

ABSTRACT BOOK



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Potency of Polysaccharide *Krestin* (PSK) from *Cariolus versicolor* as a protector for chronic inflammatory autoimmune diseases on Rat's (*Rattus norvegicus*) Joint Feet

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Polysaccharide krestin (PSK) is a protein-bound polysaccharide K obtained from the extraction process of *C. versicolor* that has immunomodulatory properties. RA is one of the chronic inflammatory autoimmune diseases. The factors that are responsible for RA disease is a balance between the proinflammatory factor and an anti-inflammation factor ie. Th17, Regulatory T cell, Th1 and Th2. TGF- β 1 acts as an anti-inflammatory cytokine in inducing the formation of Treg FoxP3 cells in rat and humans and can suppress effector T cells in autoimmune disease. The aim of this study is to explain the potency of PSK from *C. versicolor* as an immunomodulator against the improvement of *Adjuvant arthritis* in rat's (*Rattus norvegicus*) joint feet. The research method used was experimental laboratory using a Randomized Post Test Only Group Design. The subjects were 66 male adult rats (*Rattus norvegicus*), aged 16 weeks with 200-250 grams BW, which had been induced by adjuvants (AA). Subjects were divided into 6 groups, 3 treatment groups and 3 control groups. PSK is given at a dose of 50 mg / kg BW / day through gastric sonde for 1 and 2 weeks in 3 different groups. Elisa and Flowcitometry blood tests were performed to see levels of TGF- β 1 and T regulator, the foot tissue retrieval for histopathology to measurements thickness of foot. The results showed a significant difference in TGF- β 1 1 and 2 week ($p=0,017$), 2 weeks ($p<0,001$) and 3 weeks ($p<0,001$), T Regulatory cell 1 week ($p=0,008$) and 2 weeks ($p<0,001$), foot thickness before sacrifice 1 weeks ($p<0,001$) of PSK given. The correlation between PSK - TGF- β 1 levels - CD4⁺CD25⁺FoxP3⁺ Regulatory T cell expression and foot thickness during the second weeks showed a significant correlation with moderate to strong strength correlation. Conclusions: Provision of PSK as immunomodulator at dose 50 mg/ kg BW/ day orally potentially improved the Adjuvant Arthritis in the rat's (*Rattus norvegicus*) foot joints through mechanism of increased TGF- β 1 levels and CD4⁺CD25⁺FoxP3⁺ Regulatory T cells, and rat's foot thickness with the most effective given time of 2 weeks.

Keywords: *Polysaccharide Krestin* (PSK), CFA, TGF- β 1, Regulatory T cells, foot thicknes

Characterization of Collagen-Based Artificial Cornea Candidate

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Corneal ulcer could cause blindness. Cornea is a transparent, outermost layer of the eyeball that controls vision. Corneal ulcer is characterized by the presence of suppurative infiltrate and partial loss of surface from tissue death. The stressors of the ulcer include bacteria, fungi, and herpes simplex virus. Currently, transplantation is the only treatment. However, limited donor, post-operative complications e.g. autoimmune and long healing time made it a difficult option. Hence, synthetic cornea could be the alternative solution. Synthesis of collagen- chitosan-glycerol-HPMC as artificial cornea and its characterization were carried out. Fourier Transform Infra Red (FTIR) analysis indicated the presence of expected functional groups in the fabricated composite. Light transmission of the artificial cornea was also investigated. Its transparency and light transmission ability is determined by the material thickness, which in turn depends on its water content. Water content measurement showed significant differences between collagen-chitosan-glycerol and collagen-chitosan-glycerol-HPMC samples. Under simulated physiological conditions, the percentage of its degradation was low and in accordance to application requirement. Cytotoxicity test showed negligible toxicity of the material. From preliminary investigation, material based on collagen and chitosan could be considered artificial cornea.

