak

Prof. Dr. Jawhar Fattah Saeed, President of Salahaddin University Erbil, Irak.

Assoc. Prof. Dr. Zaiton Abdul Majid, Dean Faculty of Science, Universiti Teknologi Malaysia

Honored speakers,

and Ladies and Gentlement.

It is indeed a great pleasure and honor for me to welcome all of you at the 8<sup>th</sup> International Conference and Workshop on Basic and Applied Science (ICOWOBAS) 2021. This conference is going to be a forum for exchanging views and ideas not only to overcome the COVID-19 crisis, but also to advancement of the 2030 agenda.

This year, 2021, will be defined by unprecedented challenge that the world is having to endure as a result of the novel coronavirus (Covid-19). A challenge that can only be surmounted by science and it's application solutions by all countries.

Science and technology have enabled many of us – to a great degree – to continue to live, work, study and virtually maintain social contact with one another as best as possible during the lockdown period. And our hopes of a potential remedy for the virus also rest on the trajectory of science and applied science advancement.

What the pandemic has demonstrated is that Agenda 2030 for Sustainable Development is important for everyone and while COVID-19 has thrown a spanner in the works to some extent, it must not be used as an excuse to scale back our efforts in achieving the Goals.

I believe that by participating in this virtual conference, we are in the right place and the right time. Together let us accelerate the exchange of ideas and scaling-up of good practices. I am confident that you will find new ideas, fresh energy and novel partnerships to sustain your efforts in support of the SDGs and recovery from COVID-19, through science and its application.

Finally, I wish the conference be successful and reach its goals as mentioned and I wish all of the guests enjoy the hospitality during these two days conference. Have a nice and pleasant seminar.

Thank you very much.

Wassalamualaikum ww.

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## Welcoming Speech from Universiti Teknologi Malaysia

Welcome participants to the 8th International Conference and Workshop on Basic and Applied Sciences (ICOWOBAS 2021)

The first ICOWOBAS was organized by Universitas Airlangga (UNAIR), followed by ICOWOBAS conferences hosted by other universities in turn over the years including Universiti Teknologi Malaysia (UTM) and Salahaddin University Erbil (SUE). This year, the eighth instalment of the conference makes its way once more to Surabaya, in which UNAIR is the host to this important event.

This conference is a departure from previous ICOWOBAS conferences in that for the first time, it is held virtually. Now, participants can access and attend this conference from anywhere around the globe, thus providing ample opportunity for discussion from home.

This abstract book is a testament to the value of mutual aims and strong ties between universities by gathering research work from Indonesia, Malaysia, Iraq, United Kingdom and India at ICOWOBAS 2021.

The theme of this year's conference, "Development of Fundamental Science and Technology in New Normal Era: Its Implementation towards Sustainable Development Goal", is truly appropriate in responds to the current challenges faced by our respective nations. In view of the current pandemic situation, the urgency and drive to work on explorative ventures in fundamental and applied research as well as developing skills that aim to be more sustainable and innovative based on science and technology is more important than ever before.

On behalf of UTM, I would like to express my most sincere gratitude to all participants for their participation and valuable contributions to ICOWOBAS 2021. In addition, my heartfelt thanks go to the conference taskforce from UNAIR, and collaborators from Tishk International University, Salahaddin University Erbil and Universiti Teknologi Malaysia who have put out their best in making this conference a success. I wish everyone a productive conference!

Assoc. Prof. ChM. Dr. Zaiton Abdul Majid  
Dean  
Faculty of Science  
Universiti Teknologi Malaysia





## Welcoming Speech from Salahaddin University -Erbil

Dear all,  
Professors, lecturers, researchers, ladies and gentleman's.

Good morning:

On behalf of Salahaddin University –Erbil (SUE), I would like to express my sincere gratitude and thanks to all of you. Today is a special day for all of us who gather to the online international conference (8<sup>th</sup> ICOWOBAS-2021).

This event is vital for the scientific community because it allows the specialist to join us which is important in shaping today's and future scientific challenges. We should feel happy, though, that we could join here healthy and well, since there are lots of people in the world who suffer from this vicious Covid-19 virus.

At the same time, once this pandemic is over and the country borders become open. When our life returns to the normal. We need to boost for more scientific cooperation to substitute the time we lost during the pandemic. I think in spite of the online communications help people to connect during this crisis but nothing is more powerful than face to face interactions.

I regret that during the last couple of years many scientific opportunities for face to face cooperation were prohibited. Therefore, we all together need to work very hard to retrieve these opportunities.

As such special event, I hope that Salahaddin University-Erbil will remain to be a place where you want to come to participate in the scientific conference next time after pandemic.

You are always welcome to come Erbil and good luck to all of you.

Thank you very much.

Prof.Dr. Jawhar Fattah Saeed  
The President



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## Welcoming Speech from Tishk International University

Ladies and Gentleman,  
Assalamualaikum ww.

It is an honor and great pleasure for me to welcome all participants and presenters to join the 8<sup>th</sup> ICOWOBAS 2021 virtually.

International Conference and Workshops on Basic and Applies Sciences ICOWOBAS is organized to implement existing collaborations between University Airlangga Surabaya, Indonesia, University Teknologi Malaysia, Malaysia, Salahaddin University of Erbil, Kurdistan, Iraq, and Tishk International University, Kurdistan, Iraq is honored to join such an outstanding group to promote the development of sciences and their prospect of application in industry and medical devices this year.

ICOWOBAS is a lot of work. We could not have done it without help from many people. We especially like to thank the organizer committee and reviewers from Universitas Airlangga Surabaya, University Teknologi Malaysia, Salahaddin University, and Tishk International University for providing outstanding work and professional reviews.

Finally, I gladly announce that Tishk International University would like to host the upcoming 9<sup>th</sup> ICOWOBAS conference in 2023 in Erbil, Kurdistan, Iraq.  
Thank you and enjoy the conference.

Assist. Prof. Dr. Idris Hadi Salih  
Head of Board of Trustees (TIU)



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# KEYNOTE SPEAKERS

## Nanofluids – Inception and Development

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**Abstract.** Nanofluid is a blend of suspended metallic nanoparticles and some customary fluid say water. The thermal performance of the base fluid is dramatically augmented with the inclusion of metallic nanoparticles. The application of nanofluids has revolutionalized modern engineering procedures especially in the manafacuttring of small gadgets. The nanofluid has gained great significance in the field of nanotechnology as literature shows the attempt made by the scientist and the researchers to discover the numerous characteristic of nanofluids.

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## Identification of Solids for True Design and Precise Characterization of Functional Materials

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**Abstract.** How can we design solid photocatalysts? What is the decisive factor controlling photocatalytic activities? So-called band-structure model (BSM), electrons in a valence band (VB) of a photocatalyst is photoexcited to a conduction band (CB), leaving positive holes in VB, and electrons and holes reduce and oxidize, respectively, substrates adsorbed on the surface of the photocatalyst, does suggest preferable band positions for redox reaction uniquely decided only by crystalline structure. The other possible factors, e.g., particle size and surface structure, cannot be discussed within BSM. Recently, we have developed reversed double-beam photoacoustic spectroscopy (RDB-PAS) which enables measure energy-resolved density of electron traps (ERDT) [1,2]. Those electron traps (ETs) seem to be predominantly located on the surface of almost all the metal oxide particles, with exception of nickel oxide and therefore they reflect macroscopic surface structure in ERDT patterns. Using ERDT pattern with the data of CB-bottom position (CBB), i.e., ERDT/CBB patterns, it has been shown that metal oxide powders can be identified without using the other analytical data such as X-ray diffraction patterns or specific surface area, and similarity/differentness of a pair of metal-oxide samples can be quantitatively evaluated as degree of coincidence of ERDT/CBB patterns. In this talk, a novel approach of material design based on the ERDT/CBB patterns is introduced [3].

[1] Chem. Commun., 2016, 52, 12096–12099. [2] Electrochim. Acta, 2018, 264, 83–90. [3] Catal. Today, 2019, 321–322, 2–8.

**Biography.** The research work on photocatalysis by Professor Bunsho Ohtani started in 1981 when he was a Ph. D. course student in Kyoto University. Since then, he has been studying photocatalysis and related topics for 40 years and published more than 300 original papers (h-index: 70) and two single-author books. After gaining his Ph. D. degree from Kyoto University in 1985, he became an assistant professor in the university. In 1996, he was promoted to an associate professor in Graduate School of Science, Hokkaido University and was then awarded a full professor position in the Catalysis Research Center (presently Institute for Catalysis), Hokkaido University in 1998. He was awarded several times from the societies related to chemistry, photochemistry, electrochemistry and catalysis chemistry.

## Utilization of Plant Biomass in Thailand with Biotechnology

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**Abstract.** In Thailand, a tropical country, plant biomass is abundant and can be potentially utilized as substrate for production of bioenergy and biorefineries. At the Plant Biomass Utilization Research Unit, we investigated the utilization of plant biomass in Thailand and also studied the roles of plant biomass-degrading microbes for biotechnological applications. The potential of biomass feedstock in Thailand was analyzed. The cellulose, hemicellulose and lignin were successfully extracted from the selected biomass or industrial wastes and used for production of value-added products. The role of biomass-degrading microbes was accessed by screening for enzyme production. The enzymes were optimally produced and also explored their potentials in biotechnology.

**Keywords :** Plant Biomass; Feedstock; Enzymes; Applications



## Data Science and Trending Jobs

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**Abstract.** The different disciplines that are related to data science and their role in the market jobs for future. How this important science is related to the future jobs. Specially nowadays in the era of 5G and 6G. The demand for data science skills will drive a 27.9 percent rise in employment in the field through 2026. (The US Bureau of Labor Statistics). There is also a noticeable shortage of qualified data scientists. **“The word on the street is there’s definitely a shortage of people who can do data science.”** Says {Daniel Gutierrez, managing editor of *insideBIGDATA*, told Forbes,}. **“data science is used by computing professionals who have the skills for collecting, shaping, storing, managing, and analyzing data [as an] important resource for organizations to allow for data-driven decision making.”** {Martin Schedlbauer, PhD and data science professor at Northeastern University, says that} Is Data Science helping the future. **Data science** can improve public health through wearable trackers that motivate individuals to adopt healthier habits and can alert people to potentially critical health issues. **Data** can also improve diagnostic accuracy, accelerate finding cures for specific diseases, or even stop the spread of a virus. When the Ebola virus outbreak hit West Africa in 2014, scientists were able to track the spread of the disease and predict the areas most vulnerable to the illness. This **data** helped health officials get in front of the outbreak and prevent it from becoming a worldwide epidemic. **Data science** has critical applications across most industries. Amazon, Facebook, LinkedIn, Hotmail, Gmail, Yahoo, etc. are already making use of it. In a 2015 speech, Economist and *Freakonomics* author **Steven Levitt** said that **CEOs know they are missing out on the importance of Big Data, but they do not have the right teams in place to perform the skills.** What can universities do to track the trending jobs for their students.

## Specialty Optical Fibers : Materials, Fabrication, Devices and Applications

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**Abstract.** Nowadays specialty optical fiber's based photonic devices play an important role in modern human's life starting from high speed broad band internet to medical surgery. The matter of specialty optical fibers involved an interdisciplinary field covering chemistry related to material science, fundamental physics and optoelectronics starting from fabrication technology to their material and optical characterizations. Indeed, they have wide application area covering the entire spectrum of scientific, industrial and commercial uses. Specialty optical fibers with either special waveguide structures or novel material compositions become heart of all-fiber based advanced photonic devices and components.

My keynote talk describes the specialty optical fiber's fabrication technology by modified chemical vapour deposition (MCVD) process in combination with solution doping technique. My talk also describes the development of multielement (ME) (P-Yb-Zr-Ce-Al-Ca) nano-phase separated silicaglass based optical fiber fabricated through conventional modified chemical vapour deposition (MCVD) process coupled with solution doping technique. The lasing and photodarkening behavior of such specialty optical fibers have been demonstrated and compared in terms of its photodarkening performance with standard Yb-doped fiber of phospho-alumina silica glass composition, which clearly reveals that ME-Yb doped fiber is a promising candidate for high power laser application with enhanced PD resistivity.



# INVITED SPEAKERS

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## Influence of Colloidal Cellulose Hydrogel on the Hydration of Cement

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**Abstract.** The study examined the effect of incorporating cellulosic hydrogel (CH) on the hydration of cement. The CH was synthesized by boiling and digesting newspaper using sodium hydroxide until gelation occurred. Since the structural integrity of concrete is strongly dependent on the extent of cement hydration, effect of CH on hydration of tricalcium silicate (C3S), the main component in Ordinary Portland Cement (OPC) was investigated. In this frame, the effect of CH on the dissolution of C3S, and growth process of calcium silicate hydrate (C-S-H) and portlandite precipitation was carried out via conductivity measurement in nitrogen environment. To support the possibly enhanced properties of cement at its early age, CH-cement composites (CH-cc) were prepared. The physicochemical characteristics were evaluated at 1, 7 and 28 days of curing age. Initial setting time showed that CH- cc hardened slightly faster, but still in the acceptable range of ASTM 191-08 in comparison to hardened cement paste (HCP). At 28-days curing age, X-Ray diffraction (XRD) showed that CA-cc possess similar crystallinity structure to HCP's and the absence of two C3S and dicalcium silicate (C2S) peaks indicating more C-S- H were successfully produced. Field Emission Scanning Electron Microscopy (FESEM) showed the existence of fibrillar, honey-comb shaped material embedded in between the C-S-H gel in CA-cc, resulting denser cement composite. CA-cc at 7, 28, 56, 90 and 120-days curing age showed higher compressive strength when compared to HCPs'. The results also suggest that the addition of CH did not retard cement hydration reaction.

## Computational Aids in Organic Chemistry

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**Abstract.** In recent years, the computational aids has played significant role in organic synthesis, owing to the introduction of technologies such as molecular dockings and molecular dynamics simulations. Today's organic chemists work in interdisciplinary groups and must comprehend not only organic chemistry but also a variety of other disciplines in order to foresee challenges and analyse advances in order to help drive the research forward. The computational works help identify potential targets in terms of efficacy and safety in vitro and in vivo for certain diseases before proceeding to synthesis part as well as can also be used as a guide for researchers to save time and reduce the cost.

**Keywords :** Synthesis; Organic; computational; docking.

## Convection flow of Carreau Fluid over a Stretching Cylinder

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**Abstract.** Carreau fluid flows and heat transfer over a stretching cylinder with the effect thermal radiation and heat generation is acknowledged in the present study. Besides, the influence of the temperature dependent thermal conductivity also been discussed. Series solutions of the highly nonlinear boundary layer differential equations are computed by using the homotopy analysis method. A convergence study of the method is illustrated explicitly. Validation of the series solutions is achieved via comparing with earlier published results for certain limiting case. The effects of the interesting parameters such as the Weissenberg number, porosity, heat source parameter, radiative number, temperature dependent thermal conductivity and curvature parameter on the velocity and temperature profiles are elucidated by graphs and tabular.



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## Time-Varying Copula in Drought Analysis

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**Abstract.** Every country that has experienced significant historical drought events has found that extreme drought has become a critical issue. Furthermore, due to severe climate change caused by global warming, many extreme drought events have changed and increased over time. Many researchers have used copula models to generate a joint probability function of the drought variables to calculate the drought occurrence probability. Continual rises in extreme drought over time would imply variability or nonstationary conditions, necessitating a change in the copula approach. However, most drought analyses conducted do not consider the nonstationary conditions that may exist in the drought variables. Thus, the primary objective of this study is to investigate the dependence structure between drought variables (severity and duration) using two methods for copula application. The first method considers the nonstationary condition that exists in the drought variables, while the second method assumes stationarity in the data. This study used monthly meteorological data (1985 to 2019) obtained from five meteorological stations in Peninsular Malaysia. The performance of both methods is compared using goodness-of-fit (GOF) and simulation tests. The results and findings of this study emphasize the importance of taking nonstationarity into account when estimating the dependence structure of meteorological data. It is because, in changing environments, either the individual meteorological series or the dependence structure between different meteorological series may be nonstationary.

**Keywords:** Dependence modelling; Drought duration; Drought severity; Nonstationary; Time-varying copula.

## Biohydrogen Production from Thermophilic Microbial Consortium

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**Abstract.** Global attention has attracted to hydrogen as a promising alternative to fossil fuels. However, most of the hydrogen production are exclusively made by methane steam reforming and coal gasification by using fossil fuels. Which in turn emits a significant amount of greenhouse gasses. Thus, biological mode of hydrogen production using microorganisms are preferable. Biological hydrogen production or biohydrogen production is a low-cost technology that requires a low energy for the process of gas generation. In addition, biohydrogen production from microorganism is a form of renewable energy that could supplement the depletion of fossil fuels. In producing biohydrogen, microbial consortia are more feasible than pure cultures because of its operational ease, stability and does not employ to any strict sterilization conditions. Furthermore, it is more favourable energetically at elevated temperatures which enables thermophiles to reach higher biohydrogen production than mesophiles. In this chapter, we will discuss about the biological hydrogen production and its mechanism of microorganisms, comparison between biohydrogen production from single pure culture and mix culture (consortium), thermophilic bacteria and its ability to produce hydrogen, and lastly, we will be discussing the ability of biohydrogen production from microbial consortium isolated from local hot springs.

## Environmental Management in Kurdistan Region of Iraq .A Review

Ass. Prof. Dr. Jehan M. SheikhSuleimany

The 8<sup>th</sup> ICOWOBAS 2021  
August, 25-26 2021

**Abstract.** Kurdistan region of Iraq mostly mountainous with a rich natural, social and economical diversity, where constraints like in accessibility, marginality and fragility are hindering the development and where huge potentialities exist for sustainable development. Precipitation in Iraq is limited and the majority of the country is arid to semi-arid. Annual precipitation in the northern hills and mountain ranges varies from 300-1000 mm, while in the extreme south and west it is in the order of 100-200 mm, and highly irregular. This study highlights and reviewed the most environmental risks that Kurdistan Region of Iraq exposed to as climate change, Drought and Agriculture, water resources, covid-19, Damming the Kurdistan Region of Iraq, dams by turkey and Iran.

The study focused on the Strategy for the Sustainable Management of Land and Water Resources and Environmental management Environmental Principles and policies, and Environmental Legislation Guides in Kurdistan Region of Iraq.

**Keywords :** environment, KRI, risks, water resources.

## The Fabrication, Characterization and Testing of MEMS Circular Diafrgm Mass Sensor

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**Abstract.** This paper presents a discussion on the fabrication, characterization and testing of a degenerate mode resonant mass sensor which takes the form of a crystalline silicon MEMS circular diaphragm. The device is fabricated from the device layer of a SOI wafer which is bonded anodically to a Pyrex substrate. The efficacy of the fabrication process is assessed. Characterization of the diaphragm is performed by actuating the diaphragm electrostatically and measuring its response using optical surface profilometry and laser Doppler vibrometry. The temperature stability of the degenerate modes of vibration is investigated and it is shown that the initial frequency split in the resonant frequencies of these modes does not change significantly with temperature. Structures which present a symmetric surface profile after processing show remarkable temperature stability. The performance of the device as a mass sensor has been evaluated by functionalizing specific sectors of the diaphragm to provide bonding sites for a S100 $\beta$  protein. Added masses down to a level of 9 pg were detected.

## Development on The Biodiesel Production using lipase from locally bacterial Strain: Genomic and Proteomic Approach

Purkan *et al*

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**Abstract.** Biodiesel as an alternative fuel in future can be provided from microalgal oil. Many methods have continuously developed to get the techniques more efficient either in lipid isolation or lipid conversion to biodiesel. Including to the technique is an efforts to get a catalyst and the varieties of microalgae as lipid source. The fatty acid methyl ester (FAME) production from *Chlorella vulgaris* has been studied by sequential investigation such as microalgae culturing, lipid extraction, and lipid conversion to FAME. The *C. vulgaris* could grow well in the BG-11 medium and had a doubling time 3.7 days for its growth using inocula 16% (v/v). The optimum of dry cell biomass as 11.6 g/L was obtained after the microalgae culture harvested for 6 days. Lipid extraction from the biomass was carried out in various solvents and ultrasonication power, resulted lipid as 31% (w/w) when extracted with a mixed solvent of n-hexane-ethanol in ratio 1:1 and ultrasonication treatment at power 25 kHz/270W for 30 min. The lipid then converted to FAME through transesterification reaction with methanol using H<sub>2</sub>SO<sub>4</sub> catalyst at 45°C for 2 h, and resulted FAME with area 32.26% in GC-MS analysis. The area was corresponded to FAME output as 13.68% (w/w). *Nannochloropsis oculata* is also used to FAME production. The lipid form the microalgae can be extracted efficiently using NiO nanocatalyst as cell disruption agent and organic solvents. The optimal treatment time for NiO nanocatalyst is 96 hours in chloroform. At the optimized conditions, the lipid extract from *N. oculata* reached 34.20 ± 0.52% of the total weight. The conversion of microalgal oil into biodiesel is carried out with a transesterification reaction using three different catalysts, respectively. Biodiesel conversion with NiO nanocatalyst is better than that with the other catalysts of NaOH and HCl. The conversion yield of microalgal oil to biodiesel with NiO nanocatalyst reaches 89.72%. Based on the advantage of NiO nanocatalyst as both a cell disruption agent and a catalyst, biodiesel production can be performed in an in situ way. The conversion yield of biodiesel was 85.54% within 60 mins. The exploration of lipolytic bacteria presents its own challenges in being able to supply lipase as a catalyst in the production of biodiesel. The compost is chosen to get the bacteria because of the lipid and fatty acids component contained in it. The research was developed to isolate the lipase-producing bacteria and determine the enzyme ability in bioconversion of lipid to biodiesel. Two bacterial species have been identified based on 16srRNA fragment analysis, which are *Bacillus Proteus* sp and *Bacillus cereus*. The bacteria result lipase enzyme that showed a power as catalyst on biodiesel production. To improve the productivity of lipase enzyme, it was developed a cloning technique. The lip genes corresponding to DNA fragments measuring 0.9 kb was cloned and expressed using pCod II-DNA vector in *Escherichia coli* BL21(DE3), then resulted lipase protein as a band 30 kDa in SDS PAGE. The enzyme showed a specific activity as 46,03 U/mg. In future the enzyme will be produced to support the catalyst demand in biodiesel production.

**Keyword:** lipase, biofuel, cloning gen, microalgae

## Dye/Titania Interface as Photo-Anode in DSSC and Its Spectroscopic Investigation

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**Abstract.** The use of organic components and its molecular modification have been interested topic in photo-voltaic materials since last two decades. The use of electron and ion spectroscopy to evaluate the surface science analysis are discussed in this study. Titania and various dye materials were used to reveal the phenomenon why the efficiency of the Dye Sensitized Solar Cells (DSSC) have not been increasing significantly for a while. Photo Electron Spectroscopy (PES), Ion spectroscopy such as Neutral-Ion Collision Impact Scattering Spectroscopy (NICISS) techniques has been employed to facilitate a thorough method to investigate the Dye-Titania interface in DSSCs.

**Keyword :** DSSCs, electron spectroscopy, Ion Spectroscopy.



## Designing Standard Growth Chart Based on Weight-For-Age Z-Score of Children in East Java Using Least-Square Spline Estimator

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**Abstract.** Children who have a lack of weight-based on anthropometric index weight-for-age is categorized as children with underweight nutritional status. In Indonesia, this anthropometric index is recorded on health card called as *Kartu Menuju Sehat* (KMS) and guided by WHO-2005 that uses children from Ghana, Oman, Norway, USA, Brazil, and India as samples. Physically, these samples is very different from children in Indonesia. Therefore, in this paper we provide standard growth charts of weight-for-age z-score designed by using least-square spline estimator and based on samples of children from East Java province of Indonesia. We use obtained growth charts for assessing the nutritional status of children in East Java. The results give average values of coefficient determination for boys and girls of 98.63% and 98.94%, respectively, and mean square error for boys and girls of 0.163 and 0.139, respectively. It means that the growth charts have satisfied the goodness of fit criterions. Also, the percentages of underweight nutritional status based on this concerned standard growth charts are less than those based on WHO-2005 standard growth charts, with differences 12.30% for boys and 10.31% for girls.

**Keywords.** Standard Growth Charts, Weight-for-age Z-scores, Nutritional Status of Children in East Java, Least-Square Spline Estimator.

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## Unraveling Bacterial Community Structure of and Bioprospecting for Useful Bacteria from Parangkusumo Coastal Sand Dunes

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Parangkusumo coastal sand dunes in Yogyakarta, Indonesia is one of the unique ecosystems in Indonesia. The ecosystem consists of mounds and narrow strips of sand with distinct boundaries determined by the sea and landward limits of sand transport and characterized with high salinity, low moisture, and low organic matter content which is hostile for life forms including microorganisms. Here, we conducted bioprospecting of useful bacteria using culture-based approach, as well as the first effort on studying the bacterial community structure of Parangkusumo sand dune using 16S rRNA-based metagenomic analysis. We successfully isolated 14 bacterial species from *Bacillus*, *Lysinibacillus*, and *Priestia* genera. Some of the isolates showed anti-bacterial and biosurfactants producing activities. Whereas, based on the metagenomic analysis, we found that Actinobacteria and Proteobacteria were the most abundant phyla, while the halophilic *Haladaptatus* was the most plentiful genus. Useful species such as carotenoid-producing *Haladaptatus litoreus* and *Sphingomonas jaspsi* were abundant in the ecosystem. Surprisingly, opportunistic pathogens such as *Escherichia coli*, *Bacillus anthracis*, and *Acinetobacter baumannii* were also among the most dominant species in Parangkusumo sand dunes. The results of this study would be valuable information for further bioprospecting of bacteria with commercial potential and the development of health and safety measures in Parangkusumo sand dunes. We also expect that this report would encourage the use of NGS technology for studying other unique ecosystems in Indonesia.

**Keywords:** sand dunes; metagenomics; biodiversity; bacterial community structure; bioprospecting



# CONFERENCE



# BIOLOGY

Paper ID: BY003

## The Effect of Pyrethroid on Mosquito Repellent Coils and Spray to The Sperm Quality and Testicular Histology of Rats

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**Abstract.** The mosquito repellent coils and spray is frequently used to eradicate mosquitoes at home. Those are contains an active pyrethroid component that can interfere with the hormonal body and cellular response body when it is used routinely and in the long-term, one of which is the testes. It will affect the quality of sperm production so that it can cause infertility. This research was aimed to know the exposure of the active pyrethroid in mosquito repellent coils and spray to the sperm quality and testicular histology in rats as a parameter of a fertility assessment. The rats were divided into 5 groups are control group, the group exposed by mosquito repellent spray for 20 days, 35 days, the group exposed by mosquito repellent coils for 20 days and 35 days. The sperm quality test was done to see the viability, concentration, morphology, and motility, as well as the histopathology of seminiferous tubules and its compared with control. The microscopic sperm quality test in the group of rats that are mosquito repellent coils and spray of 35 days decreased significantly in concentration, viability, motility and the significant increase in sperm abnormalities compared to the control group. The average number of spermatogenic cells in the seminiferous tubules indicates a significant decrease in the treatment group. The number of spermatogenic cells is decreasing in the 35 days mosquito repellent coils group. Exposure to pyrethroid substances in a long time can decrease the quality and quantity of sperm.

**Keywords:** pyrethroid, mosquito repellent, testicular, histopathology, sperm quality.



Paper ID: BY004

## Direct Verification Of Bogor Superior Mutant (*Typhonium flagelliforme*) Using RAPD Marker Techniques (Random Amplified Polymorphic DNA) and Sequencing Analysis

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**Abstract.** Cancer is a disease that infects humans from abnormal cells in the body that form rapidly and spread to other parts of the body. Currently, research on breast cancer treatment is being carried out. This research utilizes the wisdom of local plants as a herbal plant (*Typhonium flagelliforme*) which is very important in the health sector. The purpose of this study was to identify specific DNA fragments in superior mutant plant and the wild type (Bogor accession as control plant) based on RAPD markers and sequence difference analysis in each sample. A total of 15 RAPD primers were used to optimize polymorphic primers on 12 clones of mutant plants, with seven superior mutants that had high anticancer compounds (SAT) and four mutant clones that contained low anticancer compounds (SAR) with the control. Primary optimization obtained two primers OPC05 and OPB18 which provided an informative band pattern between superior clone bulk mutants which contained high anticancer compounds (BSAT), bulk mutants containing low anticancer compounds (BSAR), and the control. OPB18 primer was chosen as the primer for sequencing analysis because it has a more informative DNA fragment luminescence at a size of about 500 bp. The BSAT, BSAR, and the control sequences analysis based on the codon sequence for each segment showed a difference in size between 45-55 bp, 100-105 bp, 150-160 bp, 225-235 bp, 260-265 bp, 375-400 bp, 410-430 bp, and 450-455 bp. The control plant's sequence analysis has a similarity of around 75% with the date palm species (*Phoenix dactylifera*). These results can be used to design specific primers for anticancer compounds in mutant plants.

**Keywords:** *Typhonium flagelliforme*, Bogor accession, bulk genome, mutant plant.



Paper ID: BY005

## Anatomical and Unsupervised Multivariate analysis of *Dialium guineense* Willd. and *Detarium microcarpum* Guill. & Perr.

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**Abstract.** *Dialium guineense* and *Detarium microcarpum* are tropical trees with medicinal features and economic value in Nigeria. Both are traditionally used in Nigeria for the treatment of malarial fever, typhoid, and many other ailments. Despite the economic value of *Dialium guineense* and *Detarium microcarpum* no taxonomical information available. The study aimed at establishing taxonomic biomarkers through numerical, anatomical and unsupervised multivariate analysis. The morphological study was determined macroscopically, anatomy using fast green/ safranin and unsupervised Multivariate analysis using SIMCA. The numerical study showed variation between the species. Clear discrimination was established from the vascular bundle at midrib and the presence of trichome in *Detarium microcarpum* at both the midrib and lamina transverse sections. Multivariate analysis show despite their differences in morphological and anatomical established a strong relationship. Therefore, the study concluded the vascular bundle at the midrib are taxonomic biomarker for identification of the *D. guineense* and *D. microcarpum*. The obtained results will serve as scientific bases for drug exploration from the species in Nigeria.

**Keywords;** SIMCA, Multivariate analysis, biomarkers.

Paper ID: BY006

## Medicinal Plants Traditionally used in Koya Erbil Kurdistan Region of Iraq

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**Abstract.** Nearly every ethnic group in the world has its own traditional medicinal expertise and experiences on which they rely on. Usage of traditional medicinal plants presents a significant aspect of the imbedded culture of people in developing and developed countries. Documentation of utilised medicinal plants in a particular region at an interval of time is crucial for biological exploration and conservation. In Kurdistan region of Iraq documentation of traditional medicinal plants is not well studied. The information of traditional utilisation of medicinal plants in Kurdistan region is still at the hand of traditional herbalist. The study aimed at identifying different medicinal plants used by traditional herbalist in Koya locale of Erbil in northern Iraq. Nonrandom probability sampling and expert method with the aid of in depth interview guide was used. Forty plants species with medicinal value were documented. Family Lamiaceae has the highest abundance (12.2%), Rosaceae (7.3%), then Fabaceae (4.9%) and Lauraceae (4.9%) respectively. Leaves (28.6 %) are the most utilised part of medicinal plants in the study area. The most prepared form of preparation of medicinal plants is decoction (57.1%) and powder form (18.4%). Oral is the most common application form (69.4%). Significant number of medicinal plants utilised in Koya are wild (36.7%). Aged people are the custodian of traditional knowledge in Koya, Kurdistan region of Iraq. The study revealed new un investigated plants species that could serve as a potential source of modern medicine in Kurdistan region of Iraq. . There is need for pharmacological investigation of the medicinal plants for herbal medicine production in the region to avoid over sampling of the most popular species.

**Keywords:** Medicinal plants, ethnobotany, used value.

Paper ID: BY007

## Alginate Potency of *Sargassum duplicatum* Combination with *Abelmoschus esculentus* pods and *Garcinia mangostana* Pericarp Extracts on Blood Cholesterol and Malondialdehyde (MDA) in Diabetic Mice

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**Abstract.** This study aimed to investigate alginate potency from *S. duplicatum* with *A. esculentus* pods and *G. mangostana* pericarp extract to ameliorate blood cholesterol and MDA level in STZ-induced diabetic mice. We performed the study by using 3-4 months old male mice as animal model. The group divided into two main groups, non-STZ (normal control group) and STZ-induced diabetic mice. STZ-induced diabetic mice conducted using multiple-low dose (MLD) method with 30 mg/kg BW for consecutive five days. STZ-induced diabetic mice group then divided into three subgroups which were diabetic control group, metformin group, and treatment groups given with *S. duplicatum* extract (P1; 100 mg/kg BW), *S. Duplicatum*+*A. esculentus* (P2; 50 mg/kg BW for each extract), *S. duplicatum*+*G. mangostana* (P3; 50 mg/kg BW for each extract), and *S. duplicatum*+*A. esculentus*+*G. mangostana* (P4; 33,3 mg/kg BW for each extract). All mice were sacrificed on day 15<sup>th</sup>. Data on the blood cholesterol and MDA level were analyzed. Interestingly, it showed that the administration of *S. duplicatum* combination with *A. esculentus* pods and *G. mangostana* pericarp extracts could reduce blood cholesterol and MDA level in STZ-induced diabetic mice. In summary, the *S. duplicatum* combination with *A. esculentus* pods and *G. mangostana* pericarp extracts is a promising antidiabetic agent in STZ-induced diabetic mice.

**Keywords:** *Abelmoschus esculentus*, antidiabetic agent, diabetic mice, *Garcinia mangostana*, *Sargassum duplicatum*.

Paper ID: BY010

## Biosurfactan Production of Indigenous *Bacillus velezensis* ES4.3 Isolated from Endemic Area of Breeding Site of Dengue Fever Vectors

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**Abstract.** *Bacillus* spp. known to have shown the ability to secrete a variety of commercial bioactive compounds such as proteins, peptides, and lipopeptides (LPs). Some of the LPs produced by *Bacillus* spp. are surfactin, iturin, and fengicin. Surfactin is known to have high potential on waste treatment, pharmaceuticals, and agriculture. Surfactin in agriculture has been shown to exhibit antifungal and antibacterial activity which plays an important role in root colonization and participates in the induction of plant systemic resistance. The purpose of this study was to determine the name of the local *Bacillus* sp. ES4.3 isolate, the biosurfactant coding gene, and the potential for biosurfactant produced by *Bacillus* sp. ES4.3 that has been isolated from the sediment of breeding sites for *Aedes aegypti* in the endemic area of Dengue Fever Vector in Surabaya, Indonesia. Genomic DNA of *Bacillus* sp. ES4.3 can be detected by isolating the DNA and visualizing it by electrophoresis. Furthermore, the 16S rRNA gene was amplified by the Polymerase Chain Reaction (PCR) method. After that, the resulting nucleotide sequences were analyzed to find their relationship with MEGA 6. Detection of biosurfactant coding genes was carried out by PCR method using *srfAD* primers. Analysis of the homology level of the surfactin gene was performed using the NCBI BLASTn and BLASTp genetic analysis program. From the research results, it can be concluded that the *Bacillus* sp. ES4.3 isolate, after the 16S rRNA gene was analyzed by BLASTn NCBI analysis, had 99.86% closeness to the species *Bacillus velezensis* strain EGI198. The results of the detection analysis on the biosurfactant coding gene, namely the surfactin gene, showed a 99.86% present identity with the *srfA-D* gene on the *Bacillus amyloliquefaciens* group. The biosurfactant activity showed positive results, indicated by the formation of clear zones on the hemolysis test, the formation of emulsions on the emulsification test, and a decrease in surface tension in the values of 21.38 mN / m from the NB media control and 33.74 mN / m from the aquades control. Based on the results of this study, *Bacillus velezensis* ES4.3 has the potential to produce surfactin and can be developed as a biological agent in agriculture on suppressing the growth of plant pathogens, on pharmaceuticals fields for the production of antibiotics and anti-fungi, and bioremediation in oil waste treatment.

**Keywords:** 16S rRNA, surfactin, emulsification activity, surface tension.

Paper ID: BY011

## Antioxidant Status of *Gynura procumbens* Leaf Extracts: The Management of Cadmium Toxicity

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**Abstract.** The objective of this research was to evaluate antioxidant status of *G. procumbens* leaf extracts for the management of cadmium (Cd) toxicity in mice. Research was conducted using twenty male mice, which were grouped into five treatments: P1 (control), P2 (Cd 100 mg/L), P3 (*G. procumbens* 100 mg/L + Cd 100 mg/L), P4 (*G. procumbens* 200 mg/L + Cd 100 mg/L), P5 (*G. procumbens* 300 mg/L + Cd 100 mg/L). The results showed methanol extract of *G. procumbens* leaves contain phenolic and flavonoids compound by total phenolic content (TPC) and total flavonoid content TFC assay, they were strongly correlated with antioxidant activity. In this study, it was also known that Cd exposure decreasing of catalase (CAT) levels in blood serum and liver homogenates compared to control significantly. Administration of methanol extract of *G. procumbens* leaf increasing of CAT levels in blood serum and liver homogenates compared to Cd treated. The best treatment methanol extract of *G. procumbens* leaves was 100 mg/L.

**Keywords:** Antioxidant activity, Cadmium, CAT levels, *G. procumbens*.

Paper ID: BY013

## The Influences Of Physiological Stress From N And Si On Growth And Lipid Content Of Microalgae *Skeletonema costatum* As Material Candidate Of Biodiesel

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**Abstract.** The utilization of biodiesel is an alternative step to meet the energy needs of fossil fuels that will gradually decline. Supported by the potential of Indonesia's marine wealth, microalgae serve as a promising biodiesel raw material candidate. The purpose of this research is to know the effect of physiological stress of N (nitrogen) and Si (silica) nutrients on growth and lipid microalgae content of *Skeletonema costatum* as biodiesel fuel candidate. The method used in this research is *Skeletonema costatum* culture in intermediate scale as much as 8 L. Making growth curve by counting cell density by using Hemacytometer. Harvesting is done at the end of the exponential phase. Then tested lipid content qualitatively with fluorescence *microscope*. The results obtained were the highest cell density on N3Si2 (KNO<sub>3</sub> 0 g / L and Na<sub>2</sub>SiO<sub>3</sub> 15 g / L), while the N2Si3 treatment (KNO<sub>3</sub> 37.5 g / L and Na<sub>2</sub>SiO<sub>3</sub> 0 g / L) was the lowest cell density. Accumulation of lipids in the treatment of N2Si2 (KNO<sub>3</sub> 37.5 g / L and Na<sub>2</sub>SiO<sub>3</sub> 15 g / L).

**Keywords:** Lipid, Nutrient, Stress Physiological, *Skeletonema costatum*.



Paper ID: BY015

## The Evaluation Toxicity of CdSO<sub>4</sub> Exposure in Mice

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**Abstract.** The toxicity of heavy metals, particularly cadmium (Cd) is closely related to their accumulation in tissues and organs. The objective of this research was to analyze the toxicity effect of various doses CdSO<sub>4</sub> on mice, especially determine histological of hepatocyte cells and hematological analysis. Research was conducted using twenty male mice, which were grouped into five treatments: P1 (control), P2 (Cd 50 mg/L), P3 (Cd 75 mg/L), P4 (Cd 100 mg/L), P5 (Cd 150 mg/L). The Cd treatment was given orally for 30 days using injection syringe with a round tip (a cannula). The results showed that Cd exposure significantly decreased to hepatocyte normal cells, red blood cell, hemoglobin concentration and platelet count. Meanwhile, Cd exposure significantly increased to hepatocyte necrotic cell, swollen cells, serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) levels. The highest of disruption to hepatocyte cell and hematological was 100 mg/L.

**Keywords:** CdSO<sub>4</sub>, Hematological, Hepatocyte cells, Mice.

Paper ID: BY016

## The Genetic Characteristics and Biosurfactant Activity of Native Entomopathogenic *Bacillus* sp. BK7.1 Isolated from Baluran National Park East Java Indonesia

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**Abstract.** *Bacillus* spp. known to have shown the ability to secrete a variety of commercial bioactive compounds such as proteins, peptides, and lipopeptides (LPs). Some of the LPs produced by *Bacillus* spp. are surfactin, iturin, and fengicin. Surfactin is known to have high potential on waste treatment, pharmaceuticals, and agriculture. Surfactin in agriculture has been shown to exhibit antifungal and antibacterial activity which plays an important role in root colonization and participates in the induction of plant systemic resistance. The purpose of this study was to determine the name of the local *Bacillus* sp. ES4.3 isolate, the biosurfactant coding gene, and the potential for biosurfactant produced by *Bacillus* sp. ES4.3 that has been isolated from the sediment of breeding sites for *Aedes aegypti* in the endemic area of Dengue Fever Vector in Surabaya, Indonesia. Genomic DNA of *Bacillus* sp. ES4.3 can be detected by isolating the DNA and visualizing it by electrophoresis. Furthermore, the 16S rRNA gene was amplified by the Polymerase Chain Reaction (PCR) method. After that, the resulting nucleotide sequences were analyzed to find their relationship with MEGA 6. Detection of biosurfactant coding genes was carried out by PCR method using *surfAD* primers. Analysis of the homology level of the surfactin gene was performed using the NCBI BLASTn and BLASTp genetic analysis program. From the research results, it can be concluded that the *Bacillus* sp. ES4.3 isolate, after the 16S rRNA gene was analyzed by BLASTn NCBI analysis, had 99.86% closeness to the species *Bacillus velezensis* strain EGI198. The results of the detection analysis on the biosurfactant coding gene, namely the surfactin gene, showed a 99.86% present identity with the *surfA-D* gene on the *Bacillus amyloliquefaciens* group. The biosurfactant activity showed positive results, indicated by the formation of clear zones on the hemolysis test, the formation of emulsions on the emulsification test, and a decrease in surface tension in the values of 21.38 mN / m from the NB media control and 33.74 mN / m from the aquades control. Based on the results of this study, *Bacillus velezensis* ES4.3 has the potential to produce surfactin and can be developed as a biological agent in agriculture on suppressing the growth of plant pathogens, on pharmaceuticals fields for the production of antibiotics and anti-fungi, and bioremediation in oil waste treatment.

**Keywords:** 16S rRNA, surfactin, emulsification activity, surface tension.

Paper ID: BY017

## Association of Thyroid Hormones with Metabolic Stress Markers in Patient with Hyperthyroidism

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**Abstract.** Biomarkers for diagnosing the occurrence and development of hyperthyroidism constitute a major worldwide clinical scrutiny. Evidence is continuing in investigation about most relevant biomarkers in developing the disease. For more accurate indications, the present study aimed to discover and correlate the most dependent biomarkers in developing hyperthyroidism in both genders. In the present study, two groups were included, first group: twenty healthy males and females, in whom the serum levels of thyroid hormones profiles were within normal limits with the ages of (20-75) years. In second group: twenty patients with hyperthyroid disease, (elevated level of T3 and T4 with decreased level of TSH) with the ages of (19-76) years were included. The present study revealed that referral biomarkers were varied between genders with a remarkable association of hyperthyroidism with serum cholesterol, triglycerides, malondialdehyde and low-density lipoproteins in males, while nitrites and creatinine were significantly elevated in female patients. Thyroxine, as a dependent parameter in Pearson-correlation test, was significantly correlated with cholesterol, TG, and LDL in females ( $r=0.482$ ,  $0.38$ ,  $0.546$ , respectively), but, however in males, malondialdehyde ( $r=0.814$ ) was correlated with thyroxine, nitrite ( $r=0.989$ ) with T4 and creatinine ( $r=0.958$ ) with thyrotropin-stimulating hormone (P-value 0.005). In this study, we found that accurate diagnosing biomarkers in clinical tests are urgent to be considered as an efficient tool to facilitate and individualise treatment of hyperthyroidism.

**Keywords:** Hyperthyroidism, metabolic stress, malondialdehyde, creatinine, nitrite.

Paper ID: BY018

## The Effect of Temperature and Addition of Onion Extract on the Quality of *Gallus domesticus* Semen Collected Using Teaser Female Methode

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**Abstract.** This study aimed to determine the quality of *Gallus domesticus* semen on the effect of storage time by the addition of red onion extract in the Ringer's Dextrose diluent at room temperature and temperature of 5°C. The making of red onion extract was done by using the maceration method utilizing 50% ethanol solvent and evaporated with a vacuum rotary evaporator by a temperature of 50°C. *Gallus domesticus* semen was collected using the female teaser method. The collected semen was divided into 4 treatments, namely T0 (Ringer's Dextrose without red onion extract), T1 (Ringer's Dextrose + 0.02 ml of red onion extract), T2 (Ringer's Dextrose + 0.04 ml of red onion extract), and T3 (Ringer's Dextrose + 0.06 ml of red onion extract). The evaluation of the semen quality during storage at a temperature of 5°C including individual motility, viability, and abnormality was observed within 6, 8, and 24 hours. The experimental design used a Completely Randomized Design (CRD), the data analysis used Analysis of Variance (ANOVA), which then proceeded with the Duncan Multiple Range Test (DMRT). The analysis showed significant differences ( $P > 0.01$ ) for individual motility and ( $P < 0.05$ ) for sperm viability. The best results were shown by T2 treatment (Ringer's Dextrose + 0.04 ml of red onion extract) and T3 treatment (Ringer's Dextrose + 0.06 ml of red onion extract). The sperm quality resulted by of T2 and T3 treatment could last up to 24 hours at temperature of 5°C, with average individual motility (T2)  $43.49 \pm 2.74b$ , viability  $67.98 \pm 2.05c$ , abnormalities  $16.59 \pm 0.65a$  and for individual motility (T3)  $40.00 \pm 4.47b$ , viability  $62.41 \pm 1.08a$ , and abnormality  $17.77 \pm 0.8a$ . The addition of 0.04 ml of red onion extract in Ringer's Dextrose diluents with 24 hours of storage time at 5°C met the quality requirements to be used for artificial insemination.

**Keywords:** *extract onion, food availability, Gallus domesticus, sperm quality, teaser female.*

Paper ID: BY020

## The Effect of Daun Wungu [*Graptophyllum pictum* (L.) Griff] Ethanol Extract on Glucose Tolerance and Pancreas Islets of Langerhans in Ovariectomized Mice

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**Abstract.** This research was aimed at determining the effect of daun wungu [*Graptophyllum pictum* (L.) Griff] ethanol extract on glucose tolerance and pancreas islets of langerhans in ovariectomized mice. Ovariectomy was first performed in experimental female mice. There are six groups in this research, namely, the normal control group (0.2ml aquadest), the ovariectomized control group (0.2ml aquadest), the hormonal control groups (0,2ml esthero solution) and the treatment groups with daun wungu ethanol extract (10 mg/kg bw, 20 mg/kg bw and 30 mg/kg bw) respectively. After the end of the research all mice were tested for glucose tolerance, sacrificed and the pancreas organ was cut off to make pancreas slide with Hematoxyllin, eosin The pancreas histology was made using the paraffin method and Haematoxylin-Eosin staining. The glucose tolerance were calculated by AUC value. The result of this research showed that were daun wungu ethanol extract decreased glucose tolerance value and increase the diameter of pancreas islet langerhans. and the optimal dose was 20 mg/kg.

**Keywords:** Daun wungu, glucose tolerance, islet of langerhans, ovariectomized mice.

Paper ID: BY021

## ***Gynura procumbens* Methanolic Extract Suppresses Proliferation of Hepatocellular Carcinoma: *In Vitro* Assay**

Umami Zubaidah<sup>1, a)</sup>, Sugiharto<sup>1,b)</sup>, Dwi Winarni<sup>1,c)</sup> and Yosephine Sri Wulan Manuhara<sup>1,d)</sup>

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**Abstract.** Nowadays, Hepatocellular Carcinoma (HCC) is regarded as one of the most frequent human neoplasm which causes the second and sixth most deaths in the world and Indonesia, respectively. HCC current medications are diverse with all their side effects. Thus, the discovery of low risk-novel therapeutic is important. *Gynura procumbens* is a perennial herb that has been suggested as anticancer therapeutic. In this current research, the toxicity effect of *G. procumbens* leaves methanolic extract (GPM) on HCC cell line (Huh7it) proliferation will be analyzed using MTT assay. To perform toxicity assay, GPM extract which contains 0.1% (v/v) dimethyl sulfoxide (DMSO) mixed with DMEM medium in various concentration. Huh7it cell line was seeded in DMEM medium at the density  $2.3 \times 10^4$  cells/well then incubated overnight. Percentage (%) cell viability data from MTT assay were fitted to a logarithmic equation to determine IC<sub>50</sub> value of GPM. The result showed that GPM possesses anti-proliferative activity on cell proliferation in dose- dependent manner but did not in time-dependent manner. The IC<sub>50</sub> value of GPM was categorized as moderate where the IC<sub>50</sub> value after 24 hours incubation was 63.83 µg/mL while after 48 hours incubation was 125.84 µg/mL. This study reveals that GPM potentially used as anticancer therapeutics in treating HCC.

**Keywords:** Anticancer, *Gynura procumbens*, Hepatocellular carcinoma, Huh7it cell, In vitro assay.



Paper ID: BY022

## Screening of Biosurfactant Production by *Bacillus* spp. Potentially Inhibiting The Growth of *Ralstonia solanacearum*

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**Abstract.** Biosurfactants are surfactants produced by living organisms, including microorganisms. Several studies have shown that species from the *Bacillus* genera are able to synthesize biosurfactants as antimicrobial agents for plant pathogens. This study aims to detect the ability of three isolates of *Bacillus* indigenous from potato rhizosphere in Bumiaji, Batu, Malang, which are known to potentially inhibit the growth of *Ralstonia solanacearum*, in producing biosurfactants. This research was started from the rejuvenation of *Bacillus* spp. isolates, followed by the growth of *Bacillus* spp. on blood agar and nutrient broth media. The potential of *Bacillus* in producing biosurfactants was detected from the haemolytic activity on blood agar, the percentage of emulsification activity and the surface tension value of the culture supernatant, also the ability of bacteria to adhere to the hydrocarbon substrate. The results showed that the three *Bacillus* isolates (Ba-1, Ba-2, and Ba-11) had different abilities in synthesizing biosurfactants. The ability of Ba-1 and Ba-2 in producing biosurfactant were indicated by haemolytic activity on blood agar, decreased surface tension of 18.44 mN/m and 14.90 mN/m, as well as adherence activity of 13.46% and 38.46%, respectively. The ability of Ba-11 to produce biosurfactants was indicated by a decrease in surface tension up to 32.54 mN/m, hydrocarbon emulsification activity of 90%, and adherence activity of 10%. Biosurfactants from isolates of *Bacillus* spp. potential to be applied in controlling the development of *R. solanacearum*.

**Keywords:** Agriculture innovation; Antimicrobial agent; *Bacillus* spp.; Biosurfactant; *Ralstonia solanacearum*.

Paper ID: BY023

## Study On Several Genus Of The Solanaceae Family With Phenetic Approach Methods

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**Abstract.** This study aims to determine the morphological diversity of several genera of the Solanaceae family, the relationship between several genera of the Solanaceae family through a morphological approach, and morphological characters that affect the grouping of several genera from the Solanaceae family. The sampling activity was located in Lumajang district. Parts of the plants to be studied consisted of 30 characters, including stature, stems, leaves and flowers which were then analyzed by descriptive and phenetic methods. Based on the results of the descriptive analysis, it was found that the diversity of morphological characteristics between several genera of the Solanaceae family, namely the genus *Solanum*, *Capsicum*, *Physalis*, *Datura*, *Nicotiana*, and *Petunia*. Based on the analysis using the phenetic method using the SPSS program, a dendrogram was produced showing two main groups, namely group A and group B with a similarity value of 20.9%. Group A consists of the genus *Nicotiana* and *Petunia* with a similarity value of 40.7%. Group B consists of group C and group D with a similarity value of 36.7%. Group C consists of the genus *Physalis*, while group D consists of groups G and H with a similarity value of 50.1%. Group G consists of the genus *Datura*, while group H consists of the genus *Capsicum* and *Solanum* with a similarity value of 61.8%. Based on the PCA (Principal Component Analysis) results, the characters that influence the grouping of several genera from the Solanaceae family included the characters of *phyllotaxis*, leaf edges, leaf width, leaf length, leaf flesh, anthera color, and flower type.

**Keywords:** biosystematic, dendrogram, morphology, PCA, Solanaceae.

Paper ID: BY024

## Diversity and Enzymatic Potential of Bacteria Isolated from Household Waste Compost

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**Abstract.** The ecosystem in organic waste processing in Surabaya provides a resource of potential microorganisms in the form of bacterial isolates that degrade organic waste components. This study aims to isolate, identify, and test the enzymatic potential of bacteria from household waste compost in degrading the main components of organic waste. Bacteria were isolated from compost samples obtained from household organic waste processing in Surabaya. The compost sample was mixed with sterile physiological water then the suspension was inoculated on nutrient agar media. The compost indigenous bacterial isolates obtained were then characterized macroscopically and microscopically. All isolates obtained were then tested for their potential in producing amylase, cellulase, protease, and lipase enzymes on agar selective media. A total of 12 compost indigenous bacteria that were successfully isolated showed different macroscopic, microscopic and enzymatic potential characters. The three most potent bacterial isolates that could hydrolyze organic waste components from starch, cellulose, protein, and lipid compounds were KO A8, KO A9, and KO A11. Two isolates KO A8 and KO A9 belong to *Bacillus*, and one isolates code KO A11 belongs to *Actinobacillus*. Compost-indigenous bacteria showed the potential to be applied as a microbial formula in the processing of household organic and domestic wastes to help zero waste environment.