Keyword : cornea, degradation, water content, transparency, cytotoxicity

Ultrasonic Induced Micro-Structural Transition of Micelle System

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The tremendous attention given to micelle systems is due to its potential uses in many scientific, biomedical and industrial applications. Micellar aggregations possess unique ability to exhibit different physicochemical properties through dynamic and reversible structural transformation. This is controllable by different stimuli. Early studies suggest that apart from the responsiveness of the surfactant itself, the nature of counterions in ionic micelle systems can also induce the evolution of micellar morphology. Structural changes of micelles may also be induced by ultrasonic irradiation. Despite the potential applications, studies involving ultrasonic modification of micellar structures are scarce. In this study, systems with various concentration ratios of cetyltrimethylammonium bromide (CTAB) micelle with counterion, sodium salicylate (NaSal) were sonicated at different frequencies (20 kHz – 1 MHz) and power levels. In general, the viscosity decreases upon sonication for CTAB/NaSal system at 20kHz. The sonication of NaSal itself results in the degradation of the compound forming hydrophilic products. The counterion with more hydrophilic property does not penetrate deep into the micelle layer leading to structural changes to the micelle. However, sonication at higher frequencies revealed an increase of viscoelasticity, due to the formation of long threadlike and tubular micelles. These suggest that both, chemical and physical effects of sonication play major roles in inducing micelle structural changes. Further discussion on the effect of sonication of the micellar system at higher frequencies and different power levels will also be discussed.

Keywords: Micelle, sonochemistry, viscoelasticity, acoustic cavitation

Effect of 2,4D and BAP on Callus Induction of *Piper retrofractum* Vahl.

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Piper retrofractum Vahl. in Indonesia has the potential to be one of the medicinal plants to treat infertility problems. Several secondary metabolite compounds contained in *Piper retrofractum* Vahl. are essential oils, alkaloids, piperins, saponins, flavonoids, triterpenoids, steroids and glycosides. These secondary metabolite compounds can be isolated through the in vitro plant culture for callus. Plant tissue culture method to induce callus requires proper media formulation to get optimal result. The purpose of this research was to know the effect of growth regulator combination 2,4-D and BAP on induction time, percentage, wet weight, dry weight, and callus morphology on callus culture of *Piper retrofractum* Vahl.'s leaf explant. Leaf explant of *Piper retrofractum* Vahl. cultured on MS mediums with 2,4-D and BAP growth regimens combined with concentrations of 0.0 mg/L, 0.5 mg/L, 1 mg/L, 1.5 mg/L, 2 mg/L. This research was a laboratory experimental research with complete randomized design method. The data obtained were analyzed quantitatively and qualitatively. Quantitative data consisted of induction time, percentage, wet weight, dry weight of callus, while qualitative data was obtained from the description of *Piper retrofractum* Vahl. morphology. Quantitative data were analyzed statistically using SPSS version 21 program. The results showed that the combination of growth regulator 2,4-D and BAP added in culture medium influenced growth of *Piper retrofractum* Vahl. leaf explant. Both at the time of induction, percentage, wet weight and dry weight of callus. The best combination of growth regulators 2,4-D 1.0 mg/L and BAP 1.0 mg/L showed the mean time in inducing callus 15 days after planting. The combination of growth regulators 2,4-D 1.0 mg/L and BAP 2.0 mg/L was the best combination which resulted in mean wet weight and dry weight of callus 31,20 mg and 5,92 mg. Morphology of callus was produced by explant mostly textured friable with greenish-white color which cultured in medium with combination of growth regulators 2,4-D 1.0 mg/L and BAP 2.0 mg/L in all parts of edge and surface explant.

Keywords: 2,4-D, BAP, callus induction, *Piper retrofractum* Vahl

Effect of *Coriolus versicolor*-hot water extract on *Mycobacterium fortuitum*-induced immune function in mice

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The polysaccharides from *Coriolus versicolor*-hot water extract contain β -glucan that can activate granulocytes, monocytes, and macrophages. Giving polysaccharides on bacterial infection is expected to increase the immune response. This study assessed polysaccharides activity in improving immune response after nontuberculosis mycobacteria infection like *Mycobacterium fortuitum*. The animal model used was female mice, strain Balb/C, age 8-10 weeks. Polysaccharides was administrated before and/or after bacterial infection for 10 days, dose of 50 mg/kg body weight. Infection *M. fortuitum* was administrated 2 times, dose of 10⁶ cell. After the end of treatments were performed serum and peritoneal fluid isolation. All data were analyzed by Anova and Duncan test. The oral administration of the PSK increased the number of phagocytes ($p < 0.05$ at the administration of polysaccharides before-after infection), improved the phagocytic activity ($p < 0.05$ at the administration of polysaccharides before infection), increased the IFN- γ and antibody level ($p < 0.05$ at the administration of polysaccharides after infection and before-after infection), but not effected on TNF- α level ($p > 0.05$). The administration of polysaccharides could enhance non-specific immune responses, specific immune responses, and pro-inflammatory cytokine in mice induced to *M. fortuitum*. These results suggest that the polysaccharides could be utilized as an effective immunostimulatory agent.