**Keywords:** Biodivers; Household waste compost bacteria; Enzyme; Solid waste; Zero waste.

Paper ID: BY026

## Analysis of toxicity in liver and kidney of mice (Swiss webster) induced by Aluminum Chloride

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**Abstract.** Research on aluminum (Al) is still a trending topic that continues to be discussed today. The use of this metal in everyday life cannot be avoided, such as toothpaste, pharmaceuticals, industrial applications including manufacturing paint and water treatment. Therefore, the enhancement entrance of Al in many fields exposes human beings to its biotoxicity. Thereby, the present study was to investigate the toxic effects of aluminum on sensitive organs as the kidney and liver. Mice were divided into three groups; one month group of age, two months group of age, three months group of age. Al was administrated by injected intra-peritoneally at a dose of 200 mg/kg bw, every two days, for 30 days. Control only received distilled water. The results have shown that Al causes dilatation of the central vein, the sinusoids appear dense, and the hepatocytes underwent hydropic degeneration. Vacuolation appearin mice treated group one month and two months of age. The findings of histopathological in kidney tissues after administration Al is shrinkage of the glomerulus, dilatation of capsule Bowman, dan degenerative in the proximal tubular of the lining. Clearly, Al caused severe degenerative changes in the tubular lining in mice of one month group of age, also two months group of age, and hemorrhage in mice of three months of age. This finding mean that Al is toxic to the liver and kidney and the mice at one month of age and two months of age are more susceptible than mice at three months of age.

**Keywords:** Aluminun, toxic, kidney, hepar, susceptible.

Paper ID: BY027

## Inhibition of Angiotensin and Endothelin Converting Enzymes Mediating the Vascular Activity of Bradykinin in Hypertensive Rats

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**Abstract.** The current study was intended to investigate the impacts of kinin-kallikrein system (KKS) and its contribution with each of endothelin converting enzyme (ECE) and angiotensin converting enzyme (ACE) on blood pressure and some related physiological aspects. To meet the requirements of the study, *In vivo* and *in vitro* experiments were performed. The *in vivo* trials included six groups. The first group served as control (saline infusion), the second group was infused with L-NG-Nitroarginine methyl ester (L-NAME), the third group was given bradykinin (BK), the fourth group was injected with captopril, the fifth group was infused with phosphoramidon, and the sixth group was given a combination of phosphoramidon and bradykinin (BK). After an hour of infusion, the results demonstrated that L-NAME had moderately increased mean arterial pressure (MAP), while it had decreased malondialdehyde (MDA). On the other hand, infusion of BK has conducted to a significant elevation in the level of serum nitric oxide (NO). Moreover, co-infusion of BK and phosphoramidon showed a significant increase of NO. The *in vitro* experiments were designed to confirm the procured results of *in vivo* trials. For this purpose, isolated rat aortic rings were pre-incubated with different agents such as BK antagonist, L-NAME, captopril, phosphoramidon. Win hydrochloride (BK-B2 receptor antagonist) pre-incubation for twenty minutes significantly lowered  $E_{max}$ . Having said that captopril has reduced  $E_{max}$  significantly with a significant change of PIC50. It could be concluded that captopril caused more significant reduction in BP as compared to phosphoramidon. Ultimately, owing to pre-incubation of separated aortic rings with BK-b2 receptor blocker, the vasorelaxant action of BK was strongly reduced, hence, we conclude that BK can relax aortic rings vigourously through activation of B2 receptors.

**Keywords:** Aortic ring; Bradykinin (BK); Kinin-kallikrein system (KKS); Invasive blood pressure.

Paper ID: BY028

## Antibacterial and Adsorptive Activity of Silver Loaded Zeolite Y-Layered Double Hydroxide Nanocomposite

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**Abstract.** Zeolite nanocomposites (ZL) have been extensively explored due to their practicality, especially in purifying water from harmful pollutants and bacteria. In this study, we prepared a silver loaded zeolite Y (AgZ) with layered double hydroxide (LDH) as AgZLDH nanocomposites for dyes removal of cationic methylene blue (MB) and anionic acid orange 7 (AO7). The AgZLDH nanocomposite was simultaneously evaluated for its antibacterial properties against Gram-positive (*Staphylococcus aureus*) and Gram-negative (*Escherichia coli*). The AgZLDH nanocomposites were prepared via ion exchange of Ag<sup>+</sup> ions into the zeolite frameworks and followed by co-precipitation of Al(NO<sub>3</sub>)<sub>3</sub> and Mg(NO<sub>3</sub>)<sub>2</sub> salts. The zeolite, AgZ, LDH and synthesized AgZLDH nanocomposite were then characterized using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and field-emission electron scanning microscopy with energy-dispersive X-ray spectroscopy (FESEM-EDX). It was found that the zeolite Y was successfully loaded with Ag<sup>+</sup> ions and coated with LDH without altering its native framework. Dye adsorption analysis shows the prepared nanocomposite was able to remove both types of dyes in different concentrations. For its antibacterial activity, disc diffusion results showed considerable halo-zone formation against both types of bacteria. The nanocomposite was further tested for its simultaneous action and exhibit promising results in removal of both dyes as well as favourable antibacterial activity. In summary, the successful synthesis of AgZLDH nanocomposites may provide new method and practical alternative to treat and purify water from pollutants and harmful bacteria.

**Keywords:** Adsorption; Antibacterial agent; Layered double hydroxide; Nanocomposite; Silver; Zeolite.



Paper ID: BY029

## The Protective Effect of *Gynura procumbens* Adventitious Root Against Lead Acetate Toxicity in Balb/C Mice

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**Abstract.** The mechanism of lead toxicity is oxidative stress, through by increases the productivity of reactive oxygen species (ROS) and directly suppresses the body's antioxidant system. The methanol extract of adventitious root *in vitro* culture of *G. procumbens* contains abundant of phenolic and flavonoids compounds as an antioxidants. The objective of this study was to evaluated the protective effect of *G. procumbens* adventitious root *in vitro* culture against lead acetate-induced in mice to red blood cell (RBC), hemoglobin concentration (HGB), aspartate aminotransferase (AST) levels, alanine aminotransferase (ALT) levels, superoxide dismutase (SOD) levels, and histology of liver cells. Research was conducted using twenty male mice, which were grouped into five treatments: P1 (control), P2 (Pb 100 mg/L), P3 (*G. procumbens* 100 mg/L + Pb 100 mg/L), P4 (*G. procumbens* 200 mg/L + Pb 100 mg/L), P5 (*G. procumbens* 300 mg/L + Pb 100 mg/L). The results indicated that administration of adventitious root methanol extract of *G. procumbens* could prevent a decrease in the number of RBC, HGB levels, SOD levels, and the percentage of normal hepatocyte. It was also known, *G. procumbens* could prevent increase in AST levels, ALT levels, the percentages of swollen and necrosis hepatocyte due to lead acetate treatment significantly. The effective dose of *G. procumbens* extract was 300 mg/L.

**Keywords:** Adventitious root, *Gynura procumbens*, Hepatocyte, Lead acetate, SOD.

Paper ID: BY030

## Effects of Medicinal Plants Rhizome on Growth Performance of Tilapia (*Oreochromis Niloticus*) Exposed to Micro Plastics

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**Abstract.** Microplastic (MP) and nanoplastic (NP) pollution in both sea and river reduces the function of aquatic biota habitats, including habitats of fish. The usage of rivers as a water source for fish farming, will disrupt the growth and development of fish thereby reducing its production. Supplementary from the Zingiberaceae is an alternative option to reduce the impact of MP pollution in fish body. This study aims to analyze the potential of several plants in Zingiberaceae group as a source of antioxidants for fish supplement to reduce the effects of oxidants caused by MP. Thirty-six tilapia fish were divided into two groups, control and treatment group with variations in MP concentrations (0, 1, and 10 mg.kg<sup>-1</sup>) and variations of supplementary source (*Curcuma longa*, *Curcuma xanthorrhiza*, and *Alpinia galanga* rhizomes). The results showed that medicinal plants of Zingiberaceae group were able to increase the growth of tilapia exposed to MP. Rhizoma of *Alpinia galanga* gave the best effect followed by *Curcuma longa* and *Curcuma xanthorrhiza*.

**Keywords:** Fish, fresh water, microplastic, medicinal plants, rhizome.

Paper ID: BY032

## Numerous Subculture Affect to Branches Number and Roots Length of *Gynura procumbens* Lour. (Merr.) During Adventitious Roots Proliferation in Solid Medium

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**Abstract.** Optimization of adventitious root biomass production can be achieved using in vitro technic through bioreactor culture technic. However, numerous adventitious root explants are required for the initial inoculum of culture in the bioreactor. As an effort to fulfilling the inoculum requirement for bioreactor culture starter, we tried our way through subculture methods through this research. The adventitious root of *Gynura procumbens* regenerated from leaf explant in solid MS medium supplemented with 5 mg/L indole-3-butyric acid (IBA). The root pieces were subcultured with the same medium composition. The subculture period was performed fifth time with a culture interval every 3 weeks. The result has shown that the subculture period affects a number of branches. The highest mean of branches number was achieved at the 4<sup>th</sup> subculture period (48.0±7.58), but not significant with the first subculture period (47.2±9.00). The length of the roots was affected by a number of branches. The high subculture period (4<sup>th</sup> and 5<sup>th</sup>) shown numerous shorter roots (dominated root size with scores 1 and 3). The saturated concentration of IBA in medium and specific response from roots explant tissues might cause different root proliferation during the subcultures period. Based on the data was achieved, the adventitious roots inoculum stock could be fulfilled through root cultures which be maintained using the 1<sup>st</sup> to 4<sup>th</sup> subculture period.

**Keywords:** adventitious roots; *Gynura procumbens*; indole-3-butyric acid; roots proliferation; subcultures.

Paper ID: BY033

## Antibacterial Activities of *Bacillus* spp. Isolated from Parangkusumo Coastal Sand Dunes, Indonesia

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**Abstract.** This study is the first endeavor to evaluate the antibacterial activity of bacterial isolate from coastal sand dune in Indonesia. Five *Bacillus* species were isolated from coastal sand dune soil and their ability to produce antimicrobial compounds were analyzed using disc diffusion methods. Among the isolated species was *Bacillus aryabhatai* (isolate PSD 2.1) which was found for the first time in Indonesia. *B. velezensis* PSD 1.2. and *B. subtilis* PSD 3.1 showed inhibitory activity only against Gram-positive bacteria, while *B. aryabhatai* PSD 2.1. and *B. megaterium* PSD 40.1 exhibited inhibitory effect only on Gram-negative bacteria. The only isolate showed inhibitory effect in both Gram-negative and Gram-positive bacteria was *Bacillus spizizenii* PSD 2.2. Further research to optimize the production condition of and to characterize the antimicrobial compounds from the *Bacillus* isolates are needed. This study is expected to encourage further exploration of beneficial microorganisms from the coastal sand dunes ecosystem in Indonesia.

Paper ID: BY034

## Determination of Phenolic Compound, Flavonoid, and Saponin Content of *Gynura procumbens* (Lour.) Merr. Extract

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**Abstract.** *Gynura procumbens* is one of the efficacious plants used as raw materials for traditional medicine in Indonesia. *G. procumbens* contains bioactive compounds such as triterpenoids, polyphenols, saponins, steroids, chlorogenic acid, caffeic acid, vanillic acid, coumaric acid, para hydroxy benzoic acid, flavonoids, and essential oils. This study aimed to determine of phenolic compounds, flavonoids, and saponins content in the leaves, stems, and roots of *G. procumbens*. Determination of these bioactive compounds content was carried out by extraction method with methanol solvent and analyzed using thin layer chromatography, Image-J software, and spectrophotometer. The results of the flavonoid test using TLC showed that the leaves organ produced the highest flavonoids content compared to stems and roots. The results of the saponin test using TLC did not show any saponin spot on the leaves, stems, roots of *G. procumbens* based on a standard solution of saponins. The results of analysis using a spectrophotometer showed that the total of phenolic (438.85 GAE mg/L for the total of phenolic compound content) and the results of image-J was found that the highest total flavonoid color intensity was obtained in the leaf organ of *G. procumbens* were the highest compared to the stem and root organs. Based on the results of this study, it can be concluded that the leaves organ of *G. procumbens* contained a lot of phenolic and flavonoid compounds content, while the content of saponin compounds contained are so small that they are not detected by the TLC method.

**Keywords:** Flavonoid, *Gynura procumbens*, phenolic compound, saponin, Thin Layer chromatography.

Paper ID: BY036

## Histopathological Changes in Gills of Wild Snakehead Murrel, *Channa striata* (Bloch, 1793) Infected with *Trichodina* sp. Fouquet, 1876 from Surabaya River

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**Abstract.** Trichodinids are ciliated protozoa that are widely recognized as one of the main groups of fish parasites. The genus *Trichodina* presents the greatest species diversity. However, in Indonesia records of *Trichodina* species are very less, and little is known about its pathogenicity in the host, especially in freshwater fish. This study provides notes on *Trichodina* sp. on wild snakehead fish, *Channa striata* from the Surabaya river and description of pathological changes in gills. On the one hand, histopathology provides a well method for detect the effects of irritants and pathogens in various organs including gills which are vital organs of fish. Live fish were transferred to the laboratory of Parasitology as soon as possible and were examined within 24 hours. Smears from the gill were examined for the parasite *Trichodina* sp. and ciliates was observed microscopically without staining. Second step was performed histopathological examination of the gills. Results give expression that infected fish showed It is seen that there is necrosis at the edge of the filament of gill in the form of fusion of the filament edge. Gill lesions were proportional to parasite intensity, in which the gill tissue was compromised in heavy infestation. Histopathological observations seen proliferative disturbances were found, including epithelial hyperplasia, rupture, and mononuclear and eosinophilic infiltrate that culminated in necrosis. Serious damages of primary lamella and secondary lamella included: increase in cells size (hypertrophy), increase in cells number (hyperplasia), fusion of the secondary lamella and blood congestion of the base of primary lamella. In conclusion, this ciliated protozoan causes compromised respiratory capacity that leads to severe gill lesions and currently is an important pathogen that afflicts wild snakehead fish in Surabaya.

**Keywords:** histopathological changes, gill, *Trichodina* sp., wild snakehead.





# BIOMEDICAL ENGINEERING

Paper ID: BE003

## Lumen and Nuclei Detection in Histopathology of Prostate Cancer Based on Morphological Feature Extraction

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**Abstract.** Prostate cancer is the most common cancer in men. The results of a fast and precise classification can be a very important objective of reference. Histological assessment is valuable information for doctors. The most common assessment for histological assessment of prostate cancer is the Gleason Grading System. Gleason pattern detection was done by extracting morphological features in the form of Line Length, Area Fraction, and the comparison between Line Length and Area Fraction. All morphological features became the input of backpropagation neural network. Based on the results of backpropagation testing, this method could classify gleason pattern images with an accuracy of 91.67%. The threshold of segmentation in determining the lumen and nucleus didn't have a specific range in its threshold due to the lack of uniform contrast in each image.

**Keywords:** Backpropagation; Gleason Pattern; Histological Assessment; Morphological Features; Prostate Cancer.

Paper ID: BE004

## Adsorptive Hemodialysis Membrane For Creatinine Removal

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**Abstract.** Blood purification is essential in the medical field to separate and eliminate toxins and impurities in the bloodstream. Hemodialysis membranes, although they can help patients, cannot function as a substitute for kidney or liver function in removing all impurities and toxins from the body. To be able to get rid of all the toxic substances in the body, the hemodialysis membrane must have adsorption properties so that it can adsorb all the toxins that cannot be removed diffusion through the membrane pore. Hemodialysis membrane of chitosan starch without cross-linking and cross-linking has been made for the separation of creatinine compounds. Chitosan-starch crosslink membranes are made using glutaraldehyde as a cross-linking agent. Chitosan-starch membrane without cross-linking has a tensile strength of 10.07 kgf/mm<sup>2</sup> while the membrane of cross-linked starch chitosan has a better tensile strength that is 66.79 kgf/mm<sup>2</sup>. The chitosan-starch membrane without cross-linking has clean water fluxes of 91, 60 L/m<sup>2</sup>hour while chitosan-starch membrane cross-linking has the water fluxes of 89.17 L/m<sup>2</sup>hour. Chitosan-starch membrane without cross-linking can remove creatinine of 6.427 mg Crt /gram membrane where the amount removed by adsorption reaches 3.828 mg Crt/g membrane. Chitosan- starch crosslinked membrane can remove creatinine of 5,682 mg Crtgram membrane with the amount removed by adsorption reaching 3,589 mgCrt/gram membrane. Chitosan-starch hemodialysis membranes can remove creatinine through a combination of adsorption and diffusion in one step

**Keywords:** chitosan, janeng starch, membrane hemodialysis, glutaraldehyde, creatinine.

Paper ID: BE005

## Role of Bacterial Types and Odor for Early Detection Accuracy of Bacteria with Gas Array

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**Abstract.** Periodontal disease, especially dental caries, is the most common disease that occurs in the oral cavity. Poor awareness of oral hygiene leads to tooth decay that usually ends with tooth extraction. Dental caries is caused by the accumulation of microbes, including bacteria in the oral cavity. Electronic nose is one of methods that can be used for early detection of oral and dental diseases with gas array sensor. This article discusses the role of bacterial types and odor for early detection accuracy of bacteria with gas array sensor. Study of e-nose application to detect the odor-based bacterial growth, taken from Pubmed, Web of Science and Scopus. The results of article review from reputable international journals showed that the TGS Metal Oxide Sensor (MOS) was able to identify gases formed by bacteria with more than 95% accuracy. In its implementation, the PCA computational analysis method is proven to be able to distinguish gases produced by bacteria properly. E-nose with various computational analysis methods, has shown to be able to identify gases emitted by various bacterial and odor with a fairly high accuracy value, namely in the range 80-90%.

**Keywords:** food security, gas array sensors, odor, bacterial types.

Paper ID: BE006

## Methylcellulose - AgNPs - oat hydrogel as a wound dressing for burn wound

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**Abstract.** Based on the RISKESDAS (Basic Health Research) in 2018 the prevalence of burns was reached 1,3% of the total population of Indonesia. One clinical treatment for burns is to use hydrogels as wound dressing since it can absorb wound exudates, by keeping the wound moist. This study was conducted to determine the effect of adding oat extract to the hydrogel methylcellulose-AgNPs. Hydrogel methylcellulose-AgNPs are mixed with oat extract, with an oat extract concentration of 0 wt%, 0.5 wt%, 1 wt%, 1.5 wt%, and 2 wt%. The characterization carried out included XRD crystallinity test and SEM morphology test for the characterization of AgNPs, and it was found that 10.2% of AgNPs were formed and evenly distributed AgNPs. In addition, characterization of hydrogel wound dressing was carried out which included antibacterial test, cytotoxicity test, swelling test, and antioxidant test. It was found that the best variable methylcellulose-AgNPs-oat hydrogel was a sample with an oat concentration of 2 wt%, which had a clear zone diameter of 10.35 mm and was sensitive to bacteria, had 2.206% viability, a swelling value of 71.7%, and has an antioxidant value of 95%. It shows that the addition of oats can increase the cell viability because oats with antioxidant property can act as innovation biomaterial which might counteract the free radicals produced by AgNPs, but it also functions as antibacterial.

**Keywords:** Hydrogel wound dressing, Methylcellulose, AgNPs, Oat, innovation.

Paper ID: BE008

## Preparation and Characterization of Amorphous Silica Nano (SiO<sub>2</sub>) Based on Lumajang Sand Using Precipitation Method for Biomaterial Composite Applications

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**Abstract.** Research has been carried out on the synthesis of amorphous silica (SiO<sub>2</sub>) made from Lumajang sand using the precipitation method. The use of this method is based on its simplicity and can produce large quantities. To increase the efficiency of synthesis, nano sand was used which was processed using high energy milling (HEM) for 15 hours and sintering temperature variations of 500°C, 600°C, 700°C, 800°C and 900°C. The results showed that the leaching process using 2M HCl can reduce crystal peaks and ball milling for 15 hours using HEM produces a sand particle size of 103.8 nm. From the XRD test of five sintering temperatures, amorphous silica occurs at a temperature of 700°C while at other temperatures, crystalline silica peaks still appear. This is supported by the degradation test data which showed that amorphous silica sintered at 7000C had the highest rate. Thus, this amorphous silica has good potential as a hydroxyapatite biomaterial composite preparation which has a weakness in the rate of degradation

**Keywords :** amorphous silica, Lumajang sand, precipitation methods, and biomaterials.



Paper ID: BE009

## Synthesis and Characterization of Hydrogel Based Hyaluronic Acid and Chitosan for Intraperitoneal Antiadhesion Application

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**Abstract.** Postoperative Peritoneal Adhesion is a severe case that frequently occurs in patients after undergoing laparotomy surgery. Intraperitoneal adhesions are pathological attachment that usually appears between the omentum, intestine and abdominal wall. Several kinds of barriers are made to prevent the formation of adhesions including liquid barriers such as crystalloids (NaCl and Ringer's lactate), sodium hyaluronate, and carboxymethyl cellulose (CMC) but the weakness is that they are quickly absorbed by the body. A solid barrier has weakness of difficulty in applying to cover all parts of the wound surface. In this study, we innovate to make degradable hydrogel and injection of N, O-Carboxymethyl Chitosan (NOCC), Aldehyde-Hyaluronic Acid and the addition of *Allium sativum* (garlic oil). The best sample with the concentration of A-HA / NOCC 30:10 g/ml was obtained. The composite hydrogel of NOCC / AHA / *Allium sativum* has very sensitive antimicrobial properties. In vitro cytotoxicity assay using hepatocyte cells showed that the hydrogel is non-toxic due to the percentage of living cell. It is known that the degradation products of in vitro degradable hydrogels for 2 weeks. The evaluation of hydrogel application in mouse model with abrasion defect side has been performed to identify the effectiveness of the NOCC / AHA / *A. sativum* as anti peritoneal adhesion. We have compared normal saline group and the control group. All animals are trying to sacrifice 7 days after surgery to observe the existence of adhesion in intra peritoneal organs. Based on all assays result it can be resumed that the NOCC / AHA / *Allium sativum* hydrogel possibly to be biomaterial to prevent postoperative intraperitoneal adhesion.

**Keywords:** Anti peritoneal adhesion, NOCC, AHA, *Allium sativum*, hydrogel.

A black and white photograph of chemistry glassware, including a graduated cylinder, a beaker, and a funnel, set against a dark background. The glassware is partially obscured by a large, stylized blue arrow graphic pointing from the top right towards the bottom left.

# CHEMISTRY

Paper ID: CE003

## Evaluation of Thermal and Spectroscopic Properties of Hybrid Biocomposite OPW/Ramie for Materials Building

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**Abstract.** Environmentally friendly and sustainable buildings encourage researchers to develop natural fibre-based building materials. The potential of available palm oil trunks is abundant and has not been utilized to the maximum as this research is carried out. This study investigates the thermal and spectroscopic properties of OPW-based biocomposite hybrids as building material candidates. Hybrid biocomposite reinforced OPW and ramie fibre with tapioca flour as the matrix. OPW particles with mesh numbers 20, 40, 200 and ramie fibres are performed initial treatment in 100<sup>o</sup>C water and NaOH solution. Hybrid biocomposite is formed using hotpress with variations of HBC1, HBC2, HBC3 and HBC4. Thermal properties are testing consisting of thermogravimetric analysis and differential scanning calorimetry and spectroscopic testing in X-ray diffraction and infrared spectroscopy. The thermogravimetric study showed that HBC3 samples had better thermal stability than HBC1, HBC2, and HBC4, at 358<sup>o</sup>C. Endothermic hybrid biocomposite temperatures range from 30-158<sup>o</sup>C and exothermic 394-445<sup>o</sup>C. PLA sheet in HBC3 samples affects the increase in thermal properties of hybrid biocomposites. Hybrid biocomposite HBC3 has the most apparent crystal size of 3.45 nm. OPW-based biocomposite hybrid has the opportunity to be used as building interior material.

**Keywords:** Building; Hybrid biocomposite; Oil palm wood; Thermal and spectroscopic properties.

Paper ID: CE004

## The Development of Potent Alternative Oligomerized Carrageenan-Based Hard Capsule

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**Abstract.** Plant-based hard capsules are developed to offer the alternative to conventional hard capsules that used to be prepared from gelatin. One of the concern is caused by the cow disease outbreak. On the other hand, there are not many alternative drug delivery systems (DDS) in the form of hard capsule that could be utilized for drugs needed to be dissolved under 15 minutes. This paper reports the oligomerization process to partly cut the polymeric chain of carrageenan (CRG) was used using citric acid (CT) with the control of time and temperature. CRG was mixed with maltodextrin (MD) and plasticized with sorbitol (SOR) to maintain its gel strength and flexibility based on past researches. Resulted hard capsules (CRG(O)-MD/SOR) had the water content of  $17.20 \pm 1.20$  % and the thickness of 10.0 mm. The viscosity of CRG(O)-MD/SOR solution reached more than 8000 cP at 65°C compared to the its individual components' solutions. To study the release mechanism process, salicylamide (SCA) and erythromycin (ECT) were used as the drug models. The dissolution rate of SCA was faster than ERT and the release kinetics mechanism of both drugs were different where SCA followed the first order release kinetics mechanism and ERT followed the Korsmeyer-Peppas mechanism. The analyses showed the indication that the CRG(O)-MD/SOR hard capsule has the potential to be developed as the alternative of conventional hard capsules.

**Keywords:** drug delivery system, oligomerization, citric acid, carrageenan, polymer.

Paper ID: CE005

## Synthesis of Nanosilica from Lapindo Mud through Sol Gel Method based Green Chemistry for Ibuprofen Medical Waste Adsorption

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**Abstract.** The Lapindo mud eruption in Sidoarjo caused a lot of material and non-material losses. On the other hand, the potential for Lapindo mud requires further utilization. Lapindo mud with a content of 53.03% Si, is a future silica reserve if processed based on research and technology. One of the efforts made by synthesizing Lapindo mud as nanosilica is because the content of silica is a major element in the Lapindo mud which can be applied to adsorb ibuprofen waste. Nanosilica from Lapindo mud with a sol-gel method based on green chemistry which is more environmentally friendly was successfully synthesized using P123 pluronics as a mold and egg white as a natural surfactant with variations of P123: egg white, namely 0.5: 0; 0.25: 0.25; and 0.0: 0.5. In the nanosilica manufacturing process, the method used is hydrothermal with a NaOH catalyst and refluxed for 6 hours. The results obtained were then centrifuged and ended with calcination at a temperature of 500°C to get really pure silica. The nanosilica adsorbent material was then characterized using FTIR, XRD and SEM. The results of FTIR analysis showed that the nanosilica material contained silanol (Si-OH) and siloxyl (Si-O-Si) groups. For XRD analysis, it shows that the nanosilica is in a regular crystalline form. Meanwhile, SEM analysis resulted in relatively the same particle size between 200-1000 nm. The adsorption performance of the nanosilica material was tested against ibuprofen waste as measured by a UV-Vis spectrophotometer. The optimum contact time for the adsorption of nanosilica against ibuprofen was 60 minutes with a maximum adsorption capacity of around 98% following the second order pseudo-kinetic model.

**Keywords:** Lapindo mud, Nanosilica, Green Chemistry, Adsorption of ibuprofen, Sol-Gel Method.

Paper ID: CE006

## The Effect of Sugarcane Bagasse-Nanocellulose Addition on Mechanical Properties and Antibacterial Activity of Chitosan Plastic Against *S. aureus*

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**Abstract.** Nowadays, chitosan has the potential as a biodegradable plastic with good antibacterial activity. Therefore, research related to the development of the mechanical stability of chitosan as a biodegradable plastic was needed. So this research focuses on the effect of sugarcane bagasse-nanocellulose addition on the mechanical and antibacterial activity of chitosan membrane against *S. aureus*. Chitosan plastic with the addition of sugarcane bagasse-nanocellulose were prepared on acrylic molds and dried by oven. Mass ratio of Sugarcane bagasse-nanocellulose in the chitosan film was varied to 0:10, 2:10, and 4:10. The surface morphology of film was evaluated by scanning electron microscopy. The interaction between nanocellulose and chitosan was monitored by X-Ray Diffraction and Fourier Transform-Infra Red Spectroscopy. The obtained result suggested that there are hydrogen bonding between nanocellulose and chitosan. The Mechanical properties was observed, include film thickness, transparency, moisture content, and thermal properties. The nanocellulose addition can decreased chitosan film moisture content. Analyses of thermal properties showed that nanocellulose addition on chitosan film have effect increasing stability of film under high temperature, and the degradation occurred above 250°C.

**Keywords:** Sugarcane bagasse-nanocellulose, chitosan plastic, *S. aureus*, mechanical properties, antibacterial activity.



Paper ID: CE007

## *In-silico* and *In-Vitro* Antiplatelet Activity from *Carica papaya* L. Chloroform Fraction Leaves Extract

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**Abstract.** Ischemia and stroke are the top ten deadliest diseases in the world, where both of these diseases are related to blockage of blood vessels. Clopidogrel as an antiplatelet agent for the therapy for those diseases still has many side effects. The treatment with *Carica papaya* L. extract containing alkaloid compounds, traditionally has an anti-platelet effect. This research aimed to observe antiplatelet activity of Chloroform Extract of *Carica papaya* L. Leaves by *in-silico* study into ADP (Adenosin Diphosphate) receptor and *in-vitro* study of platelet rich plasma induced by ADP which was observed with spectrophotometer UV / Vis method. Based on the results of *in-silico* study, alkaloid compounds such as Dehydrocarpain I, Dehydrocarpain II and Emetin have docking score (-121.77 until -142.75 Kcal / mol) had lower binding energy than Clopidogrel (-111.09 Kcal / mol) to the ADP receptor. From *in-vitro* study, we found that the addition of 100 ppm of chloroform fraction extract of *Carica papaya* L. leaves inhibited platelet aggregation about  $2.55\% \pm 0.36$ , which was better than the standard drug, Clopidogrel ( $2.13\% \pm 0.34$ ). Based on the results of *in-silico* and *in-vitro* study, the chloroform fraction extract of *Carica papaya* L. which contained alkaloid compounds, had activity to inhibit platelet aggregation, therefore they are potential to be developed as new drugs.

**Keywords:** ADP receptor, Antiplatelet; *Carica papaya* L.; Platelet Rich Plasma, 4NTJ.

Paper ID: CE008

## Preparation and Characterization of Thin Film Sorbent Based on Self Assembly Polyelectrolyte Multilayers for Drugs Extractor

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**Abstract.** A new material of thin film sorbent based on self assembly polyelectrolyte multilayers (PEM) has been successfully developed. Several of important coating parameters including pH of coating solution, salt addition in coating solution, dipping time, and number of layers were optimized for drug extractor by using thin film microextraction (TFME) technique. The optimum conditions were evaluated by the highest extraction performance for tricyclic antidepressant drugs (TCAs). Cellulose acetate membrane was chosen as supporting material. While polyelectrolyte materials namely poly(allyl amine hydrochloride) (PAAH) and poly(styrene sulfonic acid) (PSS) were chosen as coating materials. PAAH and PSS were deposited on the surface of supporting material, repeatedly. The results showed that the optimum coating conditions were the pH of PAAH 2 and PSS 2, no addition of salt in coating solution, the dipping time of each layer 5 minutes, and the number of layers 5. The optimized material was characterized by attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR), field emission-scanning electron microscopy (FESEM), and thermal gravimetry analyzer (TGA).

**Keywords:** Cellulose acetate, Polyelectrolyte Multilayers, Thin Film Extraction, Tricyclic Antidepressant, Sorbent.

Paper ID: CE009

## Biotransformation of Compounds in Laja Gowah Oil (*Alpinia malaccensis* (Burm.f) Roscoe) by *Aspergillus niger* and Its Antibacterial Activity

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**Abstract.** Laja gowah (*Alpinia malaccensis*) is a Zingiberaceae plant which has been used as traditional medicine by Indonesians. Research on the biotransformation of the compound content of laja gowah oil with *Aspergillus niger* has been carried out. The biotransformation process was carried out at room temperature with various incubation times of 24, 48, 72, and 96 hours. Analysis of compound content of laja gowah oil and biotransformation products using Gas Chromatography - Mass Spectrometer. Analysis of the biotransformation process was carried out using Thin Layer Chromatography using four types of solvents with different polarity. The compound content of laja gowah oil includes methyl cinnamic compounds, eucalyptol, camphor, and beta-pinene. Antibacterial test of the biotransformation product was carried out on *Escherichia coli* and *Staphylococcus aureus* bacteria through the agar diffusion method. The optimal incubation time for biotransformation of laja gowah oil was 72 hours to produce methyl cinnamate (96.98%). Biotransformation with *Aspergillus niger* does not produce new derivative products, increases levels of methyl cinnamic compounds, so that it can be used as a method of improving the quality of laja gowah oil. Based on the results obtained, the transformation product containing higher methyl cinnamate inhibits the growth of *Staphylococcus aureus*.

**Keywords:** laja gowah oil, *Alpinia malaccensis*, methyl cinnamate, biotransformation, *Aspergillus niger*.

Paper ID: CE010

## Sugarcane Bagasse Cellulose-based Semi-Interpenetrating Hydrogel as Slow-Release of Fertilizers

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**Abstract.** Biocompatibility of synthetic polymers combined with natural polymers could benefit the materials mechanical, swelling and release properties. In this study, hydrogel based on sugarcane bagasse cellulose grafted with polyacrylamide network semi-interpenetrating (semi-IPN) of linear poly(vinyl alcohol) (SC-g-PAAM/PVA/NP) was prepared by solution polymerization in the presence of initiator ammonium persulfate (APS) and *N,N'*-methylene-bis-acrylamide (MBA) as crosslinker. Nitrogen and phosphorus are the focus fertilizers introduced into the hydrogel during the synthesis process using sources from urea and dipotassium hydrogen phosphate, respectively. The purpose of this study is to investigate the effect of swelling and release study of fertilizers with or without PVA in the hydrogel. The synthesized semi-IPN hydrogel was characterized by Attenuated total reflection-Fourier transform infrared (ATR-FTIR) spectroscopy, and Carbon-13 Cross Polarization /Magic Angle Spinning solid-state NMR (<sup>13</sup>C CP/MAS NMR). The dynamic water uptake (swelling test) and slow release of fertilizer were investigated in distilled water for 24 hours and best interpreted using Fickian Diffusion Kinetic model. The release study of nitrogen and phosphorus were analyzed using Total Kjeldahl Nitrogen method and Ion Chromatography, respectively and the kinetic release were further studied by using Korsmeyer Peppas model. Hydrogel with and without PVA shows chain-relaxation controlled swelling behavior with SC-g-PAAM/NP has higher swelling capacity, than SC-g-PAAM/PVA/NP described from the kinetic study. While the rate of release of SC-g-PAAM/NP is lower than SC-g-PAAM/PVA/NP and both release of fertilizers properties is still out of the Committee of European Normalization (CEN) Standard to be a slow-release fertilizer media. Further investigation on the effect of other matrices ratio as well as PVA amount can be studied to improve the slow-release properties of the material.

**Keywords:** Cellulose, fertilizer, hydrogel, slow-release, swelling.

Paper ID: CE011

## Chitosan Grafted Synthetic Polymer and Its Swelling Studies

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**Abstract.** Chitosan, a natural biopolymer and a derivative of chitin, is a good adsorbent in many applications. However, chitosan has several limitations such as unstable in acidic medium and low porosity thus some modification could enhance its adsorption. This study focused on modification of chitosan with synthetic polymers by grafting polyacrylamide (chitosan-g-PAAm) and poly (methyl methacrylate) (chitosan-g-PMMA) separately on chitosan via free-radical polymerisation (FRP). The chitosan-based polymer synthesised and the control samples were characterised using solid ATR-FTIR, NMR and SEM. ATR-FTIR results confirmed the grafting between PMMA and PAAm with the amino/hydroxyl groups of chitosan through the intensities in the absorption bands at 1726, 1147 and 2952  $\text{cm}^{-1}$ . Grafting yield was calculated to identify the quantity of polymers grafted on the chitosan backbone. For chitosan-g-PAAm, *N,N'*-methylenebisacrylamide (MBA) as crosslinker was applied to strengthen the material to a suitable physical state. The preliminary physical test as an adsorbent was done is swelling test for chitosan, PMMA homopolymer, PAAm homopolymer and grafted copolymers were investigated to study the materials swelling capacity in distilled water at a certain duration time. Chitosan showed low swelling related to the low adsorption of water. It is expected that grafted chitosan beads increase the swelling properties of the materials. Physical changes and amount of water absorbed were recorded. This study will show the effect of polymers grafted on chitosan on the swelling and give an idea whether it can have potential to be used for environmental application.

**Keywords:** Chitosan, Poly(methyl methacrylate), polyacrylamide, water absorbency, swelling.

Paper ID: CE012

## Synthesis and Antibacterial Study of PMMA/Porphyrin/Silver Nanoparticles

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**Abstract.** The advancement of an antimicrobial coating material with activated properties may accelerates the prevention of the emergence of resistant bacteria. As a potential light-activated antibacterial material, poly(methyl methacrylate) (PMMA) nanoparticles were impregnated with silver nanoparticles and cationic 5,10,15,20-tetrakis(N-methylpyridinium-4-yl)porphyrin (TMPyP) via a novel one-pot miniemulsion technique. At first, silver nanoparticles were prepared in which chemical reduction of silver was carried out using sodium borohydride (NaBH<sub>4</sub>). The effect of various parameters was optimized including the order of mixing the reactants, presence of a stabilizer and time on stability, as well as size and concentration of the silver nanoparticles which were studied by UV-Vis. Afterwards, the silver nanoparticles were incorporated into PMMA via a miniemulsion method. In the next phase, TMPyP was synthesized from TPyP which was initially prepared via Alder-Longo condensation method. Consequently, PMMA/TMPyP and PMMA/TMPyP/silver nanoparticles were synthesized via the established miniemulsion method and were studied using UV-Vis DR and TEM to investigate the presence of porphyrin and silver in the samples. To evaluate the antibacterial activities, Kirby-Bauer test was carried out for all samples in dark against Gram- negative *E. coli* and Gram-positive *S. aureus*. Samples containing porphyrin were further tested under illumination to study the photoactivation of porphyrin. The results of this work showed the successful synthesis of PMMA/silver, PMMA/TMPyP, and PMMA/TMPyP/silver nanoparticles via miniemulsion method. The antibacterial studies revealed that the use of two different antibacterial strategies improved the antibacterial properties of the polymer nanoparticles.

**Keywords:** PMMA; Porphyrin; Silver; Miniemulsion; Antimicrobial.



Paper ID: CE013

## Preparation and Application of imidazolium-Based Poly(ionic liquid) in Removal of Methylene Blue and Methyl Orange

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**Abstract.** Poly(ionic liquids) (PILs) have been widely utilized in environmental applications for water purification. In this work, a series of PILs with poly(vinylbenzyl chloride) (PVBC) backbone will be synthesized via Reversible Addition-Fragmentation Chain Transfer (RAFT) polymerisation utilizing monomer and further modified into imidazolium-based pendants side groups into homoPVBC and block copolymers. The obtain poly(ionic liquids) will be characterized by various techniques namely attenuated total reflection spectroscopy (ATR-FTIR), proton nuclear magnetic resonance spectroscopy (<sup>1</sup>H NMR) and thermal analysis by differential scanning calorimetry (DSC) and thermogravimetry (TGA) techniques. The confirmation of the structure and morphology of the material will be conduct using scanning electron microscope (SEM). The ability of the PILs in adsorption of dyes will be explored using a cationic dye (methylene blue, MB) and an anionic dye (methyl orange, MO). Adsorption parameters such as adsorbate concentration, pH, temperature, adsorbent dosage and contact time would be studied. The maximum adsorption ability (Q<sub>max</sub>) of PILs under the optimum conditions will be calculated. In this study, the pseudo-first-order and pseudo-second-order equations will be apply to interpret the adsorption of the dyes on poly(ionic liquid). The kinetics of the adsorption will be further predicted by considering the effect of contact time on the adsorption of the dyes by the adsorbents. The two most popular isotherm models, Langmuir and Freundlich will be used to describe the adsorption of the dyes on the adsorbents. The isotherm study can reveal information on the maximum adsorption capacity (mg g<sup>-1</sup>), adsorption mechanisms and favorability of the adsorption process. The residual dye concentrations will be measured using a UV-Visible spectrophotometer. To determine the feasibility and nature of the adsorption process, thermodynamic parameters such as  $\Delta G^\circ$  (free energy standard),  $\Delta H^\circ$  (enthalpy change) and  $\Delta S^\circ$  (entropy change) will be calculated. To evaluate the reusability of the adsorbent, repeating adsorption-desorption of methylene blue and methyl orange will be carried out. This PIL may have potential applications as eco-friendly and safe for dyes removal with high efficiency and excellent reusability.

**Keywords:** Poly(ionic liquids) PILs, Dyes, Adsorption, Removal.

Paper ID: CE014

## Effect of Activation on Gelatin Modified ZnO Using Tamarind, Lime, and Wuluh Starfruit as Adsorbents *Methylene Blue*

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**Abstract.** The synthesis of environmentally friendly natural acid activated ZnO has been successfully carried out using the hydrothermal method as an innovation to replace synthetic acid. Hydrothermal method with a temperature of 100°C for 24 hours and activated using extracts of lime, tamarind, and star fruit wuluh then in the oven at 100° for 24 hours and continued with calcination. The adsorbent formed was then characterized using FTIR (*Fourier Transform Infrared Spectroscopy*) and XRD (*X-Ray Diffraction*). FTIR results on all ZnOG activated with 3 natural acids showed an absorption pattern at 1056 cm<sup>-1</sup> and 1689 cm<sup>-1</sup> which indicated the presence of the O-Si-O and Zn-OH functional group. Crystallinity was tested using an XRD instrument and the results showed that the silica structure of ZnOG was amorphous because there was a peak that widened at 10-20°. The degree of crystallinity of activated ZnOG extracts of tamarind, starfruit, and lime were 52%, 58%, and 65%, respectively, with a crystal size of 0.4 nm; 0.39 nm; and 0.42 nm. The adsorption process of methylene blue using ZnOG adsorbent as much as 50 mg in 120 minutes with a speed of 150 rpm. From the research results, it is known that the activator of lime extract has the highest adsorption capacity compared to tamarind and wuluh starfruit extract, which is 62.881 mg/g.

**Keywords:** wuluh starfruit extract, tamarind extract, lime extract, methylene blue adsorption, ZnO-Gelatin.

Paper ID: CE015

## Production and Characterization of Hard-shell Capsules from Carrageenan-Alginate Copolymers with Polyethylene Glycol Plasticizer as Drug Delivery Carrier Materials

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**Abstract.** Drug delivery carrier is a mechanism used to distribute drugs into the body. Drug delivery carrier which is widely used in drug delivery, such as capsules. Carrageenan-alginate is a vegetable polymer that is expected to be a substitute for gelatin in making capsules. The purpose of this research is to prepare, and characterize carrageenan-alginate hard shell capsules with polyethylene glycol plasticizers as drug delivery carrier materials. Hard-shell capsules were made from carrageenan-alginate and PEG copolymers with variations in the volume of 0.5 ml (CAP1), 1.0 ml (CAP2), 1.5 ml (CAP3), and 2.0 ml (CAP4). Hard-shell capsules characterization includes swelling, tensile, dissolution, disintegration, kinetic, Fourier-transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscope (SEM) tests. The hard shell capsules with the most optimum mechanical properties were CAP3 capsules with % swelling of 413.2%, stress values of 101.4 Mpa, strain values of 0.27, and young modulus of 1297.9 Mpa. Dissolution results showed that the *salicylamide* drug was distributed 11% in buffer phosphate at the 120th minute. Disintegration results for 37 minutes. FTIR results show there are hydrogen bonds between carrageenan, alginate, and PEG. SEM results showed the hard shell capsules had a smooth and porous surface morphology and cross-section, which was an average of 4.949  $\mu\text{m}$ . The most linear release kinetic test results using the Higuchi model at pH 6.8 with reaction rate constants of  $1.002 \text{ M}\cdot\text{s}^{-1/2}$  and  $R^2 = 0.967$ , so that the Carrageenan-alginate copolymer hard shell capsules with PEG plasticizers can be used as controlled release drug delivery carriers.

**Keywords:** capsules, carrageenan, alginate, polyethylene glycol, *salicylamide*.

Paper ID: CE016

## Dialysis Membranes for Acute Kidney Injury

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**Abstract.** Mortality and morbidity rates among critically ill (septic) patients having acute kidney injury (AKI) are very high, considering the number of patients that has died after their admission. Inappropriate selection of the types of continuous renal replacement therapy and inadequacy of the therapy become the immediate causes of those issues. Dialysis is a commonly used treatment intended to prolong the life of the AKI patients. Dialysis membranes, which are the core of dialysis treatment must be properly selected to ensure a fair treatment attended to the patients. The accumulation of certain types of molecules must be dealt using the right membrane. Whether it is low-flux, high-flux or adsorptive type, the dialysis membrane should be chosen depending on the condition of the patients. The selection of dialysis membranes should also be based on their effect on the treatment outcomes and the patients' well-beings. All these options are needed to serve the patients of different clinical settings. The use of dialysis membranes is not restricted to conventional hemodialysis, but rather they can be employed in hemoperfusion, hemofiltration, hemodiafiltration or a combination of any of them. This chapter would be focussing deeply on the different types of dialysis membrane, their characteristics and approaches in addressing the issues encountered in patients having AKI with sepsis and/or multiorgan failure in intensive care units.

**Keywords:** Acute kidney injury, hemodialysis membrane, hemodiafiltration, hemoperfusion, adsorption.

Paper ID: CE018

## Phytochemical-Assisted Synthesis of Nanostructured Titania using *Azadirachta Indica* Leaf Extract and its Application in the Photodegradation of Methyl Orange

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**Abstract.** Titania (TiO<sub>2</sub>) is among the prevalently used semiconductor metal oxides for environmental and wastewater treatment owing to its versatile properties and superior photocatalytic activity. Various conventional methods have been explored for the synthesis of TiO<sub>2</sub> nanoparticles (TiO<sub>2</sub> NPs). However, the biosynthesis method emerged due to its simplicity and environmentally-friendliness. In this study, TiO<sub>2</sub> NPs were biosynthesized using the aqueous leaf extract of *Azadirachta indica* (*A. indica*). The influence of the extract volumes, solvents (water/ethanol) and acetic acid on the properties of TiO<sub>2</sub> NPs was studied. FTIR analysis confirmed the presence of phenolic compounds in the leaf extract and TiO<sub>2</sub> NPs formation, as a broad band was observed at 430 – 850 cm<sup>-1</sup>. XRD patterns showed that the samples were mainly of anatase phase, except for water-based samples and when 1 and 2 mL of extract volumes were used, which resulted in anatase/brookite mixture. All samples' average crystallite sizes were between 6.3 and 12.4 nm. FESEM images displayed almost spherical NPs, with size range of 17 to 38 nm. UV-vis-NIR studies showed that the bandgaps were of anatase TiO<sub>2</sub>. The TiO<sub>2</sub> NPs photocatalytic activity was evaluated in the photodegradation of methyl orange (MO) under UV light irradiation. The water-based samples synthesized using 2 mL of the extract achieved 98.62% of degradation within 270 min. These results indicate that the use of plant extracts in biosynthesis method and only water as the solvent managed to produce TiO<sub>2</sub> NPs with good physicochemical properties and photocatalytic activity in the photodegradation of organic dye.

**Keywords:** Titania nanoparticles; *Azadirachta indica*; biosynthesis, photodegradation.

Paper ID: CE019

## Photodegradation of Polycyclic Aromatic Hydrocarbon by Titania in Hollow Copper Oxide Photocatalyst

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**Abstract.** Water contamination is increasing at an alarmingly due to uncontrolled discharge of untreated effluents, such as polycyclic aromatic hydrocarbons (PAH), into water resources. Hence, the development of alternative wastewater treatment method is needed and in this context; photocatalysis on the surface of titania ( $\text{TiO}_2$ ) have sparked widespread interest. However,  $\text{TiO}_2$ 's performance is restricted by its limited solar light absorption and fast recombination of photogenerated electrons-holes pairs. In this work, the synthesis of a core-shell composite photocatalyst was demonstrated using commercially-available  $\text{TiO}_2$  particles encapsulated in hollow copper oxide shell ( $\text{CuO}/\text{void}/\text{TiO}_2$ ), consisting three parts: synthesis of  $\text{C}/\text{TiO}_2$  using glucose solution as the carbon source, followed by a layer of CuO with different concentrations and finally calcination to remove the carbon to obtain  $\text{CuO}/\text{void}/\text{TiO}_2$ . XRD results shows that the core  $\text{TiO}_2$  particles predominantly consisted of anatase phase and they were successfully coated with CuO shell as proven by the TEM images. The UV-vis-NIR analysis revealed a decrease in band gap energy of the void samples to 2.47 eV, with the light response expanding from UV to visible light. In the photocatalytic degradation of naphthalene, an example of PAH, it was shown that the sample synthesised with 1.0 mol of CuO showed greater degradation percentage under UV (67.8%) and visible light (71.2%) irradiations, as compared to the other concentrations of CuO and the  $\text{TiO}_2$  directly coated by CuO. It can be concluded that  $\text{CuO}/\text{void}/\text{TiO}_2$  photocatalysts have been successfully obtained and the photocatalysts displayed the good photocatalytic ability under both UV and visible light irradiations.

**Keywords:** Copper Oxide shell; Hollow core-shell particle; Naphthalene; Titania core; Visible light photocatalytic.



Paper ID: CE020

## Extraction of Crystalline Cellulose from Release Paper

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**Abstract.** The extraction of crystalline cellulose from release paper waste was conducted via several processes which removed the inorganic substituents, silicone, hemicellulose, and lignin. The release paper waste was disintegrated manually followed by alkali and bleaching treatments, and controlled conditions of acid hydrolysis to remove the amorphous region in the cellulose. Attenuated total reflectance Fourier transform infrared (ATR-FTIR) spectroscopy was used to analyze the extracted cellulose particles and confirmed the removal of silicone in the sample. X-ray diffraction (XRD) analysis indicated that the extracted cellulose has high crystallinity index of 87.67%. Field emission scanning electron microscopy (FESEM) micrograph shows that the extracted cellulose has a fiber-like structure with an averaged diameter of approximately 1  $\mu\text{m}$ . The extraction of crystalline cellulose paves way towards alternative reuse of release paper waste in the production of crystalline cellulose which can be applied in various applications.

**Keywords:** cellulose extraction; crystalline cellulose; release paper.

Paper ID: CE021

## Analysis of *Leucas zeylanica* Extracts For Potential Anthelmintic Activity

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**Abstract.** *Leucas zeylanica*, also known as "Pokok ketumbit," is a medicinal herb used in Malaysia to cure various illnesses and is rich in flavonoids. Different conventional methods have been used for the extraction of bioactive compounds from medicinal plants. However, the ultrasound-assisted extraction method stood out because of its efficiency and low toxicity. Throughout this research, the ultrasound-assisted extraction technique was done using two solvents: ethanol and methanol, to extract the leaves and to run qualitative and quantitative analysis using chromatography and spectroscopy techniques to determine exactly the phytochemicals present in *L. zeylanica* extracts, as well as to determine the potential of the extracts as an anthelmintics. Qualitative analyses were done by phytochemical screening tests, which showed that both extracts of *L. zeylanica* contain flavonoids, phenols, tannins, saponins, steroids, coumarins, alkaloids, and terpenoids. The ATR-FTIR results demonstrated some significant peaks in both extracts. The LC-MS-MS results identified that ethanolic extracts had three fragment spectrums of apigenin, luteolin, and phthalic acid mono-2- ethyl hexyl ester at m/z 270.05, 286.05, and 278.15 in positive ion mode at a retention time of 11.26 min, 10.57 min, 16.56 min, respectively. Quantitative analysis of ethanolic crude extract was performed by UV-vis spectrophotometric assay to determine the total phenolic content (TPC) and total flavonoid content (TFC). TPC showed a gallic acid standard calibration curve,  $y = 0.0063x + 0.02$  and estimated amount was  $151.54 \pm 0.04$  mg of gallic acid equivalent/ 1 g of extract, meanwhile TFC displayed a quercetin standard calibration curve of  $y = 0.0050x + 0.037$  and estimated amount of flavonoids was  $71.76 \pm 0.2$  mg of quercetin equivalent/ 1 g of extract. Using albendazole as a reference in the anthelmintic assay, results demonstrated that ethanolic and methanolic extracts have anthelmintic activity at dose of 100 mg/ml at 42 minutes, and 23 minutes, respectively.

**Keywords:** *Leucas zeylanica*; chemical analysis; flavonoid extraction; ultrasound assisted extraction; anthelmintic activity.