Keywords: *Coriolus versicolor*, polysaccharides, *Mycobacterium fortuitum*, immune function

Finite-Size Effect on the Thermodynamics Properties of Transverse-Field Quantum Ising Model using Matrix Product States (MPS)

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Phase transition occurs due to singularities of certain thermodynamic functions at the critical points in thermodynamic limit. However, analysis of convergence towards critical dynamics in finite-size systems are important in understanding real materials. We study the finite-size effects on quantum phase transition of 1D transverse-field quantum Ising model. A finite size one-dimensional quantum Ising model can be solved by exact diagonalization and by using finite-size scaling hypothesis, it can be shown to exhibit same universality class of 2D classical Ising model. We investigate this problem using the tensor network (TN) approach, which has been widely adopted for solving quantum many-body problem. A generic ground state wavefunction of a gapped system with size N can be efficiently represented as a TN either as Matrix Product States (MPS) for 1D or Projected Entangled Pair States (PEPS) for 2D. Park & Cha (2015) showed that MPS with only modest Schmidt rank, χ is able to reproduce critical exponents in thermodynamic limit using finite-size scaling. We generalize the formalism to investigate the finite-size effects on thermodynamic properties of 1D quantum Ising model.

Keywords: Finite-size Effects, Matrix Product States, Quantum Ising Model

Investigation of surface plasmon resonance on side-polished optical fiber sensor

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Here we propose a rigorous configuration of using surface plasmon resonance properties on a side polished optical fiber in various sensor applications. The used of Au, Ag, Co, Pt with combination of several materials like TiO₂ and 2D-material like graphene oxide, MoS₂ and WS₂ are our motivation. The experimental technique is mainly focused on using side-polished or D-shape optical fiber. The process starts from polishing single mode fiber (SMF) with diameter of 125/85 microns. The power loss will be deliberately obtained from the polish optical fiber with record of loss of each sample. The samples were then undergone coating process in the evacuated chamber in the electron beam machine. Variation of thicknesses has been set in order to observed the effects of Surface Plasmon waves (SPs) acting on the optical fiber. This talk will generally describe potential application based on the respective SPR own by certain materials from different aspects of fabrication namely thickness layer, annealing process, size distribution, size of particles and spacing of the particles. The properties of these materials will be studied from tunability of the wavelength for specific aspect of sensor. The characteristics own were then been combined with various materials such as TiO₂ and 2D materials to observed their performance. Thickness on titanium (Ti) surface plasmon resonance (SPR) optical fiber sensor. The present configuration is included side-polished optical fiber sensor, titanium (Ti) coating, MoS₂ and sensing medium. We perform the performance of the design sensor in terms of sensitivity, detection accuracy and quality factor. Addition of MoS₂ layer on the Ti for example; will increase overall sensitivity of the device. The polishing region is covered by metallic layer acted as active sensing medium as the interaction between the SPW, fiber mode and consequently the fiber mode attenuation depend strongly on the refractive index of analytes. Variations of analytes used such as water, 60% alcohol, sodium chloride, glucose and sucrose can be determined by monitoring changes in the wavelength at which the resonant attenuation of the fiber mode occurs.

Keywords: Surface plasmon resonance (SPR), fiber optic sensor, refractive index (RI), sensitivity

Synthesis of Complex Compounds, $K_2[Mn(C_9H_7N)_2][Co(SCN)_6]$, and Its Preliminary Test as Material for Potassium Ion Battery

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The research objective of present study was to synthesize complex compound from $[Mn(qui)_2](NO_3)_2$ (qui = quinoline) and $K_4[Co(SCN)_6]$ and to test its potential as material for potassium ion battery. The complex was synthesized by reaction in methanol as solvent at room temperature to give a greenish blue solid with melting point of 165-167°C. The complex was then characterized using XRD, XRF, and FTIR. Its empirical formula was determined as $MnCoK_2S_6C_{24}N_8$. Upon characterization using cyclic voltammetry, this compound exhibit oxidation and reduction potential values of -1,240V and +0,594V, respectively. Further characterisation of its x-ray single crystals and further battery test are in progress.