Paper ID: CE022

## Physicochemical Properties of Malaysian Bivalve Molluscs Shells For Phosphate Adsorption

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**Abstract.** The excessive amount of phosphate ( $\text{PO}_4^{3-}$ ) released to the wastewater will cause the growth of algal bloom and become to eutrophication. According to European commission, the concentration of phosphate less than  $35 \mu\text{g/L}$  can cause sufficient growth of algal blooms. However, the application of regulation in Malaysia, the standard removal of phosphate is  $5 \text{ mg/L P}$  and  $10 \text{ mg/L P}$ . The current wastewater treatment faces challenges in the efficient treatment of phosphate at low cost treatment. The shell of Malaysian main bivalve molluscs including blood cockles (*Anadara granosa*), green mussel (*Perna viridis*), oyster (*Crassostrea gigas*), marsh clam (*Polymesoda expansa*), meretrix venus (*Meretrix lusoria*) and asian freshwater clam (*Corbicula fluminea*) were analyzed for physicochemical properties vis FTIR, BET surface area, FESEM, XRD, XPS, XRF and TGA. This study suggests that the applications of Malaysian main bivalve molluscs shells is a promising, low cost adsorbent for phosphate removal from aqueous. However, the raw shells should be treated for better chemisorption and physisorption properties. Further analysis on the kinetic model for the adsorption capacity also should be performed.

**Keywords:** Adsorption; Bivalve Molluscs; Phosphate; Physicochemical; Shells.

Paper ID: CE023

## Green Synthesis of Silver Nanoparticles-Eggshell Nanocomposite and their Catalytic Action in the Reduction of 4-Nitrophenol

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**Abstract.** In recent years, metal nanoparticles have attracted wide attention due to their attractive properties and interesting applications. In particular, the catalytic properties of silver nanoparticles (AgNPs) are of interest to many researchers due to their high reactivity. In this study, a green method for the synthesis of AgNPs has been developed using *Garcinia mangostana L.* leaf extract as a reducing and stabilizing agent. The formation of AgNPs was confirmed by the presence of the absorption peak at 450 nm in the ultraviolet-violet (UV-Vis) spectrum. The biosynthesized AgNPs were then immobilized onto the surface of eggshell powder to give AgNPs-eggshell nanocomposite. Energy dispersive X-ray (EDX) analysis on the AgNPs-eggshell nanocomposite showed the presence of Ag peaks that indicated a successful immobilization of Ag onto the surface of the eggshell powder. The X-ray diffraction (XRD) analysis showed a series of diffraction peaks that are consistent with crystalline calcium carbonate (CaCO<sub>3</sub>) from the eggshell and metallic Ag. Based on the TEM images, the AgNPs were mostly spherical, with a mean diameter of 14.6 nm. The catalytic activity of the nanocomposite was then tested in the reduction of 4-nitrophenol to 4-aminophenol in the presence of sodium borohydride at room temperature. The highest activity was observed for the nanocomposite with Ag loading of 6 wt% and 4-nitrophenol with the concentration of 0.03 mM that gave 98.76 % reduction and the rate constant of 0.1433 min<sup>-1</sup>. Under these optimum conditions, the AgNPs-eggshell nanocomposite catalyst showed good reproducibility and could be recycled three times with a slight decrease in catalytic activity. This work signifies the good catalytic activity of the biosynthesized AgNPs-eggshell nanocomposite in the catalytic reduction of 4-nitrophenol.

Paper ID: CE024

## Effect Of Hydrothermal Temperature On The Synthesis Of Zinc Oxide (Zno) Using Cow Bone Gelatin Extract For Adsorption Application Of Ibuprofen

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**Abstract.** This study aims to determine the effect of variations in hydrothermal temperature on the maximum adsorption capacity of zinc oxide on ibuprofen tested by UV-Vis spectrophotometer, the effect of variations in hydrothermal temperature on zinc oxide functional groups tested by FTIR, and also the effect of hydrothermal temperature on the morphology of zinc oxide tested by SEM, (4) the effect of variations in hydrothermal temperature on the crystallinity of zinc oxide tested by XRD, and (5) kinetics model of ibuprofen adsorption by ZnO. Zinc oxide was synthesized using hydrothermal method with Pluronic F127 soft template and gelatin as surfactant. Ethanol and ZnSO<sub>4</sub> as sources of zinc oxide. Zinc oxide was synthesized with hydrothermal temperature variations of 100 °C, 150 °C, and 200 °C. After that, zinc oxide was characterized by FTIR, SEM, and XRD. The adsorption capacity of zinc oxide on ibuprofen was measured by means of a UV-Vis spectrophotometer. The results showed that the maximum adsorption capacity of zinc oxide material synthesized at temperatures of 100 °C, 150 °C, and 200 °C against ibuprofen compounds were 229.855 mg g<sup>-1</sup>, 233.453 mg g<sup>-1</sup>, and 236.858 mg g<sup>-1</sup>, respectively, (2) the functional groups on zinc oxide are Zn-OH, Zn-O-Zn, and ZnO, (3) the morphology of nano-ZnO is in the form of an aggregate with a heterogeneous surface, (4) the crystal size of zinc oxide is synthesized at a temperature of 100 °C, 150 °C, and 200 °C were 16.72 nm, 18.15 nm, 14.97 nm and their % crystallinity were 79.47%, 77.13%, and 84.95%, (5) the adsorption kinetics model followed the Pseudo second Order.

**Keywords:** Adsorption, Hydrothermal, Zinc Oxide, Ibuprofen, Gelatin.





# COMPUTER SCIENCE



Paper ID: CS001

## Pneumonia Detection From Chest X-ray in Children Using Convolutional Neural Networks

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**Abstract.** Pneumonia is the most common diagnosis found in cases of lung disease in children. Systematic early childhood disease diagnosis is often time-consuming and vulnerable to errors. Radiologists, on the other hand, have a difficult time identifying pneumonia by chest X-rays, which must be manually examined. Several factors may make the radiologist's job more complicated during the analysis phase, such as ambiguous picture findings, conflicting with other diagnoses, or identical characteristics with other diseases. The purpose of this study was to develop an automated classification system of pneumonia images using deep learning to assist clinical diagnosis. This study conducted by CNN method to classify normal lungs and pneumonia lungs in children. The data used are secondary data obtained from a retrospective cohort of pediatric patients aged one to five years from Guangzhou Women and Children's Medical Center, Guangzhou, China. The data that has been prepared undergoes a pre-processing process, namely performing data augmentation. This study performed the VGG16, VGG19, InceptionV3 and ResNet50 of CNN models for recognition and classification pneumonia images. System evaluation is done using a Confusion matrix and Receiver Operating Characteristic (ROC) curve by calculating the Area Under Curve (AUC) value. From the evaluation results, the VGG16 architecture with 100 epochs obtained the highest accuracy value, with the accuracy 95.51%, sensitivity 90.6%, specificity 98.46%, and AUC 94.53%. While the ResNet 50 architecture with 50 epochs obtained the lowest value results, with the accuracy 79.01%, sensitivity 44.44%, specificity 99.74%, and AUC 72.09%.

**Keywords:** Convolutional Neural Network; Pneumonia; Confusion Matrix; ROC Curve; Children.

Paper ID: CS003

## Issues Related to the Implementation of Enterprise Resource Planning in the Public Sector on the Benefits of Investment and Change Management: Perum Bulog Case Study

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**Abstract.** Perum Bulog is a State-Owned Enterprise that serves as a company that runs logistic business /warehousing and as PSO (Public Service Obligation) to maintain stabilities rice prices. These roles cause complexity of the business process so it requires a system to help with that. ERP implementation can provide benefits such as business process efficiency and revenue increase. Perum Bulog implements ERP to assist Perum Bulog in running its business processes. ERP implementation has a significant impact but raises issues such as failure to provide return of investment and failure in change management because of ERP implementation. These issues can lead to failures in ERP implementation. The purpose of this research is to identify the business benefits of ERP implementation, identify risks of not achieving business benefits, and formulate a change management strategy used in ERP implementation in Perum Bulog.

**Keywords:** Benefit Dependency Network, Change Management, Enterprise Resource Planning (ERP), IS/IT Investment Benefits, generic IS/IT Benefit Tables, IT Metric.

Paper ID: CS005

## A study of QoS in an Integrated Architecture of WLAN and Hetnet Based LTE-A

Slvar Abdulazeez Arif

**Abstract.** In the paper, an integration architecture based on loose coupling concept between WiFi and LTE- A heterogeneous networks (HetNet) was proposed. The ultimate objective is to investigate the feasibility and the practicality of the design through investigating the performance measures for different applications in the network. As well, a functionality of the load balancing was deployed in the architecture in order to prove that the architecture is flexible and can be opened to any further functionality. The architecture was built and simulated using riverbed network simulator, it was proved that the architecture is working appropriately and the connectivity of the different technologies demonstrated by applications communication with each other's in the architecture. As well, different existing load balancer algorithms were tested on the architecture and numerical results were obtained demonstrating which algorithm is better.

Paper ID: CS006

## Development of Conceptual-Level Architecture Vision for Real Estate Sector

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**Abstract.** This paper presents the development of conceptual-level architecture vision used for real estate sector. In Enterprise Architecture Planning (EAP), conceptual-level architecture vision may also be referred to as architecture vision planning. Aiming to streamline the business processes, organizations need information and communication technology support. Conceptual-level architecture vision is an early and important stage in the development of integrated information and communication technology so that they are aligned with business objective. We adopted the stages proposed by TOGAF ADM in performing the conceptual-level architecture vision for real estate sector. This conceptual-level architecture vision produced three artefacts, namely *stakeholder map matrix*, *value chain diagram*, and *solution concepts diagram*. It also produced a *statement of architecture work* that described the architecture project description and scope, overview of architecture vision and architecture project plan and schedule. The results of conceptual-level architecture vision have been confirmed and obtained continuous feedback from stakeholders using questionnaires. The results of this study could be the initial stage of enterprise architecture blueprint for the real estate sector.

**Keywords:** Conceptual-Level Architecture Vision; Information and Communication Technology; Solution Concept Diagram; Stakeholder Map Matrix; Statement of Architecture Work; Value Chain Diagram.

Paper ID: CS007

## BPMN2UserStory: Web Application for Generate User Story from BPMN

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**Abstract.** User stories and BPMN are valuable artifacts in requirements elicitation because of their ease of presenting a conceptual model that encourages communication and knowledge sharing. Process innovation in the software requirements can be enabled by associating user stories and BPMN. In this study, we propose to derive a collection of user stories from a BPMN diagram. We identify the elements in the BPMN diagram and correlate them with the user story elements to then convert the information in the BPMN into user stories. The dataset is obtained by collecting BPMN diagrams available on the internet and converting them into user stories. Our evaluation is done by comparing the results of humans annotator with the system. We managed to obtain precision, recall and F-measure of 0.7, 0.74 and 0.72. In user story extraction, aspects of WHO and WHAT were successfully obtained from BPMN, while aspects of WHY were not detected in BPMN attributes.

**Keywords:** user story; BPMN; knowledge sharing; process innovation; requirements elicitation.

Paper ID: CS008

## Multilevel Feedback Queue: Efficient Scheduling and Implementation By Using Dyanamic Quantum

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**Abstract:** A multitasking operating system allows many programs to run at the same time. We need to schedule our Central Processing Units (CPUs) efficiently to handle these services. CPU scheduling algorithms come in a scores of forms and any strategy has advantages and disadvantages. We implemented a Multi-Level Feedback Queue (MLFQ) algorithm with static time quantum for the first queue, making an efficient scheduling algorithm of MLFQ dynamic time quantum used in the second queue. Besides this, we compared both results and observed that dyanamic time quantum which gave the best result. In the first queue, we used the Round Robin (RR) algorithm with less quantum time for processes having a short burst time. The process that had more burst time than the defined quantum in the first queue allowed to move into the second queue. Here, we calculated the average burst time of all remaining processes and defined that burst time as a quantum for the second queue after the Shortest Job First (SJF) scheme applied in this queue. As a result, 70% of the processes in the second queue was received CPU. Other processes moved in the lower queue (last queue). So, this technique prevented the starvation problem for those processes which have large burst time.

**Keywords:** CPU scheduling, Average Turnaround Time, Waiting Time, Multilevel Feedback Queue, Dynamic Time Quantum, Starvation.



Paper ID: CS009

## A Systematic Literature Review of Movie Recommender Systems for Movie Streaming Service

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**Abstract:** Pada era digital seperti saat ini, teknologi internet membuat informasi yang tersedia bertambah dengan pesat. *Recommender Systems* adalah salah satu teknologi yang paling banyak digunakan untuk melakukan pemfilteran informasi dengan tujuan menangani banyaknya informasi yang tersedia. Salah satu informasi yang berkembang yaitu film. Semakin bertambahnya film yang rilis pada setiap tahunnya membuat berkembangnya aplikasi yang menawarkan layanan *streaming* film seperti, Netflix, Viu, Disney Hotstar, dll. Hal ini membuat para developer untuk bersaing dalam memberikan layanan yang terbaik kepada penggunaanya dalam memberikan rekomendasi film yang akurat. Oleh karena itu, teknologi *movie recommender systems* sangat dibutuhkan untuk memudahkan dan memberikan pengalaman yang baik saat *user* menggunakan layanan tersebut. Tujuan dari penelitian ini adalah melakukan *Systematic Literature Review* (SLR) untuk menganalisis metode-metode yang digunakan dalam membangun *movie recommender system* yang telah dilakukan pada beberapa penelitian sebelumnya. Proses *Systematic Literature Review* dilakukan dalam tiga tahap yaitu, proses *planning*, *conducting*, dan *reporting*. Studi utama yang terpilih pada proses SLR ini dalam rentan tahun 2010-2020. Beberapa studi utama yang terpilih mencakup *movie recommender systems* dengan menggunakan metode *Collaborative Filtering*, *Knowledge based Filtering*, dan *Hybrid Filtering*. Dalam membandingkan dan melakukan penilaian terhadap beberapa metode yang dikembangkan, pada akhir penelitian ini menunjukkan beberapa keuntungan dan kekurangan dari metode-metode yang digunakan dalam membangun *Movie Recommender Systems*.

Paper ID: CS010

## An Investigation of Class Diagram Builder System from The Translation of BPMN and Database

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**Abstract:** BPMN is a standard business process model that is accepted both nationally and internationally. Class diagram is a UML diagram that describes the classes in a system and their relationship between one class and another. In this research, as part of process innovation, we propose a generator system that can efficiently the time in making a complex Class Diagram with BPMN and Database. We identify and analyze every element of BPMN and Database that is relevant to make a complex Class Diagram. The Dataset that was used is a self-developed one that took reference from the internet. Evaluating performance of Generator System was done by comparing and assessing the class diagrams generated by the system with class diagrams designed by experts. Confusion matrix method was used to measure performance of Generator System. The Generator System succeeded to achieve accuracy by 97.4%, which means that this proposed system's performance is good. In this translation, generated Class Diagram unable to show multiplicity.

**Keywords:** BPMN, Class Diagram, Confusion Matrix, Database, Generator, Process Innovation.

Paper ID: CS011

## Culinary Recommendation System using MOORA Method

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**Abstract:** Currently, culinary tourism is proven to have an economic impact on Micro, Small and Medium Enterprises (MSME). There are various viewpoints on the ideal dining location, including taste, parking lot, service, price, and other support facilities. As a result, accommodating culinary enthusiast preferences is critical for producing appropriate recommendations, as their favourite culinary destinations are highly subjective and diverse. Gastronome may find that decision support systems can help them find a culinary establishment that meets their needs. Incorporating the MOORA method into a decision support system can automatically calculate the value and produce the best option. This study aims to create a web-based system that provides appropriate recommendations for gastronome by utilizing the Multi-Objective Optimization on The Basic of Ratio Analysis (MOORA) as a ranking advisor because this method determines an alternative with a high degree of selectivity. The results demonstrated that the algorithm ensures optimal decision-making based on user and expert evaluations.

**Keywords:** Economic impact, culinary, MOORA, MSME, recommendation system.

Paper ID: CS012

## UserScenario2Seq: Generate Sequence Diagram from User Stories Scenario

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**Abstract.** Generating sequence diagrams from user stories scenario are needed to easy to create or develop software. User story scenarios are constructed based on Behat cheat sheet format. User stories scenario going through preprocessing data and arranged plain text of user stories scenario with Plant UML format. Sequence diagrams generate by their artifacts with Portable Network Graphics (png) image format. Sequence diagram generated from user stories scenario comparing with sequence diagram generated from conventional way by an analyst system with the same dataset and calculate the accuracy three aspects such as object created, flow and name of an object sequentially are 100%, 100%, and 40%. This paper proposes a web-based application with many features such as creating a new project, making a new project's feature formed by user story scenario in the project, and downloading the generated sequence diagram from the project's feature. This application has successfully generated a sequence diagram by extracting the control objects, boundary objects, roles, messages, and flows from the given, when, and then conditions and user stories in the user story scenario.

**Keywords:** User stories scenario; Sequence diagram; Knowledge sharing; Process innovation.

Paper ID: CS013

## USESPEC to BPMN: Web Generator Program for Use Case Specification to BPMN

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**Abstract.** Background: Business processes are increasingly prioritizing software to support their activities, especially in modeling business processes. Creation of a graphical business process model in BPMN is used to model organizational business processes and to effectively communicate. This model composes a BPMN on a Use Case Specification, for web application acceptance tests. Objective: In this study, we developed a tool to generate BPMN from Use Case Specification to help and facilitate practitioners to conduct testing. Methods: The generated BPMN is made according to the Use Case Specification format so that it can be directly executed by the tester. Identification of inputs, processes, and outputs is required to be able to build this tool. The input to this tool is use case specification. The process carried out is to input the use case specifications and modified scenarios by applying the scenario ID. The output of this tool is a BPMN image based on the use case specification. Meanwhile, the system development method used is the Scrum method. Evaluation is done by compared the results of the system with the one created manually. The expert chosen in making BPMN manually /grown truth is someone who has researched BPMN. Results: This tool can generate a BPMN file based on the Use Case Specification. Results of the calculations that have been carried out show that the system output has produced the average of F-measure on all Use Case Specification datasets is 96.68%. Conclusion: The tool can help user especially entry-level programmers to generate BPMN from Use Case Specification and make easy for the users for testing the web applications

**Keyword:** User stories scenario; Sequence diagram; Knowledge sharing; Process innovation.

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Paper ID: CS014

## Generation of Use Case Specifications from User Story Scenarios

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**Abstract.** The usage of user story scenarios in software development is increasing. However, there is still little knowledge about artifact generation, especially about the generation of use case specifications from user story scenarios. This is shown by the lack of literature studies on use case specifications generation from user story scenarios. In this research, we propose a tool for converting user story scenarios into use case specifications in hope of allowing entry-level programmers to generate artifact translations with more ease. The method used in the software development process is the Agile method. The method used to evaluate the performance of the system was the confusion matrix method. Some flaws in the system were found during the evaluation process. The F-measure value obtained from the evaluation was 70%, which is relatively good, even though the system still has so much room for improvement.

**Keyword:** Behaviour-Driven Development, Use Case, User Story, Process Innovation.



A grayscale photograph of a wind turbine on a grassy hill under a cloudy sky. The image is partially overlaid by a large, stylized blue arrow graphic pointing downwards and to the right, which serves as a background for the title text.

# **ENVIRONMENTAL SCIENCE AND ENGINE**

Paper ID: ES001

## The Side-Effects of 5G between Hypothesis and Theory

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**Abstract.** While the ongoing world's trends towards competitive development, the fifth generation of broadband wireless telecommunications hypotheses states controversial challenges and negatively affecting the end-users. Without a doubt, this generation will increase the speeds of communications and will provide access network to billions of subscribers, and hence a trend to lower cost; But on the other hand, will lead to contradicting voices on the side effects on the end-users. 5G operates in the millimeter-wavelength whose frequency spectrum between 25 to 100GHz. Most of the 5G applications are above 50GHz. Thus, this super high frequency opens points of arguments as far as the end-user's health and safety concerns. In this paper, the authors tried to identify the different sources of EMF that human is exposed to, the UV, the X-ray, the power supply networks. Critically EMF, and the telecommunication FR generation including the 5G. Investigated the ongoing hypothesis that 5G sources can generate radiofrequency radiation that can damage DNA, uncontrolled cell growth, and pre-mature aging. The concerns of mm-waves side effects on the end-users have been presented together with proposed disciplines for protections have been suggested. The mm-waves applications and its pre-active means are not limited to telecommunications, it goes beyond that, in e-government, e-business, security, e-Health, industry, and so forth, that is to say, wide sectors of any society, thus the 5G will be the benchmark of a smart city. This must be looked at in parallel with the need for better health and safety requirements to safeguard the end-users. The paper found no conclusive evidence based on experimental documented informative data that the 5G can cause harm to health. To testify to any given hypothesis, sufficient empirical investigations are needed to find a well-tested hypothesis. The finding so far is that FR can cause negligible heat energy to the skin of the end-user.

**Keywords:** 5G Challenges, Side effect, Super Frequency, COVID 19. DNA, e-health, EMF, FR, mm-waves.

Paper ID: ES003

## POST COVID-19 URBANISM: A Challenge for All City and Regional Planners to Rethink The Way of Designing Future Cities

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**Abstract.** The COVID-19 pandemic marked the year 2021 with one of the biggest public health crises of all time, still threatening to take away millions of lives. A massive economic and environmental crisis is poised to instigate and triggering further negative consequences for human lifestyle and well being. Humankind is facing a time of uncertainty and unprecedented changes with the urban environment and regional planning under the spotlight. Cities, especially the globally significant ones with dens population – such as Los Angeles, New York, London, Berlin, Paris, and Wuhan – are disproportionately affected (for now). Thus, the pandemic is evolving into an urban crisis, forcing designers and urbanists to reconsider our deeply held beliefs about good city forms and aiming towards increasing smart sustainable cities. During these hard times, we need to adjust our role as environmental engineers of the cities, but more importantly, we need to re-examine the way we shape our cities and the agenda behind it for future pandemics and in the ‘post-COVID-19 world’.

This paper investigates engineering of city planning principles at a level of global society and regional planning to consider the post-Coronavirus future of our regions, cities, and towns of tomorrow. The aim of this paper is to initiate and facilitate a much-needed dialogue regarding planning challenges, goals, and constraints for the benefit of future generation and the environment. As the ancient wisdom foretells that a crisis is also an opportunity to learn from it, as it’s the responsibility of environmental engineers to embrace the challenge and to reinvent our mission: Innovate for Better Cities.

The several initial questions that formulate this paper is starting with what we have learned from the still unfolding chaos of the Coronavirus, and moving towards speculative, future exploring questions:

- How have cities enabled and contained the pandemic once the pandemic peaked?
- Is there an existing model of a city which is ‘pandemic-resistant’?
- Should there be a new worldwide policy that effects every governance when humankind faces future pandemics?
- Is the question of a ‘post-COVID-19 city planning related to public health only or a broader matter of survival, security and safety in the face of all possible risks does its particularly abrupt climate change?
- When considering future pandemics and emergencies, should planners focus on the physical form (density, shape, size, structure) and the material elements of the city (public realm and infrastructure) only or should environmental urbanists also take action on the social, economy, governance and politics?
- What types of urban sustainable innovations can we promote, based on the lessons learned during the COVID-19 crisis?

**Keywords:** Environment, Post-COVID pandemic, Regional Planning, Urbanism.

Paper ID: ES004

## Projections of Greenhouse Gas Emissions from Indonesian Electricity Production as a Baseline for Climate Change

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**Abstract.** The Indonesian government has set a Nationally Determined Contribution (NDC) to reduce Greenhouse Gas (GHG) emissions by 29% by 2030 independently and up to 41% with international assistance and cooperation. Therefore, the Indonesian government has set a target to reduce GHG from the energy sector by 11% by 2030. This study aims to evaluate the electricity generation process carried out by PLN in meeting the country's electricity needs and estimate the projection of electricity production and GHG emissions in the electricity generation process in Indonesia. This estimation is crucial as there is a difference between the Electricity Supply Business Plan (RUPTL) and the actual conditions. Indonesian electricity production process data is obtained from the Electricity Emission Calculation and Reporting Application (Apple Gatrik) 2018. In this study, projections of GHG emissions were carried out based on trends in fuel use. The scenario used in this GHG emission projection is taken from the fuel use scenario in the RUPTL. The projection result showed that the most significant GHG emissions are generated by coal fuel. The projection results are expected to become a baseline to determine various scenarios for meeting the electricity demand and meet the required reduction in GHG emission.

Paper ID: ES005

## Carbon Emission Reduction and Indicative Carbon Revenue Through the Implementation of Renewable Energy in the Coal-Fired Power Plants in Indonesia

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**Abstract.** To support the National Greenhouse Gases (GHG) emission reduction, PLN, as the state electricity company in Indonesia, has defined the policy based on the Electricity Supply Service Plan 2019-2028 towards the development of Renewable Energy (RE) and the use of low carbon technology. The PLN Green Transformation Program consists of three different scenarios, i.e., the projects based on a long-term corporate plan, the green booster, and the large-scale development of RE. Implementation of the program by 2028 will result in the emission reduction of 37,5 million tons of CO<sub>2</sub> and a reduction of emission intensity of 0.09 TCO<sub>2</sub>/MWh. Indicative carbon revenue that can be offered in the carbon market is also estimated, highlighting possible revenue and consideration for PLN in choosing the suitable carbon market in the future. The amount of GHG emission reduction may still be increased through the continuous effort of PLN in supporting the government policy for reducing the national GHG emissions.



Paper ID: ES006

## People's Age and The Effectiveness of Using Activities in The Environment of Commercial Streets

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**Abstract.** Streets are one of the vital components of the urban form that supports the city dwellers' public and private activities. Streets are most public of all city spaces and utilised by all users. Therefore, activities are vital in persuading people to use the street and presenting the image of the city. Thus, types of activities are part of the reasons for people to prefer pleasant and comfortable routes over shorter ones. The relation between people's ages and the used activities of the commercial street declined due to the poor physical environments in its local context. An uncomfortable environment on the streets is partially attributed to an over-presence of traffic lights. Mawlawi Street has been progressively becoming unpleasant, unsuitable of functions as well as disagreeable environment. This would represent the problem statement of this research, which is trying to study the cultural, social and businesses activities present in the mentioned street and their effect on its livelihood. The objective of this paper is to examine the relationship between these activities and the different age groups of the users. This study focuses on local context in Mawlawi Street as one of the major shopping streets in Sulaymaniyah city centre. This paper used a quantitative methodology via a survey of users ( $n = 330$ ). The data were analysed using frequency, mean value, percentage and chi-square statistics. The result shows that the cultural activities were the most important one for its users, while the social one were the least, and the businesses were in the middle. The majority of the users were of the young-adults age category. The research gives a good overview on the types of activities which are encouraging high street usage, and which activities need to be improved or added.