Keyword: Complex compound, manganese(II) ion, cobalt(II) ion, quinoline, thiocyanate ion, potassium ion battery

Modification of Polymers: Structures and Functionalities

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Polymers can be created with specific properties that are tailored to a wide range of applications, with various architectures and specific groups via a variety of reaction mechanisms of different complexity. A series of multi-end functionalized poly(styrene) and poly(isoprene) additives carrying 1 to 3 fluoroalkyl (CF) groups were prepared by endcapping the living chain ends of polymers prepared via living anionic polymerization. The resulting polymers have been used as additives to render the surface of polymer films hydrophobic/lipophobic. The additive molecular weight, the number of CF groups, additive concentration and annealing conditions have a significant impact upon the resulting surface properties. We also developed a synthetic route towards highly branched polymer in good yield and devoid of microgelation via the versatile technique anionic polymerization, which was conducted under high vacuum conditions using sec-butyllithium as initiator at 50 °C in toluene. Toluene served as a solvent and as a chain-transfer agent, meanwhile tetramethylethylenediamine (TMEDA) acted as polar modifier and divinylbenzene (DVB) deployed as the branching agent for the “living” poly(isoprenyl)lithium anions. The nature of the reaction was studied on the TMEDA/Li ratio as well as the DVB/Li ratio. This methodology has the potential of providing soluble branched vinyl polymers at low cost using the readily available raw materials. In parallel work, superparamagnetic nanosorbent functionalized polythiophene coated iron oxide (Fe₃O₄) nanoparticles was successfully synthesized via a simplistic method to enhance extraction of a potent endocrine disruptor, di-(2-ethylhexyl)phthalate (DEHP). Removal of DEHP was found to be temperature and pH dependent with a maximum adsorption capacity at 298.15K at pH7 and the adsorption kinetics followed a pseudo second-order kinetics model. Thermodynamic studies revealed that adsorption occurred heterogeneously on the adsorption sites, and adsorption of DEHP was found to be spontaneous, feasible, ordered and exothermic.

Keywords: functionalized polymer, branched polymer, anionic polymerization

Cell-targeting nanotechnology – towards a bio-inspired healing concept

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Unwanted side effects of medical drugs frequently limit the application spectrum and cause severe problems, particularly in cancer therapy. However, the close similarity of all cellular processes does not only constrain the search for cancer related drugs. The concept of drugs affecting species-specific (e.g. bacterial) cellular processes, is frequently reaching its limits. Limited resources of backup antibiotics to cater growing resistance, particularly for hospital-based infections, demonstrate the need of an alternative concept. Unlike cellular processes, cells of different species, and even healthy and carcinogens' cells, differ significantly in their surface. This differentiation has long been used for vaccination purpose and forms the basis of a new medicinal approach: Instead of targeting specific cellular processes, a non-specific cell toxic is specifically delivered to a selected target cell via a receptor-mediated drug delivery system. This concept can be addressed with both hard and soft nanomaterials. A key aspect for both cases is the design of the particle surface. Here we report strategies for a controlled bio-functionalization of nanoparticles of both hard (inorganic nanocrystals) and soft nature (vesicular lipid assemblies) for potential diagnostic and therapeutic applications. The generic approach emphasizes on a chemical fixation of a water soluble spacer with coupling anchor for *CLICK* chemistry on the (environment facing) nanoparticle surface.

Keywords: Biofunctionalization of nanoparticles, receptor-based cell recognition, vesicular drug delivery, *CLICK* chemistry

The Kou's Jump-Diffusion Model with Single Jump: The Application in Short-Maturity Quanto Options

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The characteristics of asset return distribution in the market are far from normal distribution, especially for exchange rate return. It is usually leptokurtic and heavy-tailed return. Skewness and kurtosis are the common measures of leptokurtic and asymmetry issues in the asset return. The existence of jump is considered as a source of leptokurtic feature. The purpose of this study is to give some evidences to show that series approximation as suggested by Xu (2011) is not proper in the option pricing. Another purpose is to have an option pricing model that can account for the extreme characteristics of the asset return distribution such as very high kurtosis issue. The constructed models are the Kou's jump-diffusion model with single jump (KJD1) that will be applied to quanto options, which the underlying assets are the index quoted in the foreign currency and the exchange rate of the foreign currency to the domestic currency. We expect that the underlying assets in quanto options are leptokurtic. We attempt to simplify the KJD model by assuming that in the short maturity time, there will be only one jump expected to happen. This study concludes that the KJD1 model can account for arbitrarily high kurtosis and very skewed return distribution. For in-the-money (ITM) options, the pricing errors are smaller than that for out-of-the-money (OTM) and at-the-money (ATM) options. Besides, the series approximation models should not be applied to the return with high kurtosis (more than seven). With very large kurtosis, the price from the series approximations may become negative for ATM options, which is not trustable. Furthermore, the price from KJD1 model is quite close to the price from KJD model for options with short maturity time and low jump intensity, especially for ITM option.

Keywords: leptokurtic, jump-diffusion, series approximation, quanto options

Strengthen The Role Of Democracy On Government In Southeast Asia to Eradication of Terrorism

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This paper focuses on confidence building democracy in developing countries with case of terrorism in Southeast Asia. The application of democracy in Indonesia and the Philippines is advanced in Southeast Asia, with elections and established system in the country to get people can participate in created the policy. This research used comparative method to see the relations between countries with democracy system in Southeast Asia and the increasing acts of terrorism from the region. In some case, people using democracy to represent the power of people that is used as a weapon to against the government. Terrorism in developing countries tended to occur because of distrust in democratic system. Distrust in developing countries because of power to some parties and transferring unjust power. Building the confidence in democratic functioning will make a good political element and good transfer of power in democracy. Surveys (Newton, 1999) of countries with a high indicator of public confidence in the government show good relationships between governments and communities. Thus, this paper argue that public confidence building can be a solution for the government to alleviate the rising act especially those who are targeting government.

Keywords: Democratic, Government, Southeast Asia, Terrorism

An Improved Concept Of Solving Set To Increase Efficiency In Outlier Prediction

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Most of the algorithm involving outlier published by researchers related with outlier detection, but not many discussed outlier prediction. Outlier prediction is essential to keep data validity. The conventional algorithm of outlier prediction has a weakness in a matter of efficiency because it has to compare query data with the entire data in the dataset. A new concept involving solving set arose as a solution to the efficiency problem on outlier prediction. Prediction time are faster because query data only need to be compared with data in the solving set. In this research, an improved concept of solving set was developed. The solving set was defined as a subset of data set containing the border data of clusters and its centers to represent the data set, instead of defining the solving set as a subset of data set containing the top- n outlier to represent the data set as defined in the previous research work. The border data was detected using the BORDER algorithm since it was proven capable of detecting the border data accurately and efficiently, while a hierarchical clustering algorithm was used to cluster the border data. The median values of the border data of each cluster were then computed to get the center of each cluster. After performing a series of experiments using both data sets with normal and uniform distributions, the new solving set was proven capable of improving the existing algorithm. On the aspect of prediction accuracy, it succeeded to improve about 5% compared to the existing outlier prediction algorithm for both data sets with normal and uniform distributions. Moreover, on the aspect of prediction efficiency, the new solving set succeeded to improve about 40% and 73% for both datasets with normal and uniform distributions, respectively.

Keywords: outlier analysis, outlier prediction, cluster border point, solving set, data mining

Improvement of Particle Swarm Optimization Performance by Applying Global-Local Best Inertia Weight on 2-Stage Feature Selection Algorithms

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Particle Swarm Optimization (PSO) has been known as a feature selection algorithm in Data Mining to improve classification accuracy. The challenge faced by PSO as a feature selection algorithm is to produce an effective and efficient subset feature. PSO conducts a search based on the concept of particle convergence on certain solutions inspired by swarms of birds in search of food. In its use, sometimes the PSO search process is trapped in local optima, resulting in premature convergence. In this study, the application of Global Local Best Weight Inertia was proposed in the 2-Stage Feature Selection algorithm to solve the problem. Experiments were carried out by implementing the Naïve Bayes Classifier classification algorithm at the Wisconsin Diagnostics Breast Cancer dataset as a sample dataset. The proposed method is proven to improve PSO performance in feature selection, which is to produce a feature subset with higher accuracy.