Paper ID: ES007

## Removal of Cd(II) and Pb(II) in Raw Water for Drinking Water in The Kali Surabaya River Using Immobilized *Skeletonema costatum*

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**Abstract.** This study aimed to know the removal efficiency of Cd(II) and Pb(II) in raw water for drinking water in the Kali Surabaya river using immobilized *Skeletonema costatum* at variations in contact time and highest removal efficiency. Water samples were taken at the intake of PDAM Karangpilang Surabaya. This study used seven contact times (one, two, three, four, five, six, and seven days), and their replications were three times. The number of *Skeletonema costatum* used in this study was  $1.5 \cdot 10^7$  cells/100 mL every 2 mg/L, and *S. costatum* immobilized with 0.65% sodium alginate. The analysis of medium filtrate in this study used the Atomic Absorption Spectrometry instrument (AAS). Analyzed data used F test (ANOVA) and if there were significant differences, then continued with Duncan test at  $\alpha = 0.05$ . The results of statistical tests showed a difference in the removal efficiency by immobilized *Skeletonema sp.* at various contact times. The highest removal efficiency was Cd(II) 80.83% and Pb (II) 86.89% at seven days contact time.

**Keywords:** Cd; immobilized *Skeletonema Costatum*; Pb; removal efficiency; sodium alginate.

Paper ID: ES009

## Micropollutants Removal in Raw Water for Drinking Water in the Kali Surabaya River by Immobilized *Skeletonema costatum* in Alginate Beads

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**Abstract.** Micropollutant in river waters is an important challenge for drinking water treatment plants (DWTPs), especially detergent (alkylphenol) and chloride. Microalgae can remove organic and inorganic materials from industrial. *Skeletonema costatum* is one of the abundant microalgae in the Java Sea. This study aimed to know the removal efficiency of alkylphenol and Cl(II) in raw water for drinking water in the Kali Surabaya river using immobilized *Skeletonema costatum* at variations in contact time and highest removal efficiency. Water samples were taken at the intake of PDAM Karangpilang Surabaya. This study used seven contact times (one, two, three, four, five, six, and seven days), and their replications were three times. The number of *Skeletonema costatum* used in this study was  $1.5 \cdot 10^7$  cells/100 mL every 2 mg/L, and *S. costatum* immobilized with 0.65% sodium alginate. Alkylphenol was analyzed by UV-Vis spectrophotometer at 228 nm and chloride at 480 nm. Statistical Test used F test (ANOVA) and if there were significant differences, then continued with Duncan test at  $\alpha = 0.05$ . The results of statistical tests showed a difference in the removal efficiency by immobilized *Skeletonema sp.* at various contact times. The highest removal efficiency was alkylphenol 98.71% and chloride 46.03% at seven days contact time.

**Keywords:** alkylphenol; chloride; immobilized *Skeletonema costatum*; removal efficiency; sodium alginate.

Paper ID: ES013

## Inductively Coupled Plasma Mass Spectrometry In-situ Analysis of Suspended Titanium Dioxide Nanoparticles

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**Abstract.** Titanium dioxide (TiO<sub>2</sub>) nanoparticles have been tremendously used in various industrial sectors and applications including cosmetics, catalysts, food additives, inks, paints and coatings. However, International Agency for Research on Cancer (IARC) has classified the TiO<sub>2</sub> nanoparticles as IARC Group 2B carcinogen, which is “possibly carcinogenic to the human” and possessed a great risk to develop health complications mainly towards manufacturing workers. In this work, the suspended TiO<sub>2</sub> nanoparticles sampling using nanoparticle respiratory deposition (NRD) sampler was analyzed using Inductively coupled Plasma Mass Spectrometry (ICPMS). The digestion method required for Ti element recovery after the nanoparticles sampling is crucially important for the optimum ICPMS analysis and therefore, this work attempted to investigate the suitable digestion method. The ICPMS analysis revealed significant difference in Ti recovery when using different digestion procedures and the amount of TiO<sub>2</sub> nanoparticles captured was also dependent on the filter used within the NRD sampler. This work might pave the way towards optimum suspended TiO<sub>2</sub> nanoparticles sampling analysis in air using the ICPMS and will unlock various research opportunities in the monitoring assessment of nanoparticles exposure towards the workers.

**Keywords:** Air sampling; ICPMS; Nanoparticles; Titanium dioxide; Exposure assessment.

Paper ID: ES014

## System Dynamics Implementation to Analyze Electricity Demand and Capacity Planning in East Java Case Study PT. PJB (Pembangkitan Jawa-Bali)

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**Abstract.** According to the current state of society, electricity demand needs are huge. This causes the demand for electricity to increase. In the current condition, the electricity company must be able to improve the company's performance so that the target of electricity needs of the community is achieved. This study aims to develop a dynamics model of electricity demand and capacity planning of PT. PJB (Pembangkitan Jawa-Bali) so that it can meet the increasing electricity needs. The development of this model uses the System Dynamics approach with the consideration that System Dynamics is part of the system thinking concept, which will form a model that is simpler and easier to understand in terms of analysis, which comes from a very complex system. Based on the system that has been made, several scenario models have been produced. This scenario model of the demand system and capacity planning illustrates that the output of PT. PJB is able to meet the electrical energy needs of East Java Distribution. With annual production increasing due to sales growth of PT. PJB.

**Keywords:** Capacity Planning, Demand, System Dynamics, dan System Thinking.

Paper ID: ES015

## Adsorption of Lead Using Durian Rind Adsorbent

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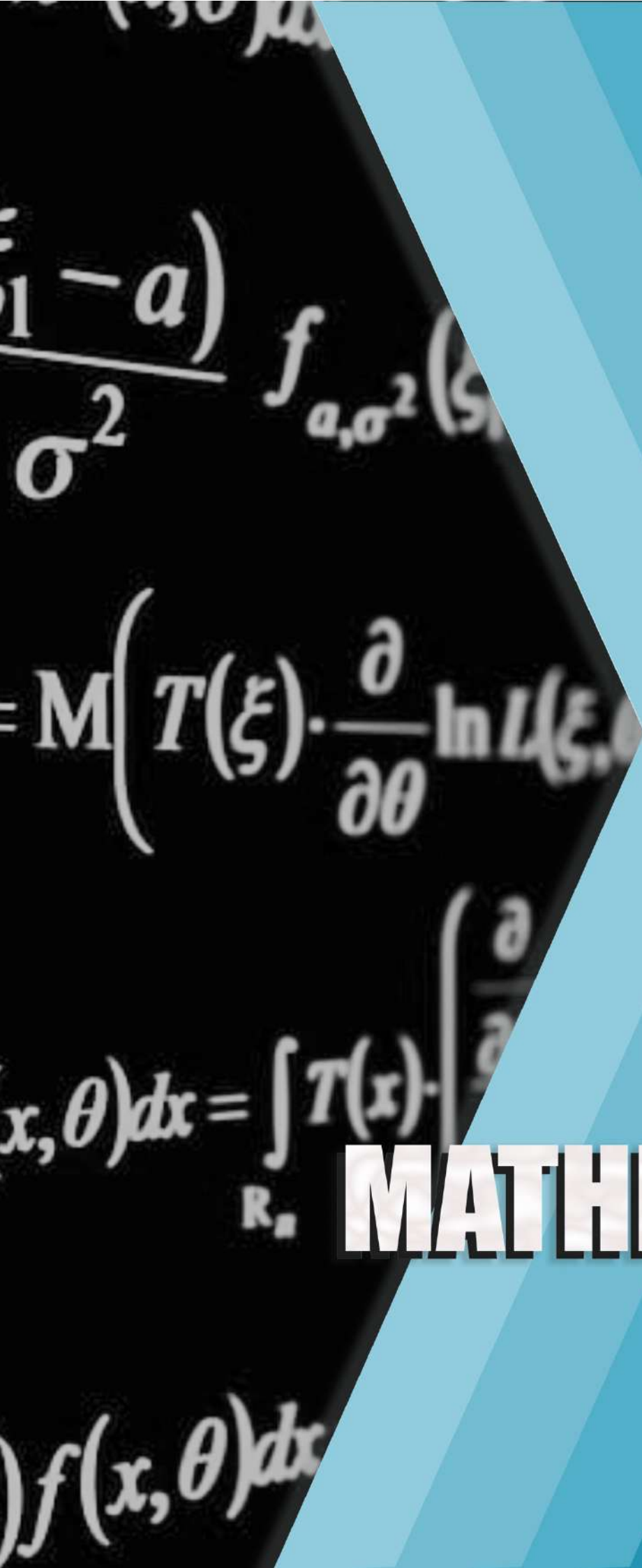
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**Abstract.** This study was purposed to determine the difference in the adsorption efficiency of Pb(II) metal ions in synthetic wastewater using an adsorbent derived from durian fruit rinds (*Durio zibethinus*) with variations of pH value in the wastewater solution and the contact time. This study also evaluates the characteristics of durian rinds using pHpzc, FTIR, XRD, and TGA. This study was carried out on a laboratory scale with a batch technique with contact time variations of 30, 60, 90, 120, 150, 180, 210, 235, 240, 245, and 250 minutes, and pH variations of 2,1; 3,1; 4,1; 5,1; 6,0; 7,1 and the initial pH value, which is 4,9. The results were analyzed using descriptive analysis and statistical analysis with Anova One-Way and Duncan test. The characteristics of the durian peel adsorbent based on the pHpzc were 5.8, and the FTIR analysis evaluates that there are hydroxyl groups -OH, carbonyl groups C=O, C-H, -CH<sub>3</sub> groups, and C-O aromatic ring groups from cellulose carbohydrates and lignin. The results of XRD analysis resulted in the presence of a crystalline form of cellulose and TGA analysis has resulted in three stages of thermal decomposition in the adsorbent. The highest value of Pb(II) removal efficiency occurred at pH 7.1 with an efficiency of 51.75%, and the adsorption analysis using a contact time of 245 minutes resulted in an efficiency of 71.22%.

**Keywords:** Adsorption, *Durio zibethinus*, FTIR, Pb(II) ions, pHpzc, TGA, XRD.



# MATHEMATICS



Paper ID: MA009

## Some applications of certain subclasses of meromorphic functions defined by certain differential operators

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**Abstract.** The main object of the present paper is to introduce certain subclass of meromorphic function associated with the concept of differential operators. We studied some geometric properties of a new type of meromorphic function, Hadamard product properties and integral operator meaninequality.

**Keywords:** Mittag-Leffler, Meromorphic functions, Starlike functions, Convex functions, Differential operator, Q-Hypergeometric functions, Hadamard product.



Paper ID: MA011

## $g^*$ -Angle between Two Subspaces in The Space of $p$ -Summable Sequences

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**Abstract.** The main object of the present paper is to introduce certain subclass of meromorphic function associated with the concept of differential operators. We studied some geometric properties of a new type of meromorphic function, Hadamard product properties and integral operator meaninequality.

**Keywords:** Mittag-Leffler, Meromorphic functions, Starlike functions, Convex functions, Differential operator, Q-Hypergeometric functions, Hadamard product.

Paper ID: MA012

## Domain of generalized difference Operator $\Delta_i^3$ of Order Three in The Sequence Spaces $l_1$ and $bv$

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**Abstract.** In this paper, the spaces  $l_1(\Delta_i^3)$  and  $bv(\Delta_i^3)$  are introduced as the domain of generalized difference operator  $\Delta_i^3$  of order three in the sequence spaces  $l_1$  and  $bv$ . Then, some topological properties and some inclusion relations are given. Additionally, Schauder basis for the spaces  $l_1(\Delta_i^3)$  and  $bv(\Delta_i^3)$  are calculated and  $\alpha$ -,  $\beta$ - and  $\gamma$ -dual of the spaces  $l_1(\Delta_i^3)$  and  $bv(\Delta_i^3)$  are computed. Finally, the classes  $(\mu(\Delta_i^3):\lambda)$  and  $(\lambda:\mu(\Delta_i^3))$  of matrix transformations are characterized where  $\mu = \{l_1, bv\}$  and  $\lambda = \{c, c_0, l_1, l_p, l_\infty, bs, cs, cs_0, bv, bv_0\}$ .

**Keywords:** Matrix domain; Sequence spaces; Difference matrix; alpha-, beta- and gamma-duals; matrix transformations.

Paper ID: MA013

## On Some Properties of Herz Sequence of Function Space

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**Abstract.** This paper discusses about Herz sequence of function space. In this study, we prove the inclusion properties of Herz sequence of function space and relation between 3 sequence of function space (homogeneous, non-homogeneous Herz sequence of function space and Lebesgue sequence of function space). We also prove Hölder's Inequality for Hadamard multiplication in Herz sequence of function space. We apply the inclusion properties and Hölder's Inequality to prove dual of Herz sequence of function space.

**Keywords:** Herz sequence, Hölder's Inequality, Hadamard multiplication, dual.

Paper ID: MA014

## Properties of Bounded Variation Function of Two Variables

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**Abstract.** Bounded function is a function with upper bound and lower bound. Bounded variation functions is a further study of bounded function. The bounded variation function is the supremum of the sum of the difference in functions from the collection of partitions of a square subset of  $\mathbb{R}^2$ , whose the value is no more than infinity. This study discusses the definition of bounded variation function of two variables and their properties. The bounded variation function of two variables are concerned with bounded function and monotone function. Bounded variation function of two variables is a bounded function to each of its subintervals and the variation can be expressed as the sum of each variation of the subintervals.

**Keywords:** Bounded function, bounded variation function, bounded variation function of two variables, monotone function.

Paper ID: MA015

## Mathematical Model and Management of Premium Fund in Takaful Insurance For Hybrid Scheme

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**Abstract.** Takaful is a type of insurance in which participants contribute a certain amount of money to a common pool in an exchange for protection against predefined losses. The hybrid model (wakalah-mudharabah) is one of business models which can be used by Takaful Operator to manage the Takaful fund in a compensation of wakalah's fees which paid upfront and a profit-sharing from investment activities for its services. This paper will discuss about the mathematical model with respects to the management of premium fund in takaful insurance under the hybrid scheme. We took samples for participants aged 25, 45, and 65 years from the 2019 Indonesian mortality table in the calculations. We noted that the probability of death for male is relatively higher in comparison with the female. Subsequently, we compared the behaviour of total takaful operator's profit based on several indicators, such as participant's gender, participant's age, and the amount of benefit. Based on the participants' gender, the total profit earned by takaful operator from male group was slightly higher than for those in female group, but during the last year of policy years, it indicated the opposite figure. The second comparison was based on the participants' age. We observed that the older age provided more profit to the operator than the participants with younger age. However, as the policy years increased, it indicated the opposite figure. Finally, the difference in the amount of death benefit received by the insured had a constant effect on the total profit for takaful operator.

**Keywords:** Takaful Insurance; Mathematical Model; Management of Premium Fund; Hybrid Scheme; Operator's Profit.



Paper ID: MA016

## New Commutative Formulas for Second-Order Linear Time-Varying Systems

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**Abstract.** This paper studies the commutativity of second-order linear time-varying systems (LTVSs). This paper presents new explicit commutative theory and conditions for second-order (LTVSs). The sensitivity of the system is also investigated by considering an example.

**Keywords:** Commutativity; Linear Time -Varying Systems; Analog Control.

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Paper ID: MA017

## On new Appell Type Changhee polynomials Operational Matrix of Fractional Order Integration and its Applications

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**Abstract.** In this paper we present a new operational matrix of fractional order integration derived based on the Appell type Changhee polynomial, we show the application of this new operational matrix together with collocation method in solving fractional differential equations (FDEs), the fractional derivatives in the FDEs are described in the Caputo sense and the operational matrix of fractional integration in Riemann-Liouville sense. Some numerical examples are finally given to show the accuracy and applicability of the new operational matrix.

**Keywords:** Appell Type Changhee polynomials, Operational matrix, Collocation methods.

Paper ID: MA019

## New Commutative Formulas for Second-Order Linear Time-Varying Systems

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**Abstract.** This paper studies the commutativity of second-order linear time-varying systems (LTVSs). This paper presents new explicit commutative theory and conditions for second-order (LTVSs). The sensitivity of the system is also investigated by considering an example.

**Keywords:** Commutativity; Linear Time -Varying Systems; Analog Control.

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Paper ID: MA022

## Bessel-Riesz Operators in Lebesgue Spaces Defined on Measure Metric Spaces

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**Abstract.** In this paper we will discuss about Bessel-Riesz operators in measure metric spaces. Saba et.al[1] have proved boundedness of these operators on Lebesgue spaces and Morrey spaces defined on quasimetric measure spaces using a different approach with different measures. In this paper these will be reproved in measure metric spaces on Lebesgue spaces with same measures.

**Keywords:** Bessel-Riesz Operators, Lebesgue spaces, Measure metric spaces.

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Paper ID: MA023

## Distance-Local Strong Rainbow Connection Number of The Sun Graph $C_n \circ \overline{K_1}$

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**Abstract.** Let  $G$  be a simple and undirected graph. Define an edge coloring  $c: E(G) \rightarrow \{1, 2, \dots, k\}$ , with  $k \in \mathbb{N}$ . A path between vertices  $u$  and  $v$  in  $G$ , is called rainbow  $(u - v)$ -path if we can have different color for each edge in the path. For two vertices  $u$  and  $v$  of  $G$ , if there is a rainbow  $(u - v)$ -geodesic in  $G$ , which is a shortest path rainbow  $u - v$  path of  $G$ , then  $G$  is called strongly rainbow connected. The  $d$ -local strong rainbow connection number ( $lsr_{cd}$ ) is the smallest number of colors needed to color the edge of  $G$  such that any two vertices with distance at most  $d$ ,  $1 < d < diam(G)$ , can be connected by a rainbow geodesic. In this paper, we discuss the  $d$ -local strong rainbow connection number ( $lsr_{cd}$ ) of the sun graph  $C_n \circ \overline{K_1}$  with  $n \geq 3$ , for  $d = 2$  and  $d = 3$ .

**Keywords:**  $d$ -local strong rainbow connection number, strong rainbow connection number, rainbow path, rainbow geodesic, sun graph.

Paper ID: MA024

## Optimal Control Analysis of the COVID-19 Model with Two Strains

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**Abstract.** Coronavirus disease 2019 (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). It's spread around the world and still endemic in many countries. In this research, we propose a mathematical model of COVID-19 transmission by taking into account two strains namely SARS-CoV-2 and D614G. The stability analysis of the equilibria of the model is presented. The COVID-19 model has three equilibria, namely the disease-free equilibrium, endemic strain 1, and strain 2 equilibria. We obtain two basic reproduction numbers based on the strains. The disease-free equilibrium is locally asymptotically stable if two basic reproduction numbers are less than one. The endemic strain 1 and strain 2 equilibria are locally asymptotically stable if the basic reproduction number strain 1 and strain 2 greater than one, respectively. We then apply the optimal control strategies in the form of preventive measures (wearing masks, social distancing, washing hands) and treatment. The existence of the optimal control variables is determined through Pontryagin's Maximum Principle. Simulation results show that preventive measures require full effort and more effective in suppressing the spread of COVID-19 compared to treatment. Concurrent administration of control provides more effective results in minimizing the population exposed and infected COVID-19.

**Keywords:** COVID-19, Strain, Mathematical model, Stability, Optimal control.



Paper ID: MA025

## Analysis of Measles Disease Transmission Dynamics with Two Doses of Vaccine Using Real Data in Indonesia

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**Abstract.** Measles is an infection of the respiratory system caused by an RNA virus which is a member of the genus Morbillivirus. The mathematical model approach is useful for predicting the spread of disease in the future. Based on WHO and CDC recommendations, in this paper, we proposed the measles model by dividing the vaccinated population compartment into the vaccinated-with-the-first-dose population and the vaccinated-with-the-second-dose population. An estimation of the model parameters was carried out based on the cumulative monthly data of measles sufferers in Indonesia in 2015 – 2017 using a genetic algorithm. The basic reproduction number was also determined to measure the potential spread of measles in a population. Based on the estimation results, the value of the basic reproduction number is 0.1710 which shows that the spread of measles in Indonesia does not occur in endemic conditions. From the analysis of the model, we obtain two equilibria, namely the non-endemic equilibrium and the endemic equilibrium which is asymptotically stable if the basic reproduction number is less and greater than unity, respectively. Sensitivity analysis was also carried out to determine the most influential parameter on the spread of measles. The numerical simulation results show that when the second dose of vaccine is implemented, the number of exposed and infected populations tends to decrease even towards non-endemic conditions compared to without the second dose of vaccine.

**Keywords:** Measles; Mathematical Model; Parameter Estimation; Sensitivity Analysis; Stability.

Paper ID: MA026

## Mathematical Model of the Spread Malaria Disease with Relapse and Reinfection Presence and Optimal Control Strategies

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**Abstract.** Malaria is a dangerous and life-threatening infectious disease which caused by four species of single-cell eukaryotic Plasmodium genus parasites. Parasites can be transmitted to humans through the bites of infected female Anopheles mosquitoes. The spread of malaria can be modeled into a mathematical model with the effects of relapse and reinfection and adding to the exposed human population. In this paper, we analyze the malaria transmission model in the presence of relapse and reinfection. We further apply an optimal control strategy such as installing mosquito nets, providing antimalarial treatment, applying hypnozooid remover drugs, and spraying insecticides. Based on the analysis of the model without giving control, there are two equilibria, which are the non-endemic and endemic equilibriums. Local stability and the existence of endemic equilibriums depend on the basic reproduction number. The non-endemic and endemic equilibrium is locally asymptotically stable if the basic reproduction number is less and greater than unity, respectively. We also investigate the sensitivity analysis of the parameters to identify the parameters that have the most impact on the model. Next, the optimal control problem on the model was solved by using the Pontryagin Maximum Principle. The numerical simulation results show that the providing of the optimal controls in the form of mosquito nets installation, providing anti-malarial treatment, utilizing hypnozooid remover drugs, and spraying insecticides simultaneously can provide the most effective results to minimize the number of infected human populations and the number of mosquito populations infected with malaria.

**Keywords:** Mathematics Model ; Malaria ; Basic Reproduction Number ; Stability ; Optimal Control.

Paper ID: MA027

## The Locating-Chromatic Number for Certain Operation of An Origami Graphs

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**Abstract.** The locating-chromatic number of a graph combined two graph concept, coloring vertices and partition dimension of a graph. Let  $G = (V, E)$  be a connected graph and  $c$  be a proper  $k$ -coloring of  $G$  with color  $1, 2, \dots, k$ . Let  $\Pi = \{C_1, C_2, \dots, C_k\}$  be a partition of  $V(G)$  which is induced by coloring  $c$ . The color code  $c_\Pi(v)$  of  $v$  is the ordered  $k$ -tuple  $(d(v, C_1), d(v, C_2), \dots, d(v, C_k))$  where  $d(v, C_i) = \min \{d(v, x) | x \in C_i\}$  for any  $i$ . If all distinct vertices of  $G$  have distinct color codes, then  $c$  is called  $k$ -locating coloring of  $G$ . The locating-chromatic number, denoted by  $\chi_L(G)$ , is the smallest  $k$  such that  $G$  has a locating  $k$ -coloring. An origami graph  $O_n$ ,  $n \geq 3$  with  $3n$  vertices is a graph with  $V(O_n) = \{u_i, v_i, w_i : i \in \{1, \dots, n\}\}$  and  $E(O_n) = \{u_i w_i, u_i v_i, v_i w_i, u_i, u_{i+1}, w_i u_{i+1} : i \in \{1, \dots, n-1\}\} \cup \{u_n u_1, w_n u_1\}$ . Let  $H_{O_n}$ ,  $n \in \mathbb{N}$  with  $n \geq 3$  be a certain operation of an origami graphs.  $H_{O_n}$  is a graph with  $V(H_{O_n}) = \{u_i, v_i, w_i, u_{n+i}, v_{n+i}, w_{n+i} : i \in \{1, \dots, n\}\}$  and  $E(H_{O_n}) = \{u_i w_i, u_i v_i, v_i w_i, u_{n+i}, u_{n+i+1}, w_{n+i} u_{n+i+1}, u_{n+i} v_{n+i}, v_{n+i} w_{n+i} : i \in \{1, \dots, n\}\} \cup \{u_i u_{n+i} : i \in \{1, \dots, n\}\} \cup \{u_i u_{i+1}, w_i u_{i+1}, u_{n+i} u_{n+i+1}, w_{n+i} u_{n+i+1} : i \in \{1, \dots, n-1\}\} \cup \{u_n u_1, w_n u_1, u_{2n} u_{2n+1}, w_{2n} u_{2n+1}\}$ . In this paper, we will determine the locating chromatic number for certain operation of origami graphs.

**Keywords:** graph, locating-chromatic number, origami graphs.

Paper ID: MA030

## Seawater Salinity Prediction Using Fuzzy Sugeno

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**Abstract.** Salinity, which is the level of dissolved salt in water, is one of the factors that influence salt production. The higher the salinity dissolved in seawater produces the better salt production. Many factors influence the salinity of sea water such as air humidity, wind speed and sea water temperature. In this study, we apply the fuzzy sugeno logic method to predict the salinity of sea water based on the influent variables. We retrieve data from the Kalianget website, Madura Island (Indonesia) and Landsat 8 image satellite. We take daily data within 1 year from January to December 2019. Fuzzy sugeno logic model in this study uses output (consequent) in the form of a constant equation (sugeno zero order model), so that the salinity prediction value of sea water that is almost close to the actuary is found on April 24, 2019 with the smallest error value is 13.9838 and MSE value is 246.034.

Paper ID: MA032

## On Characterizations and Properties of nil-injective Rings and Modules

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**Abstract.** A module  $M$  is called p-injective if for every  $a \in R$ , every R-linear map from  $aR$  to  $M$  can be extended to a linear map from  $R$  to  $M$ , which is introduced by Ming. Then,  $R$  is called right p-injective if  $R_R$  is p-injective. Furthermore, A right R-module  $M$  is called nil-injective if for any  $a \in N(R)$ , and any right R-homomorphism  $f: aR \rightarrow M$  can be extended to  $R \rightarrow M$ . Or equivalently, there exists  $m \in M$  such that  $f(x) = mx$ , for all  $x \in aR$ . If  $R$  is nil-injective, then  $R$  is a right nil-injective ring. In addition, every right p-injective rings are right nil-injective. In the present work, we develop various properties and characterizations of right nil-injective rings and modules, by which many of the known results are extended. Finally, we show that for any R-module  $M$ , the R-module  $M$  is nil-injective if and only if for any  $a \in N(R)$  short exact sequence  $0 \rightarrow aR \rightarrow R \rightarrow R/aR \rightarrow 0$  of R-modules  $0 \rightarrow \text{Hom}_R(R/aR, M) \rightarrow \text{Hom}_R(R, M) \rightarrow \text{Hom}_R(aR, M) \rightarrow 0$  is also a short exact sequence, where  $\Psi(f) = f\psi$  and  $\Theta(f) = f\bar{f}$ .

**Keywords:** exact sequence; direct sum; nil-injective; trivial extension; R-epimorphism.

Paper ID: MA033

## Tidal Wave Height Estimation on The Southern Coast of Java Island Using Fuzzy Kalman Filter

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**Abstract.** As a maritime country with the second longest coastline in the world, information about sea conditions in Indonesia such as tidal wave height plays an important role. However, the limited number of tide stations available causes a lack of information on the tides height. The tidal wave height in areas without tide stations can be estimated using data assimilation methods such as the Kalman filter. Kalman filter can also be combined with fuzzy logic, also known as Fuzzy Kalman filter (FKF). In this study the FKF method will be applied to the mathematical model of tidal waves to estimate tidal wave height in the coast of Java island, focusing in the area between Pacitan and Sendang Biru tide stations. Estimations will be carried out at the points determined with the help of a map grid, and the estimation results obtained using FKF will be analyzed and compared with the observation data taken from the tide stations to see whether the estimation provides good result.