Keywords: Feature Selection, Particle Swarm Optimization, Inertia Weight, Optimization

Balanced system on the linear system over communicating ring

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The linear time invariant (LTI) discrete-time systems over commutative ring R are defined by difference equations as below:

$$x(k+1) = A x(k) + B u(k)$$

$$y(k) = C x(k) + D u(k), \quad k = 0, 1, 2, \dots$$

where $x(k) \in R^n$ is called state vector at time k , $u(k) \in R^p$ is called input vector at time k , $y(k) \in R^q$ is called output vector at time k , and A, B, C, D are constant matrices. Dimension of state spaces is called order of the system. If order of the system is large, then the calculation related to the characteristics of the system become complicated. In many cases, such calculations are not efficient, especially in terms of time. Therefore, the high-order system needs to be reduced so that the order of the system becomes smaller. The method chosen to reduce order is the balanced truncation method. Balanced truncation method can be done after a system is balanced. The purpose of this research is constructing a balanced system on a discrete time LTI system over commutative ring, so that order reduction can be carried out with a balanced truncation method. The result of this research is a generalization from the linear system over the field to the linear system over commutative ring related to balanced system.

Keywords: linear systems, balanced system, commutative ring.

Antioxidant Activity of Gamma-mangostin for Amelioration of Impaired Kidney Structure and Function in Diabetic Mice

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This research was aimed to investigate the ability of gamma-mangostin to reduce plasma blood urea nitrogen (BUN) and creatinine, and also to ameliorates impaired renal proximal tubular of kidney in diabetic mice. In vivo antioxidant assay was conducted by using male BALB/c mice. Mice were divided into two groups; normal control (KN) and streptozotocin-induced diabetic mice. Streptozotocin (STZ) induction was performed using multiple low-dose of 30 mg/kg bw injected for five consecutive days. Diabetic mice were separated again into three subgroups; diabetic control (KD), diabetic mice treated with acarbose (KA), and diabetic mice treated with gamma-mangostin. Gamma-mangostin treatment group was categorized based on dose given; P1 (1 mg/kg bw), P2 (2 mg/Kg bw), and P3 (4 mg/Kg bw). Before and after STZ injection, body weight and fasting blood glucose were measured. Body weight and fasting blood glucose were measured at 1st, 7th and 14th day of gamma-mangostin treatment. Gamma-mangostin was given per oral for 14 days. At 15th day, plasma BUN and creatinine level were measured using Pentra C 200 Reader. Interestingly, gamma-mangostin administration was found to be able to lower plasma BUN and creatinine, and ameliorate impaired renal proximal tubular of kidney in diabetic mice significantly.

Keywords: gamma-mangostin, blood urea nitrogen, diabetic mice, creatinine, renal proximal tubular of kidney

Inferences of Malaysian Giant Prawns genetic diversity in reference to South-East Asian countries using cytochrome oxidase subunit 1 (COI) mtDNA gene

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The Malaysian Giant prawn industry has been a major interest among farmers to uplift their socio-economic income. However, the industry growth is depended so much on the bloodstocks for post larvae production. In Malaysia, translocations of broodstocks for breeding purposes and restocking program from hatchery population to riverine systems is rampant, which could lead to loss of genetic diversity. By utilising mitochondrial DNA cytochrome oxidase subunit-1 (COI), we believe it can be a quick system, to assess genetic diversity in domesticated culture in farms from nine locations dispersed all through Peninsular Malaysia. AMOVA between wild and domesticated GMP showed that the genetic variation between these two groups was not significantly different, however, based on maximum-likelihood tree and Tajima's D value Johor (wild stock) is unique and different from other populations. Domesticated populations, KKL, BLG and LGG populations have high genetic diversity, thus, these populations are suitable to become base population, instead of wild stocks, for genetic improvement program. The temporal analysis between two different time cohorts, 2004 and 2013, revealed that there was reduction of haplotype diversity and nucleotide diversity. This is supported with high F_{ST} value of Sg. Johor and Sg. Kedah between 2004 and 2013. Analysis between GMP from Malaysia with Southeast Asian countries revealed that that geographic origin location could be from Malaysia as haplotype 5, 14 and 31 were ancestral haplotype. These findings could show that mtDNA COI genetic marker, is useful to evaluate population genetic structure of the freshwater prawn in Malaysia, very quickly and helps to manage the stocks in a more sustainable manner.

Keywords: Molecular Phylogenetics, COI, genetic diversity and haplotypes

TWO FURANOCOUMARINS FROM STEM BARK of *Casimiroa Edulis*

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Two furanocoumarin, Bergapten (**1**) and Isopimpinellin (**2**), this is the first reported on the occurrence of furanocoumarin in the stem bark *Casimiroa edulis*. Their structures were elucidated and characterized on the basis of spectra data (UV-vis, FTIR, 1D NMR, 2D NMR, HRMS, etc) and comparison with the literature data.

Keywords: *Casimiroa edulis*, stem bark, furanocoumarin

BIOSURFACTANT PRODUCTION of *Bacillus subtilis* 3KP USING HYDROLISIS PRODUCTS OF CORN COBS

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The aim of this study was to determine the ability of *Bacillus subtilis* 3KP hydrocarbonoclastic bacteria to produce biosurfactant using media produced by hydrolysis of corn cobs. Hydrolysis of corn cobs was done enzymatically using *Penicillium* sp. H9 isolated from Alas Purwo National Park- Indonesia. The sugar yield from hydrolysis of corn cobs is 258 µg / mL within four days of incubation. Biosurfactant production was carried out for 0, 1, 3 and 5 days at pH 7. Bacterial growth was evaluated using turbidity values and pH decreasing of culture. The potential of *Bacillus subtilis* 3KP bacteria in producing biosurfactants was evaluated by measuring the emulsification activity of hydrocarbons and the surface tension value of the culture supernatant. Growth and production of biosurfactants are best obtained on the fifth day of incubation. The acquisition of optical density values at 650nm was 0.404 ± 0.026 with a pH of 6.5. The highest surface tension reduction value was 15.73 ± 1.21 mN / m and was supported by the presence of emulsification activities of $7.3 \pm 3.1\%$. Potential use of *Bacillus subtilis* 3KP biosurfactant was evaluated from CMC, CMD, and stability on variations in pH and temperature. The bioconversion product of agricultural waste such as corn cobs have the prospect of replacing molasses as a biosurfactant production medium.

Keywords: biosurfactant, agricultures waste, hydrolysis product, *Bacillus subtilis* 3 KP, corn cobs

Biomimetic Nature-Like Synthetic Glycolipid Nanoparticles as New Drug Carrier Systems

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Synthetic glycolipids have attracted a great deal of attention due to their biosurfactant properties, biocompatibility, biodegradability, nonionic nature and its ability to mimic the natural glycolipids which are difficult to extract and require high cost. Glycolipids are amphiphilic surfactants which have the ability to self-assemble and thus have high potential to be used as drug carrier systems. In this research, the liquid crystalline and self-assembly properties of branched-chain glycolipid namely 2-hexyldecyl- β (/ α)-D-glucoside (2-HDG) have been investigated. The liquid crystalline phase behaviour of this 2-HDG has been studied through thermal transitions by differential scanning calorimetry (DSC) and under thermotropic and lyotropic conditions by optical polarizing microscope (OPM) and further confirmed by small-angle X-ray scattering (SAXS). Due to its amphiphilic characteristic, 2-HDG formed a focal conic texture of columnar phase thermotropically, whereas inverted hexagonal dispersions (hexosomes) have been observed in binary aqueous media. The critical aggregation concentrations (CACs) were studied for the glycolipid surfactant and mixed surfactants systems of glycolipid and Tween series. The addition of co-surfactants to the glycolipid dispersions reduced the CAC value of 2-HDG, thus making the system more stable. The formations of 2-HDG and 2-HDG-Tween hexosomes were further investigated in terms of their particle size and morphology by using particle sizer and transmission electron microscope (TEM), respectively. These findings justify that branched-chain glycolipid provided an alternative nonionic surfactant with interesting phase behaviour and high potential nanoparticles (hexosomes) which could be used as new drug carrier systems in the future.