**Keywords:** Data Assimilation; Fuzzy Logic; Java Island; Kalman Filter; Tidal Wave.



Paper ID: MA035

## On Powering Adjacency and Antiadjacency Matrices of a Directed Graph

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**Abstract.** Adjacency and antiadjacency matrices are the representation matrices of a directed graph. From the earlier papers, its have been known that the powering of the adjacency matrix of a directed graph can be used to find the number of directed paths and cycles. However, we found that there is a case which the theorem does not work. Therefore, in this paper, we will extend the powering of the adjacency matrix of a directed graph and also give the additional requirement so that the properties are worked. We also generalized the case for general directed graph, which means the graph might have loop(s) and digon(s). On the other hand, we also give the representation of the powering of the antiadjacency matrix.

**Keywords:** Adjacency matrix, antiadjacency matrix, digon, directed graph, loop.



# PHYSICS

Paper ID: PH002

## Experimental and theoretical analysis for the structural, FT-IR, NLO, NBO and RDG properties of Lindane using DFT Technique

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**Abstract.** The present study focuses on the characterization and density functional theory (DFT) analysis of Lindane (LIN). The DFT method at B3LYP/6-311++G (d, p) basis set has been used for the computational investigation. Herein, structural properties such as molecular structure, bond lengths, and bond angles of the LIN have been discussed. The FT-IR experimental and theoretical spectroscopic investigation has been revealed in the present study. Mulliken nuclear charges have been explored to study the chemical activity of the LIN. The FT-IR assignments were made by comparing the experimental FT-IR absorption peaks to the scaled frequencies obtained by the DFT process. Geometric parameters, assignments for PED (Potential Energy Distribution) have also been published. Reduced density gradient (RDG), Non-Linear Optics (NLO) for non-linear optical effects and the Natural Bond Orbital (NBO) for charging relocation were studied. The intercellular electrons carrying functionalized LIN will assist in screening the necessary applications as voltage stabilizers, optoelectronic devices and memory switches proposed for screening.

**Keywords:** DFT; Lindane; Experimental & Computational FT IR; NLO; NBO.

Paper ID: PH004

## Code Of 27 In Interference With Economic Covid Era Based On Hahslm Perspective

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**Abstract.** In the era of Covid, the development of modern physics has gone beyond the application of mechanics, the theory of relativity and quantity which represent space and time which have an impact on the economic crisis. The purpose of this research is to analyze the dyntivity of relativity and quantum physics which is a reflection of prayer. The object of this research is the pattern of particles in matter, waves, and electron interference. Research is conducted through literature studies involving books, magazines, and other electronic media. This method is conducted in a descriptive and qualitative way, and is done in comparative religions, involving section 15.87 of the qur 'an. Research methods combine methods similar to dynivitas. This gauge is a quantum reality model with a microscopic reality in salic formation. Results suggest that in a quantum reality, electronic interference patterns are similar to salat patterns. Time and space were altered from words 7 and the Quran. The formula is:  $H = Ah (S, L, M)$ . This function appears in general science of physics and religiosity factor. The reflexivity of waves can be linked to code 7 at Numbers 472319 or hahslm. Even in Indonesia there is a Covid that is a global health problem. The growing number of Covid cases has a significant impact on the global economy that could affect Indonesia's stability.

**Keywords:** Code; Covid; Economic; Interference; Physics.

Paper ID: PH005

## Wavelet Transform Amorphous Radial Distribution Function Validation using Classical Density Functional Theory with Born-Meyer Type Potential

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**Abstract.** Radial Distribution Function (RDF) is commonly used in statistical mechanics to understand disordered systems such as amorphous solids, liquids, and gases. Determination of the RDF from the low energy X-Ray Diffraction (XRD) experiment shows bad resolution. We used Wavelet Transform (WT) method with our theoretically constructed Wavelet Function (WF) to solve the resolution problem and it shows good results in predicting interatomic distance and the RDF graph trend of the amorphous Ge<sub>0.25</sub>Se<sub>0.75</sub> and Ag<sub>x</sub>(Ge<sub>0.25</sub>Se<sub>0.75</sub>)<sub>100-x</sub> ( $x = 5, 10, 15, 20, 25$ ). Although the WT method shows good results for predicting the interatomic distance and RDF graph trend, we need more validation. To give more validation, we propose to use Classical Density Functional Theory (CDFT) with Born-Meyer Type Potential (BMTP). BMTP is chosen because amorphous has a short-range atomic interaction. In this research, we found the repulsion and attractive coefficients (A<sub>2</sub> and A<sub>4</sub>) for Ge<sub>0.25</sub>Se<sub>0.75</sub> are 5.93969 and 2.43213. For Ag<sub>x</sub>(Ge<sub>0.25</sub>Se<sub>0.75</sub>)<sub>100-x</sub>, the A<sub>2</sub> and A<sub>4</sub> values are consistent around (6.60-7.00 and 2.70-2.85). The BMTP geometries for Ge<sub>0.25</sub>Se<sub>0.75</sub> and Ag<sub>x</sub>(Ge<sub>0.25</sub>Se<sub>0.75</sub>)<sub>100-x</sub> also similar to potential in WT RDF. Those BMTP are also made us sure the WT method is valid.

**Keywords:** BMTP; CDFT; RDF CDFT; RDF WT.

Paper ID: PH006

## The Study of Roselle Flower (*Hibiscus sabdariffa* L.) Antioxidants Reactivity based on Frontier Molecular Orbital (FMO) Theory

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**Abstract.** The roselle plant (*Hibiscus sabdariffa* L.) is one of the abundant plants in South-East Asia, especially Indonesia. The roselle flower, the useful part of the roselle plant, contains a lot of antioxidants such as Protocatechuic Acid (PCA), Quercetin, Ascorbic Acid (AA), Cyanidin-3-O-Sambubioside (C3OS), Cyanidin-3-O-Glucoside (C3OG), and Tannic Acid (TA). To understand the antioxidants reactivity is still difficult due to limited direct observational instrument. If we have better understanding of the roselle flower antioxidants reactivity, we can take a role to enhance the efficacy and safety analysis for the next roselle-based medicinal products. Therefore, we tried to conduct a theoretical study to understand the roselle flower antioxidants reactivity to singlet oxygen  $1O_2$  and triplet oxygen  $3O_2$  via Frontier Molecular Orbital (FMO) Theory. The FMO of PCA and AA is determined from the Density Functional Theory (B3LYP and 6-311G(d,p) basis), and the rest of the FMO is determined from the Semi-Empirical Hartree-Fock (CNDO basis). The most reactive rosella flower antioxidants is determined from the value of the HOMO-LUMO interaction gap. The result shows the PCA and AA is the most reactive antioxidant to normalize  $1O_2$  with HOMO-LUMO interaction gap value of 1.22 eV and 1.86 eV. The C3OG and TA is also reactive antioxidant to bind the  $3O_2$  for preventing oxidation reaction with HOMO-LUMO interaction gap value of 3.61 eV and 3.50 eV respectively.

**Keywords:** Antioxidants; Frontier Molecular Orbital Theory; Roselle Plant; Roselle Flower.



Paper ID: PH007

## Detection of the Ultra-Low Frequency (ULF) Geomagnetic Anomalies Linked to the 2018 Banten Earthquake on the Strength of Normalized Polarization Ratio Analysis (PRA)

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**Abstract.** A study on geomagnetic ultra-low frequency (ULF) was carried out for the M5.9 Banten earthquake on January 23, 2018. The time domain of geomagnetic data on H, D, and Z components obtained from the Banten (BTN) geomagnetic station was processed by Fast Fourier Transform (FFT) and Wavelet Transform (WT) method to obtain information from signals in the frequency domain. Two polarization ratio analyses (PRA), i.e. classic PRA and normalized PRA, were used to analyze its effectiveness in detecting earthquake precursors. We compared the results of the classic PRA and normalized PRA with the Dst value to ensure that there were no magnetic storms occurring during the analyzed period. The results showed that the ULF anomaly appeared consistently on January 17, 2018, from both the classic PRA and the normalized PRA results when there were no magnetic storms. We indicate this ULF anomaly as a precursor of the M5.9 earthquake. The normalization process that was carried out made the anomaly that appeared on January 17, 2018, clearer and more significant than that of the classic PRA which still displayed ambiguous precursors. Therefore, we propose that the normalized PRA is more powerful for detecting the probable earthquake precursors and eliminating ambiguous precursors compared to classic PRA.

**Keywords:** Earthquake precursor; FFT analysis; polarization ratio analysis; ULF geomagnetic anomaly; wavelet analysis.

Paper ID: PH011

## Energy Eigenvalues of the Morse Oscillator Using Matrix Mechanics based on Harmonic Basis States

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**Abstract.** This study aims to obtain approximate solution to the Schrödinger equation of Morse oscillator using matrix mechanics based on harmonic oscillator basis states. Energies of the oscillator were obtained from the solution and compared with analytic solutions and with those obtained using other methods. The convergence of the solution as a function of number of basis states and energy levels was also investigated. Within the approximation used here, the Morse oscillator was expanded in polynomials containing 13 terms, treated as perturbation to the harmonic oscillator Hamiltonian. The Schrödinger equation was then projected into a finite subspace and solved using the standard matrix method. Once the Hamiltonian matrix elements were obtained using a Mathematica code, the Hamiltonian was diagonalized to obtain the energy eigenvalues of the oscillator. The results indicated that with 200 basis states, 16 energy levels of the oscillator were reasonably accurate with errors ranging from  $-3.7 \times 10^{-6} \%$  to  $3.95 \%$ . The first three energy levels of the oscillator were also in good agreement with the variational matrix method reported in the literature. It was also observed that the accuracy improved as the number of basis states increased and that the results were generally less accurate for higher levels.

**Keywords:** Energy eigenvalues; Harmonic basis states; Matrix mechanics; Morse Oscillator; Schrödinger equation.

Paper ID: PH012

## Crustal Velocity Modeling beneath Simeulue Island Derived from The Inversion of Receiver-Function Using Neighborhood Algorithm

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**Abstract.** The teleseismic waveforms of receiver functions from 3 temporary seismic stations are inverted to obtain the velocity structure beneath Simeulue Island using the neighbourhood Algorithm approach. The seismic stations are spread from the northern coast to the southern coast of the island. The inversion result shows that the sediment layer covers at the near surface of the island with velocity ranging from 1 to 2 km/s. The result also indicates the insertion of Sunda block continental crust underneath the island characterized by the slight increase of the seismic velocity in the middle crust. The Moho discontinuity is identified at around 22-24 km depth, which is consistent with the Moho depth observed by the previous crustal studies.

**Keywords:** Crust; Moho; Receiver functions; Simeulue; Velocity.

Paper ID: PH015

## Optimizing CT Scan Image Quality with Variation of Tube Flow and Scan Method in Water Phantom Head Image

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**Abstract.** Optimizing the quality of the CT scan image with variations in tube current and scan method has been carried out. Using variations of tube currents of 140 mA, 200 mA, 260 mA, and 280 mA, for axial and helical methods with a scan time of 1 second and a voltage of 120 kV. Image quality in terms of the value of the Signal To Noise Ratio (SNR) and the uniformity of the CT number. SNR value analysis is done by comparing the object's mean value (N) with the standard deviation of noise on the background, while the CT number uniformity analysis can be done by finding the difference between the CT number or the center mean with the edges of a homogeneous image. The results showed that increasing tube current resulted in an increase in the SNR value and a decrease in the uniformity of the CT number. The SNR value and the uniformity of the CT number in the helical method are greater than in the axial method. Optimal image quality is determined by the highest SNR value and the image uniformity value that is closest to zero. In this study, the SNR value and CT number uniformity in the two optimal methods at 280 mA tube currents are the SNR value and CT number uniformity of  $48.183 \pm 1.731$  and  $0.481 \pm 0.111$  in the axial method and  $68.964 \pm 3.790$  and  $0.814 \pm 0.179$  in the helical method.

**Keywords:** health service, CT-Scan, Tube Current, Scan Method, water phantom, image quality.

Paper ID: PH016

## Approach to Calculation of Brain Bleeding Volume with Manual ABC/2 and 2/3sh Method to Automatic Voxel Calculation Hounsfield Unit

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**Abstract.** Intracranial hemorrhage (Intracranial Hemorrhage) is bleeding that occurs in the cranium of the brain. This is an emergency that can result in death. So it is necessary to calculate the exact volume of bleeding to take further action. There are 2 methods used to calculate the volume of bleeding in this case, namely the automatic method and the manual method. The automatic volume method (automatic voxel calculation Hounsfield unit) is a volume calculation by computer software available on the CT Scan tool with voxel calculations in the range of HU values. The manual method used is the manual method ABC/2 and 2/3Sh to compare the results of the calculations to the two manual methods with the automatic method to determine the accuracy of the two manual methods so that they can be used as references in the field. The sample consisted of 21 patient data with specifications of 7 Intracerebral Hemorrhage (ICH) patient data, 7 Epidural Hemorrhage (EDH) patient data, 7 Subdural Hemorrhage (SDH) patient data. The results of the calculation show that the volumetric calculations using the manual calculation method ABC/2 and 2/3Sh to the Automatic method have differences. ABC/2 manual calculations obtained different results with the automatic method. While the manual calculation of 2/3Sh the results obtained from the calculation of all types of bleeding approach the automatic calculation and the results of the comparison the manual 2/3Sh method is closer to the automatic method which is proven by statistical tests using the Two-way Anova test, the 2/3Sh method has no difference meaning of the three types of bleeding. It can be concluded that the manual 2/3Sh method is more accurate than the manual ABC/2 method for calculating blood volume in cerebral hemorrhage for ICH, EDH and SDH bleeding.

**Keywords:** ICH (Intracerebral Hemorrhage), EDH (Epidural Hemorrhage), SDH (Subdural Hemorrhage), metode automatic, metode manual ABC/2, metode manual 2/3SH, HU (Hounsfield Unit), CT Scan, brain injury

Paper ID: PH017

## Identification of Tallow Using Surface Enhanced Raman Scattering

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**Abstract.** Raman spectroscopy can determine the chemical structure and physical state of meat components but it has the disadvantage that the cross-section of the spectrum is about  $10^{-20}$  to  $10^{-30}$  cm<sup>2</sup> per molecule. This deficiency can be resolved by using Surface-enhanced Raman Scattering. Verifying the content in food product against the information listed and applicable regulations has an important role in the food industry so in this study, research on identification of tallow was done by obtaining samples through the extraction method. Variations in the concentration were also obtained by dissolving it in n-hexane. 10 $\mu$ L of fat was measured using portable Raman spectroscopy with a 785 nm laser excitation in the range of 700 cm<sup>-1</sup> to 1800 cm<sup>-1</sup> with a resolution of 0.96 cm<sup>-1</sup>. Measurements using Raman spectroscopy on silicon substrate for concentration of 100% can be detected, but not for smaller concentration. SERS AgCu was successful in amplifying the Raman signal by detecting the peak belonging to the fat that was undetectable on the silicon substrate namely 1300 cm<sup>-1</sup> and 1442 cm<sup>-1</sup> belonging to saturated fat or esters and 1655 cm<sup>-1</sup> belonging to unsaturated fat for 10<sup>-2</sup> g/mL concentration. Meanwhile, SERS silver nanorod proved to be successful in amplifying Raman signals, including at the peak belonging to fat, even for smaller concentration.

**Keywords:** *food governance; Raman; SERS; tallow.*



Paper ID: PH018

## Spatial Resolution Test on Abdomen Examination of X-Ray Tube Performance

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**Abstract.** In the health sector, good and quality services are the main things that must be considered. One of the efforts to achieve this is to test the suitability of the diagnostic radiology X-ray aircraft by testing the spatial resolution. This study focuses on testing the spatial resolution of X-ray images at the Ahmad Yani Islamic Hospital in Surabaya. This is done in order to obtain optimal image quality and determine the performance of the X-ray tube. First, the PCB design was carried out according to the TOR 18FG acrylic phantom drawing. Furthermore, exposure to X-ray radiation was carried out on the TOR 18FG and PCB with voltages of 55 kV, 65 kV and 70 kV. The current and time used are the same, namely 8 mAs. In this study, the results of the reconstruction of the X-ray machine on the QC Tool were obtained in the form of TOR 18FG and PCB with 3 voltage variations. The X-ray machine used in this study uses a digital radiography system. The digital radiography system in this study uses a flat panel detector. The results of the X-ray reconstruction are in the form of a DICOM (Digital Imaging and Communications in Medicine) file. DICOM files must be opened using ImageJ software for plotting. Then, an analysis of the FWHM (Full Width Half Maximum) value was carried out using the OriginPro 2021 software using gaussian fittings. After obtaining the FWHM value, the spatial resolution value can be calculated. Based on the analysis that has been carried out, it can be seen that the performance of the X-ray tube is in good condition because the value of the spatial resolution on the 18FG TOR is greater when the voltage is higher. Likewise, the value of the spatial resolution on the PCB has increased from a voltage of 55 kV to 65 kV. However, the value of the spatial resolution on the PCB has decreased from 65 kV to 70 kV. In addition, X-ray tube performance is also seen from the SNR and CNR values. The SNR value on the TOR 18FG and PCB increases as the voltage is exposed. So it can be seen that TOR 18FG is more suitable to be used for spatial resolution tests and contrast resolution tests. Meanwhile, PCB is more suitable to be used for contrast resolution test.

**Keywords:** health service, X-ray plane, spatial resolution, CNR, TOR 18FG, PCB, X-ray tube performance.

Paper ID: PH019

## First-principles Calculation of Electronic Structure of Pure and Nitrogen Doped Anatase TiO<sub>2</sub>

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**Abstract.** Ab initio band calculations have been used to analyze the electronic structures of pure and Nitrogen doped anatase TiO<sub>2</sub> based on the density functional theory with the plane-wave ultrasoft pseudopotential method. We investigated the electronic properties of pure and Nitrogen doped anatase phase TiO<sub>2</sub>. The ab initio calculations were performed by using the full potential-linearized augmented plane wave method (GGA). The fully optimized structure and the relaxation introduced by minimizing the total energy and atomic forces. The resulting band structure and the density of states could be instructive to understand exceptional behavior in this system. In contrast, the band gap character around the Fermi level was indirect for anatase. In addition, the density of state (DOS) profiles showed a substantial degree of hybridization between O(2p) and Ti(3d) in conduction and valence band regions, illustrating a strong interaction between Ti and O atoms in the TiO<sub>2</sub> compound. These impurity energy levels are mainly hybridized by N 2p states with O 2p states and Ti 3d states and the band gaps of N-doped TiO<sub>2</sub> are narrowed.

**Keywords:** anatase; bandstructure; DFT ; DOS ; TiO<sub>2</sub>

Paper ID: PH021

## Fiber Optic Sensor for Zinc Detection Using Fiber Bundled Probe

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**Abstract.** Detection of zinc (Zn) levels using a fiber bundle with a stainless concave mirror as a reflector was successfully carried out. The detection mechanism uses the principle of a shift sensor with a sample of Zn solution and without direct contact between the fiber bundle probe and a sample of Zn solution. The experiment setup used a He-Ne (Helium Neon) laser which is passed to the transmitting fiber and then fired into the sample. The reflected laser beam from the sample will be captured by the receiving fiber and converted by an optical detector which is read as an optical output voltage. Variation of Zn concentration ranging from 0 to 6%. The results obtained are sensor performance which includes sensitivity and resolution are 315 mV/% and 0.002%, respectively, and the measurement range is between 2-4%. These sensors have the potential to be used in the industrial and medical fields.

**Keywords:** : fiber optic sensor, fiber bundled probe, zinc detection.

The background is a complex composition. On the left, there is a dark grey silhouette of a world map. Overlaid on the map are several data visualization elements: a white line graph with sharp peaks and valleys, a white candlestick chart with vertical lines and rectangular boxes, and a grey bar chart with vertical bars of varying heights. On the right side, there are several large, overlapping, light blue and dark blue chevron shapes pointing towards the right. The word "STATISTICS" is written in large, bold, white, sans-serif capital letters with a black drop shadow, positioned in the lower right quadrant of the image.

# STATISTICS

Paper ID: ST002

## Core Measure Analysis of The Happiness Evaluative Characteristics using Ordinal Logistic Regression

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**Abstract.** The level of happiness in Indonesia is measured using the Happiness Index approach. However, the measurement of the level of happiness can also be done by using a single-item measure because happiness is also seen as a real thing that can be measured directly. This study utilizes a single measure of happiness approach to provide a new alternative in seeing the conditions of happiness in Indonesia and to describe its relationship to the evaluative characteristics that influence it. The data used in this study is the raw data for the 2017 BPS Statistics Indonesia Survey of Happiness Levels. The analytical method used is ordinal logistic regression with an unconstrained partial proportional odds model to determine the effect of evaluative characteristics on the level of happiness. From the results of this study, two models of happiness were formed, namely, at least quite happy and very happy. In the minimal happiness model, quite happy, the satisfaction variable towards social relations and satisfaction with the environment was found to have no significant effect. While in the very happy happiness model, the variables of satisfaction with education and satisfaction with security were found to have no significant effect. Overall, satisfaction with income, satisfaction with home, feelings of pleasure, the ability to create comfortable conditions, and consistency in developing self-potential give the greatest tendency to be happy.

**Keywords:** happiness, ordinal logistic regression, evaluative characteristics of happiness.

Paper ID: ST003

## Core Analysis of The Causes of Flooding in Samarinda City using Spatial Statistics: Geographically Weighted Regression

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**Abstract.** Research related to the analysis of the causes of flooding in Samarinda City with Spatial Statistics using the Geographically Weighted Regression (GWR) method. Samarinda City has an area that is prone to flooding. Floods in Samarinda City occur due to excess surface runoff and not being accommodated in the Mahakam watersheds so that water overflows. The factors that cause flooding in Samarinda City are natural factors such as high rainfall, the topography of the area, and the tides of the Mahakam watersheds. The second factor is humans, mainly due to the element of population growth followed by an increase in the need for infrastructure, housing, clean water facilities, education, and other community services. The results of spatial statistical analysis obtained that the best model was the GWR model with  $R^2$  of 0.92 and MSE value of 0.202. Based on these results, the concept of flood control in Samarinda City was divided into three parts, namely flood control in the upstream, middle and downstream areas. The upstream flood control concept could be implemented by repairing damaged watersheds conditions and increasing watersheds resistance. The concept of flood control in the middle area could be implemented by reducing flooding and reducing surface runoff. Meanwhile, the concept of flood control in the downstream area could be implemented by facilitating the flow of existing drainage done by increasing the capacity of the drainage channel water and protecting the flow in the channel from the influence of the tide of the Mahakam River.

**Keywords:** Flood, Watershed, GWR, Samarinda City, Spatial Statistics.



Paper ID: ST004

## The Application of Observed Best Prediction (OBP) And Observed Best Selective Prediction (OBSP) Method on Small Area Estimation for Prediction of Poverty Rate at Sub-District in North Sulawesi Province

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**Abstract.** Poverty is a complicated problem that must solve by the government. Accuracy data is needed to overcome poverty problems. BPS is an Indonesian national statistical agency only estimates data at the district/city level. A small area like sub-district data is not available yet. Calculating a small area like a sub- district can use Small Area Estimation (SAE) method. The purpose of the research not only to do the estimates also to predict. A method for predicting in SAE has developed, namely Observed Best Prediction (OBP). In making predictions with OBP, predictor variables that have a significant influence will be selected gradually, using the advanced method such as the Akaike Information Criterion (AIC). Using of the advanced method was assessed complicated. So the Observed Best Selective Prediction (OBSP) was developed. With OBSP, the researcher selects the variables that are considered significant without using advanced methods. Mean Square Prediction Error (MSPE) is used to compare the goodness from two methods. The result of this research shows OBP methods are better than OBSP because OBSP has a smaller MSPE. In predicting the percentage of poverty obtained, the Miangas Sub-District poverty rate is highest compared with other sub-districts.

**Keywords:** Small Area Estimation; Observed Best Prediction; Observed Best Selective Prediction; Poverty.

Paper ID: ST005

## Factors Affecting the Achievement of Demand in High School Certificate Examination in Erbil, KRG, Iraq

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**Abstract.** High School Grade Point (GPA) and standardized tests are used as predictors of college majors for high school graduates joining college. This research looked at factors influencing high school students' performance and subsequent choice of college majors. The paper also endeavored to ascertain whether students choosing the same college majors would have, on average, same cognitive abilities. A questionnaire was used to collect data from university students, and the results indicate a number of factors that influence high school GPA, achievement. These factors are discussed in the paper and suggestions to improve on them proposed. Claims on the cognitive abilities of students with same majors are also discussed.

**Keywords:** Grade point Average, standardized tests, college majors, high school achievement, cognitive ability.

Paper ID: ST006

## The Effect of Age and Gender on COVID-19 Recovery Duration in Jambi

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**Abstract.** Coronavirus 2019 (COVID-19) is a new respiratory disease caused by the Severe Acute Respiratory Coronavirus 2 (SARS-CoV-2) which has recently become a pandemic. Gender has a significant influence related to health services, where men and women have different behaviors in accessing health services. In addition, COVID-19 also shows an increase in the number of cases and a greater risk of severe disease with increasing age. This study aims to determine whether there is an effect of age and gender on the duration of recovery for COVID-19. To do this study, secondary data which was obtained from the official instagram account of Jambi's Public Relations and Protocol Bureau named "Humas Protokol Jambi" was used. Those data were analyzed using the Two Way Anova Test. The result shows that age affects the duration of COVID-19 recovery with the longest time to be recovered is patients in 26-45 years age category. While, gender and interaction give no effect for it.

Paper ID: ST007

## Bi-response Poisson Regression Model based on Local Linear for Modelling Effect of Early Marriage on The Child-Girl to Maternal and Infant Mortality in East Java

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**Abstract.** Early married on the child-girl is defined as a marriage of a girl before the age of 18. Early married has direct effects to girl education, health, and psychological so that increase risk of the maternal mortality and child mortality cases. The maternal mortality and child mortality cases can also be an indicator of the welfare level of a region. If the maternal mortality and the infant maternal cases are the high, then the quality of health services in the area is bad and conversely. In this paper, we discuss about effect of early marriage on the child-girl to maternal and infant mortality in East Java Indonesia using bi-response Poisson regression model based on local linear. For determining the optimal bandwidth and goodness of fit for the best model use cross-validation method and deviance value. We get estimation effect of early marriage on the child-girl to maternal mortality and infant mortality curve where its optimal bandwidth is 0.67 and deviance value is 42.29256.

**Keywords:** Early Married, Infant Mortality, Local Linear, and Maternal Mortality.

Paper ID: ST008

## Properties of The Mixed Estimators Smoothing Spline and Fourier Series in Nonparametric Regression

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**Abstract.** In regression analysis, the pattern of the relationship between two or more variables is not always a parametric pattern such as linear, quadratic, cubic and others. There are many cases where the relationship pattern between variables is nonparametric pattern. In parametric regression the shape of the regression curve is assumed to be known. In contrast to the parametric approach, in nonparametric regression the shape of the regression curve is assumed to be unknown. The regression curve is only assumed to be smooth in the sense that it is contained in a certain function space. Researchers mostly develop one type of estimator in nonparametric regression. However, in reality, data with mixed patterns are often encountered, especially data patterns that partly change at certain sub-intervals and partly follow a pattern that repeats itself in a certain trend. In dealing with the mixed pattern, this paper will explain the combination of the Spline Smoothing function and the Fourier Series. Theoretical research are focused on the estimator model and its properties. The estimator model is solved by minimizing the Penalized Least Square (PLS). The mixed estimator properties of Spline Smoothing and Fourier Series in multivariable nonparametric regression are linear classes and are biased in small samples.

**Keywords:** Fourier Series; Mixed Estimators; Spline.

Paper ID: ST009

## The Curve Estimation of Bi-response Nonparametric Regression using Truncated Spline Estimator on Modelling East Java Sustainable Development Goals Achievement

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**Abstract.** In regression analysis, not all pattern of regression curve is known due to absence of prior information about the kind of relationship between response and predictor variable. In this case, nonparametric regression becomes an alternative solution since there is no assumption about parametric form. There are several functions in nonparametric regression one of which is truncated spline that is more flexible to fit the data, good at visual interpretation, and able to handle data that have changed behavior at certain subintervals. Moreover, some application involves more than one response variables that are correlated between responses. Therefore, this study aims to obtain the curve estimation of truncated spline estimators on bi-response nonparametric regression along with estimation of error variance—covariance matrix. The curve estimation of the truncated spline estimator was obtained by weighted least square (WLS) optimization with GCV as optimal knot point selection method. Then, the curve estimation of the model was applied to a real dataset of the 2019 human development index (HDI) and gender development index (GDI) in East Java Province, Indonesia. HDI and GDI become indicators of sustainable development goals (SDGs) achievement, particularly social and economic pillars. An adequate coefficient determination from the best model indicates that the model provides good performance in modeling the data.

**Keywords:** i-response; nonparametric regression; sustainable development goals; truncated spline; weighted least square.



Paper ID: ST011

## The Outlier Detection in Time Series Regression Model with Case Study on The Import and Export Percentage of Goods and Services in Indonesia

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**Abstract.** In time series data, sometimes an extreme value is found and becomes an outlier. In this paper, a procedure to detect and remove the effect of outlier are discussed to obtain a more precise time series regression model. Furthermore, a case study of Import and Export Percentage of Goods and Services was done to apply the procedure. It was found seven outliers in different times. It is obtained that the time series model with outliers give better estimation than without outliers model.

**Keywords:** i regression, time series, outlier, cross-correlation, forecasting.

Paper ID: ST013

## The Parameter Estimation of The Bivariate Polynomial Ordinal Logistic Regression Model

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**Abstract.** Ordinal logistic regression is a statistical method used to analyze the ordinal response variable with three or more categories and predictor variables that are categorical or continuous. The use of ordinal response variables is common in scientific research. We develop an extension of the bivariate ordinal logistic regression model with two correlated response variables in which the relationship between the continuous predictor variable and its logit is modeled as a polynomial form, so its called the Bivariate Polynomial Ordinal Logistic Regression (BPOLR) model. The aims of this study are determine parameter estimators of the BPOLR model using the Maximum Likelihood Estimation (MLE) method and obtain algorithms of estimating parameters of the BPOLR model. Based on the first partial derivatives, the results are not closed-form. Therefore, its needed a numerical optimization to obtain the maximum likelihood estimator, for example is the Berndt-Hall-Hall-Hausman (BHHH) method.

**Keywords:** Berndt-Hall-Hall-Hausman; Bivariate; Ordinal Response; Polynomial; Scientific Research.

Paper ID: ST014

## Interval Estimation for Nonparametric Regression based on Fourier Series Estimator in Longitudinal Data

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**Abstract.** Fourier series is developed in nonparametric regression for longitudinal data because of the demand data analysis with more complex in data structure. Nonparametric regression based on Fourier series estimator is capable to model data relationship with fluctuation or oscillation pattern, that represents with sine and cosine functions. For point estimation analysis, Penalized Weighted Least Square (PWLS) is used to determine an estimator for parameter vector in nonparametric regression. Different with previous studies, PWLS is used to get smooth estimator. Based on point estimation result with PWLS optimization, we develop further inference Statistics. The inference Statistics are interval estimation. Interval estimation can investigate the tolerance level from point estimation based on lower and upper bound and become fundamental discussion that related to hypothesis test. The main result is the lowest band confidence with lower and upper bound that related distribution from pivotal quantity. The interval confidence result is related to estimate based on regression curve with Fourier series estimator for longitudinal data.

Paper ID: ST015

## Prediction of Chicken Commodity Prices During the Covid-19 Pandemic based on Vector Autoregressive (VAR), Kernel and Fourier Series Simultaneously

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**Abstract.** One of the goals of the Sustainable Development Goals (SDGs) is to achieve good food security. However, this goal is difficult to implement due to the Covid-19. One of the impacts of the Covid-19 pandemic on the trade sector is the change in prices of several main commodities, such as chicken meat and eggs. Firstly, this study uses the Vector Autoregressive (VAR) to predict the prices of chicken meat and eggs. However, there are several parameters that are not significant and the assumptions of data stationarity, residual simultaneous normality, and residual homogeneity are not met. Thus, simultaneous nonparametric methods, that is the kernel and Fourier series, is used to predict the prices of chicken commodity. Simultaneous kernel modeling produces a Gaussian function with  $h = 0,65$  as the best kernel function, while simultaneous Fourier series produces a cosine sine function with  $\gamma$  and  $\pi$ . The Fourier series produces  $K = 119$  as the best function. So, simultaneous Gaussian-kernel model is the best model based on the criteria of Root Mean Square Error (RMSE) and  $R^2$ , with the value of 107,93 and 99,83% for chicken meat, and 16,54 and 99,97% for chicken eggs, respectively. The best model has good performance in prediction with the Mean Absolute Percentage Error (MAPE) value for chicken meat price of 3,2444%, while for chicken egg price of 3,758%. The prediction results of the simultaneous Gaussian-kernel model are expected to be a reference for the government in controlling related commodity prices during the Covid-19 pandemic.

Paper ID: ST016

## The Effectiveness of Telepractice Methods in Speech Pathology during COVID-19 Pandemic for Autistic Children in Indonesia

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**Abstract.** The education sector is one of the sectors which is most affected by the Coronavirus Disease 19 (COVID-19) pandemic. It can interfere with the achievement of one of the Sustainable Development Goals (SDGs) targets, which is ensuring inclusive and equitable quality education; besides, promoting lifelong learning opportunities for all. Furthermore, with online learning not only regular education, but also special education faces many obstacles. One of the special education programs for children with autism is speech therapy. Therefore, several innovations have been created so that therapy process can continue. One of those innovations is that speech pathology telepractice program which is conducted at the Autis Center of Blitar City. This program involves the role of parents at home and therapists via teleconference. In this study, the effectiveness of speech pathology telepractice was measured through the Wilcoxon-signed rank test and the results obtained p-value = 0.000, which means that there are differences in the speaking ability of children with autism before and after the implementation of speech pathology telepractice. This ability was measured based on several activities and assessment components which had set by the therapist. Moreover, the results of interview with several therapists and parents can be the basis for recommendations regards to the speech pathology telepractice programs to be implemented outside of Autis Center Blitar City which has not yet implemented the speech pathology telepractice. Thus, children with autism do not experience reduction in the development of their speech skills during the COVID-19 pandemic.

Paper ID: ST017

## Mapping Regencies and Cities in East Java based on Food Potential Using the K-means Method to Support the B2SA Diet Movement

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**Abstract.** The Food Agriculture Organization (FAO) and the International Food Policy Research Institute (IFPRI) stated that the COVID-19 pandemic could create a new food crisis that affected a country's food security. This can interfere with one of the Sustainable Development Goals (SDGs) target, namely ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture, one of which is for developing countries like Indonesia. To improve food security, there is an Indonesian government program related to the movement for a diverse, balanced, and safe diet in Indonesia, called B2SA. In this study, the grouping of regions in East Java is based on food production results which include staple food commodities, side dishes, vegetables, and fruits sourced from Statistics Indonesia 2020 through cluster analysis using the K-means method. The optimal cluster selection is based on the largest coefficient of determination and the smallest internal cluster dispersion rate (ICD rate). The results of this study are two optimal clusters of each food commodity where for side dishes, vegetables, and fruits, one of the clusters reflects the highest production yield, the difference is far from other regions. These results can be a recommendation for local and national governments in supporting the B2SA eating pattern movement and food security stability in Indonesia.



Paper ID: ST018

## Prediction of Positive Covid-19 Confirmation Cases in Indonesia with Parametric and Nonparametric Approaches

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**Abstract.** Covid-19 is an infectious disease caused by a coronavirus that was only known when the outbreak began in Wuhan, China in December 2019. All countries are infected with this outbreak so that it could impact the SDG program's goal of 2030 not being achieved, namely the target of Good Health and Wellbeing. In addition, a pandemic also affects all sectors of human life, including the national economy and health sectors. Economic growth in Indonesia has decreased by -5.32% in the second quartile of 2020. Meanwhile, in the health sector, some Covid-19 patients can only isolate independently, due to the limited number of health facilities. Therefore, it is necessary to do modeling, where the results of the analysis carried out can help to act appropriately and minimize the impact of the Covid-19 pandemic and ensure a healthy life to meet the welfare of the whole community following SDGs goals. This study uses parametric and nonparametric approaches to predict positive cases of Covid-19 in Indonesia. Modeling using a parametric approach, the ARIMA method is not suitable because it does not meet the assumptions. So that the nonparametric approach to the Fourier series estimator can be an alternative in overcoming this problem. By using a nonparametric approach, the MSE value is 12,472.11 and the determination coefficient is 98.12671%. Based on the results of the test data prediction to be compared with the actual value, the MAPE value obtained is 17.64% and this value is included in the good prediction category.

Paper ID: ST019

## Risk Measurement of Stocks using Value at Risk based on Johnson Transformation

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**Abstract.** Covid-19 is an infectious disease caused by a coronavirus that was only known when the outbreak began in Wuhan, China in This paper utilizes Johnson Value at Risk (JoVaR) to evaluate the individual risk of Indonesian five stocks listed in the LQ-45 Index (period of February 2021 until July 2021). The stocks are Aneka Tambang Tbk (ANTM), PT. Bank Central Asia Tbk (BBCA), PT. Indofood Sukses Makmur Tbk (INDF), Perusahaan Perseroan (Persero) PT. Telekomunikasi Indonesia Tbk (TLKM), and PT. Semen Indonesia (Persero) Tbk (SMGR). According to the result of the analysis, it can be concluded that the maximum potential loss of BBCA, ANTM, TLKM, INDF, and SMGR when the assets were held for one day for the next period of investment is between 2.56 percent until 4.48 percent, and the confidence level 95 percent. Based on Kupiec Backtesting, for several confidence levels, it can also be summarized that JoVaR more effectively measures the risk than historical VaR.

Paper ID: ST021

## Classification of Online School Problems from Tweets on Twitter Using Support Vector Algorithm

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**Abstract.** The government has implemented self-quarantine policy in an effort to reduce the spread of the corona virus, that means people are prohibited to assemble. So that the Ministry of Education and Culture implements an online school policy, so the students still received education. At first, people thought that this policy was appropriate and useful to understand technology better. However, over time, people began to complain about the various impacts they felt, such as quota fees and stress on online school. Most people complain about the problem on social media, Twitter. Thus, it is possible to identify online learning problems through Twitter by categorizing the data into 2 categories, there are technical and psychological. The identification of this online learning problem uses the text mining method with the Support Vector Machine (SVM) algorithm. This SVM algorithm is used because it can maximize the distance between 2 categories so as to minimize errors. The data used in this study were 549 documents with 52% of psychological problems documents and 48% of technical problems documents. By using the SVM algorithm and the K-Fold Crossvalidation method with K as much as 10, the average classification accuracy of the training data is 99.811% and the average classification accuracy of the testing data is 90.3%. In addition, from the results of the Press'Q test, it is known that the model used is constant to predict the testing data. This shows that the Support Vector Machine method is able to classify data on online learning problems.

**Keyword :** online school, SVM, problems, technical, psychological.

Paper ID: ST022

## Modelling of Scholastic Aptitude and Islamic Tests Using Local Linear Biresponse Multipredictor Method with Different Bandwidth for Each Predictors

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**Abstract.** Admission test is the important steps for state islamic college to get a new student that has high quality. Admission test for state islamic colleges in Indonesia using scholastic aptitude and islamic tests. Both of the test scores for state islamic colleges in the west region are higher than in the east region of Indonesia. Both of them correlated each other because calculated from the same subject then they can be modeled simultaneously. There is a correlation between both of them and the difference score of them in Indonesia, so both of the test score can be modeled using local linear biresponse multipredictor model. In this research, The purpose is to know the impact of using different bandwidth values on each predictor variable. In this research, weighted least square method used to estimated parameter of local linear biresponse multipredictor model. The result shows that modeling both of the test scores with different bandwidths for each predictor variable better than modeling them just using one bandwidth for all of the predictor variables. Modeling both of the test scores for state islamic colleges in the west region and east region of Indonesia have different patterns.

**Keyword :** bandwidth; biresponse; islamic test; local linear; scholastic aptitude test.

Paper ID: ST023

## Modeling The Number of Traffic Accident in East Java Using Negative Binomial Regression Based On Truncated Spline Estimator

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**Abstract.** Data from World Health Organization (WHO) in world showed every year more than 1.25 million victims die from traffics accidents. East Java Province had the highest number of traffic accident cases in Indonesia. Then to predict the number of accidents in East Java against predictor variables, it is necessary to build a model. Traffic accident could make victims die, serious injury, and light injury. In this study, the researcher estimate the parametric and nonparametric regression negative binomial model based on the truncated spline estimator. The best model is determined based on Maximum Likelihood Cross-Validation (MLCV). The nonparametric regression model with negative binomial approach with the best-truncated spline estimator is obtained from the combination of knots (2, 1, 2, 3) using the MLCV method. The comparison of the deviance values between parametric and nonparametric regression in this study showed the deviance value nonparametric model less then deviance value parametric model. Deviance values showed the binomial negative using nonparametric regression model approach based on truncated spline estimator is better than the negative binomial using parametric regression model approach. The analysis showed factor traffic accident cause driver is sleepy had the highest influence on the number of traffic accidents cases in East Java Province.

**Keyword :** Traffic Accident AND Death\* OR Injury\*; World Health Organization; Negative Binomial ; Spline Truncated Estimator ;East Java

Paper ID: ST024

## Covid-19 Risk Modeling in East Java Using Geographically Weighted Logistic Regression Approach

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**Abstract.** Efforts to resolve the Covid-19 pandemic are a common goal set out in the Sustainable Development Goals (SDGs). However, the rate of spread of Covid-19 in several countries is still high. To control the spread of the Covid-19 pandemic, various countries have implemented several strategic measures. In Indonesia, the government through the Covid-19 Handling Task Force has classified areas based on the level of risk of the spread of Covid-19. East Java as one of the major provinces in Indonesia is a province dominated by regencies and cities with a moderate level of risk of spreading Covid-19 (orange zone) and low (yellow zone). Controlling the rate of spread of the Covid-19 pandemic is relatively more controlled in the yellow zone area. For this reason, research was carried out to create statistical modeling related to the level of risk of Covid-19 in each district and city in East Java which was influenced by various indicators. In this study, we used factors affecting level of risk of Covid-19 namely the number of confirmed positive cases of Covid-19, the recovery rate, and the fatality rate. The analysis was carried out using a spatial approach based on the Geographically Weighted Logistic Regression (GWLR) method. The results show that the percentages of districts and cities in East Java that the recovery rate and the number of Covid-19 positive confirmations factors significantly affect on the level of risk of Covid-19 are 78.95% and 18.42 %, respectively. The GWLR model has better classification accuracy of 84.21% than that of global logistic regression model of 76.30%. The opportunity for an area to have a low level of risk of spreading Covid-19 will increase as the recovery rate increases. Therefore, the government can encourage each region to increase the recovery rate to suppress the spread of Covid-19.

**Keyword :** Covid-19; East Java; GWLR; Risk modeling.



Paper ID: ST025

## Modeling Inpatient Cases of COVID-19 in DKI Jakarta Using Pulse Function Intervention Analysis Approach

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**Abstract.** Coronavirus Disease-19 (Covid-19) is an epidemic that affects all segments of human life. Covid-19 has caused all countries to feel the impact of this pandemic, including Indonesia, especially DKI Jakarta as the first city to become the center of the spread of the virus in this country. Various attempts have been made, but the number of victims continues to increase rapidly. As a result, some Covid-19 patients can only isolate independently, due to the limited number of health facilities. This is the background for research on inpatient case modeling of Covid-19 in DKI Jakarta. One method of approach that can be used in modeling is intervention analysis. Intervention analysis is a time series analysis caused by events out of control so that it can affect stationarity in time series data. The data used in this study is the data of inpatient Covid-19 DKI Jakarta in the form of daily data obtained from DKI Jakarta Provincial Health Office from 19 July 2020 to 25 November 2020. Based on the results of the research that has been carried out, it is known that the data has decreased drastically in one time, that is the 69th data which is a pulse function intervention. The results of this research obtained that the best intervention model is ARIMA (0,2,1) with order  $b = 0$ ,  $s = 0$ ,  $r = 2$ .

Paper ID: ST026

## Exploring Failure Regression for Bearing Degradation

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**Abstract.** Bearing health monitoring providing information of the system state evolved rapidly over the past decade. Root mean square is an efficient indicator of bearing degradation for inspection and maintenance. Numerous degradation models have been developed. However, the failure regression for bearing degradation is not well explored. The residual life provides a prediction for future operation has grown as a significant issue for bearing health condition. The aim of this article is to explore the failure regression modeling for bearing degradation. Bearing in industry operate at different rotation and load conditions. The modeling for bearing residual life developed so far are limited to a single operating condition. Failure regression considers both rotation and load as operating conditions. Time domain features such as root mean square, kurtosis are extracted and used as bearing degradation indicators. An experimental platform developed by Femto technology provides time to failure under specific operating conditions. Accelerometers are mounted for measuring the horizontal and vertical vibration every 10 s at 25.6 KHz. The time to failure are observed for bearing under three speed and three load conditions. The speed and load are considered as covariates in failure regression. The failure regression yields the bearing reliability and this conditional reliability is used to calculate the bearing residual life. Bearing in practice may run at different operating speed, load and diverse operating conditions. The effect of internal and external covariates need to be explored in order to provide better residual life prediction and to optimize to maintenance strategy. Failure regression can be considered as a tool for bearing residual life prediction in presence of internal dan external covariates.

**Keywords :** bearing time to failure , covariates effect, failure regression, residual life, speed and load.

Paper ID: ST027

## Exploring The Association of Social Media to Business Development Innovations in Helping the Economy during the Covid-19 Pandemic

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**Abstract.** The International Monetary Fund (IMF) stated that the Covid-19 pandemic could trigger an economic growth crisis that would affect a country's food security. This can interfere with one of the Sustainable Development Goals (SDGs), namely to maintain stable economic growth, one of which is for developing countries such as Indonesia. For this reason, in this study, an analysis was carried out to find out the relationship of social media to business development, innovation in helping the economy during the Covid-19 pandemic, which was tested with the Chi-square hypothesis test and t-test. Chi-square hypothesis test is a type of non-parametric comparative test conducted on two variables, where the data scale of the two variables is nominal or ratio. The Chi-square statistic hypothesis test in this study was conducted to determine whether there is a relationship between innovation in establishing a business and social media. The t-test was conducted to determine the effect that the established business can help smooth the economy during the Covid-19 pandemic. Thus, this study is expected to be used as a reference by the government to revive the economic sector during the digital-based Covid-19 pandemic that can support the country's economic recovery. The results of this study indicate that there is a relationship between business development innovation and the intensity of social media use. Based on the paired t-test, the results show that there are differences in the average income both before and after the pandemic as well as before and after innovating.

Paper ID: ST028

## Exploring Kernel Estimator Performance in Predicting Effective Reproduction Number of Covid-19 in Jakarta

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**Abstract.** Effective Reproduction Number ( $R_t$ ) is the real-time monitoring metric of how fast the virus is growing. When  $R_t$  is above 1 means the virus spreads quickly. If  $R_t$  is below 1, the virus spreads slowly. The  $R_t$  data is an important parameter to guide the selection and timings of lockdown measures. Jakarta, the capital city of Indonesia, has the second-highest number of Covid-19 deaths in Indonesia, totaling 2.464 on November 19, 2020. Even the large-scale social restrictions (PSBB) policy has been enforced, the  $R_t$  are still fluctuating. The aim of this research is to see the performance of Kernel Estimator based on Mean Absolute Percentage Error (MAPE) in predicting the  $R_t$  of Covid-19 in Jakarta. The model consists of a response variable that is  $R_t$  and confirmed cases as a predictor variable. Based on  $R_t$  and confirmed cases data in Jakarta, we use 153 observations as the in sample and 7 observations as the out sample. By using Cross Validation (CV) method, we obtain the optimal bandwidth is 160 and the MAPE is 8.86% less than 10%. It means that Kernel Estimator has a very good performance for predicting  $R_t$  of Covid-19 in Jakarta.

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## The Mixed Estimator of Truncated Spline and Local Linear in Multivariable Nonparametric Regression

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**Abstract.** This article provides an overview of the mixed estimator method in multivariable nonparametric regression. The method using a mixed estimator of Truncated Spline and Local Linear. Given the data in pairs  $(t_{i1}, \dots, t_{ip}, x_{i1}, \dots, x_{iq}, y_i)$ ,  $i = 1, 2, \dots, n$  where the predictors  $(t_{ij}, x_{ik})$  and the response  $y_i$  are assumed to have a relationship pattern that meets the following multivariable nonparametric regression model

$y_i = \mu(t_{i1}, \dots, t_{ip}, x_{i1}, \dots, x_{iq}) + \varepsilon_i = \sum_{j=1}^p f_j(t_{ij}) + \sum_{k=1}^q g_k(x_{ik}) + \varepsilon_i$ . The component  $\sum_{j=1}^p f_j(t_{ij})$  is approximated by

additive Truncated Spline regression with  $p$ -number of predictors while  $\sum_{k=1}^q g_k(x_{ik})$  is approximated by

additive Local Linear regression with  $q$ -number of predictors. The error model  $\varepsilon_i$  is assumed normally distributed mean zero and constant variance. The objective of this article is to provide the estimators of

$\sum_{j=1}^p f_j(t_{ij})$  and  $\sum_{k=1}^q g_k(x_{ik})$  as well as the mixture model  $\tilde{\mu}(t_1, \dots, t_p, x_1, \dots, x_q)$  by optimization

$$\text{Min}_{f, g} \left\{ n^{-1} \sum_{i=1}^n \left( y_i - \sum_{j=1}^p f_j(t_{ij}) - \sum_{k=1}^q g_k(x_{ik}) \right)^2 \right\}$$
. The estimators of Truncated Spline component, Local Linear

component, and a mixture model of Truncated Spline and Local Linear are follow  $\sum_{j=1}^p \hat{f}_j(t_{ij}, \hat{\lambda}_j, \hat{h})$ ,

$\sum_{k=1}^q \hat{g}_k(x_{ik}, \hat{h})$ , and  $\hat{\tilde{\mu}}(t_1, \dots, t_p, x_1, \dots, x_q, \hat{\lambda}, \hat{h})$ .

**Keywords:** Local Linear; Mixed Estimator; Multivariable Nonparametric Regression; Truncated Spline.

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## Parameter Estimation and Statistical Test on Zero Inflated Poisson Inverse Gaussian Regression (ZIPIGR) Model with Exposure Variable

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**Abstract.** The overdispersion case is one of the assumptions that violated in the data count model using Poisson regression, which was caused by the presence of many zero values (more than 30%) on the response variable. Zero- Inflated Poisson Inverse Gaussian Regression (ZIPIGR) is a method that can use to model this case. In this research, the parameter estimation of the ZIPIGR model used the Maximum Likelihood Estimation (MLE) method. But from the derivatives process, it was found that the first derivatives of log likelihood from the ZIPIGR model are not close form. Therefore Berndt-Hall-Hallman (BHHH) iteration is used to facilitate MLE for obtained parameter estimation. Statistical test of the ZIPIGR model obtained using the Maximum Estimated Ratio Test (MLRT).

**Keyword :** ZIPIGR, MLE, BHHH, MLRT



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## Parameter Estimation and Hypothesis Testing on Three Parameters Log Normal Regression

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**Abstract.** The purpose in this study is to model the response variable data by following lognormal distribution with three parameters, namely shape, scale, and location parameters. This model called three parameters lognormal regression (TPLNR). The parameter estimation uses maximum likelihood estimation (MLE) method with Newton Raphson iteration approach. The test statistics for parameter testing of simultaneous and partial were obtain using maximum likelihood ratio test (MLRT) method.

**Keyword :** MLE, MLRT, Newton Raphson, TPLNR

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## Designing Z-Score Standard Growth Charts Based on Height-for-Age of Toddlers Using Local Linear Estimator for Determining Stunting in East Java

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**Abstract.** To determine stunting of toddlers in Indonesia we use Health Card that guided by WHO-2005 standard GC. Unfortunately, the samples used to design WHO-2005 standard growth charts are toddlers from Oman, Norway, USA, India, Ghana, and Brazil which are physically very different from toddlers from Indonesia, especially East Java Province. Therefore, in this study, we design Z-Score standard growth charts based on height-for-age namely 3SD, 2SD, 0SD, - 2SD, and -3SD by using samples of toddlers (boys and girls) from East Java Province, Indonesia. The obtained Z-Score standard growth charts will be used for determining stunting of the toddlers in East Java. For designing these charts, we use 59,170 secondary data (30,490 boys and 28,680 girls) collected from the results of measuring height-for-age and gender of toddlers and apply a local linear estimator of nonparametric regression based on the cross-validation criteria. The results show that the coefficient of determination values are 0.9556 (for boy toddlers) and 0.9455 (for girl toddlers), and the mean square error values are 3.700 (for boy toddlers) and 3.556 (for girl toddlers). In addition, the percentage of stunting nutritional status of boy toddlers is higher than that of girl toddlers.