Keywords: Glycolipid; Nonionic surfactant; Inverse hexagonal phase; Hexosome; Stability

A Modified QHBM for Maximum Power Point Tracking (MPPT) on Ambient Light Energy Harvester

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This paper introduces the Queen HoneyBee Colony Migration (or QHBM for short) for tracking the maximum electric power generated by the PV panel from indoor light is presented on this paper. The QHBM [1] mimics the migration behavior of a Princes Honeybee in nature, finds the best place for the hive, and finally becomes a Queen. Since the QHBM was originally developed for sink mobilities on WSN; thus, we modified the migration routes, and the evaluation function according to the PV characteristics on datasheets. The scouts find the coordinates which possible for the hive and suggest those to the Queen. In addition, the coordinates refer to the maximum power converted by a PV panel. The Queen calculates signs from scouts (or evaluation function) and chooses the maximum values. As the original QHBM, the Queen migrates to the selected coordinate near to the maximum point. By taking this action repeatedly, the QHBM can track the maximum power generated by the PV panel accurately. We conducted the simulations in Matlab and compared the QHBM to the existing MPPT algorithms, namely constant voltage, open circuit voltage, and perturb and observe. Based on the results, QHBM can surpass its competitors in term of accuracy, efficiency and response speed.

Keywords: indoor light, MPPT, QHBM, PV pane

Synthesis and Characterization of Carbazole Derivatives as Suitable Materials for Organic Light-Emitting Diodes

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Organic light-emitting diodes (OLEDs) have been attracting much attention recently for their promising applications in energy-efficient flat-panel displays and for the next generation solid state lighting. Current present lighting system such as tungsten filament bulbs and fluorescent lamp consume more power, harmful, non-disposable and have short lifetime. The development in OLEDs could solve this problem because it is self-illuminating, eco-friendly and power saving technology. Furthermore, OLEDs are thin and light, flexible, varying in shapes, colors and sizes and some are even transparent. Currently, the design of suitable host materials for the efficient and stable blue OLEDs still remains a challenge due to the requirement of high triplet energy. In order to achieve that, carbazole moiety was chosen in our study because carbazole-based host materials have high triplet energy and excellent hole-transporting properties for blue OLEDs. To serves as good host for OLEDs, the materials should fulfill some requirements: suitable ionization potentials, high electron mobility, permit formulation of uniform films without pinholes, morphologically stable and thermally stable. Therefore, we have synthesized several novel carbazole-based molecules with small to high molecular weight (more than 1700 g mol⁻¹). Some of these molecules have the ability to form good quality film, well-defined structure, high level of purity and good solubility in common solvents. Two type of carbazole derivatives were successfully synthesized. The key reaction in the synthetic pathway is The Ullman coupling reactions. The first type is the carbazole dendrimers, namely 4,4'-bis(3,6-bis(3,6-ditert-pentyl-carbazol-9-yl)carbazol-9-yl)-2,2'-dimethylbiphenyl (**ZAH-3**) and 4,4'-bis(3,6-bis(3,6-ditert-pentyl-carbazol-9-yl)carbazol-9-yl)biphenyl (**ZAH-4**) were isolated in moderate yield (60%) after purified by column chromatography and recrystallization. The second type is the fluorinated carbazole derivatives. All the synthesized compound were fully characterized by NMR, FTIR, MALDI-TOF mass spectroscopy and CHN analysis.

Keywords: OLED, Blue Host, Carbazole derivatives, triplet energy, Ullman reaction.

Effects of water absorption on the Tensile and Thermal Properties of Heat-treated Mangrove/High-Density Polyethylene Composites

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The application of wood plastic composites (WPC) in outdoor is gradually replacing wood in building industries, however, the absorption of moisture by WPC has hindered this development and pose a threat to the service usage of WPC. Thus, water absorption, tensile and thermal characterisations were carried out on untreated and heat-treated mangrove/high-density polyethylene (HDPE) composites. Heat treatment of mangrove was done at 120°C in the presence of nitrogen gas. The untreated and treated MPs were compounded with HDPE at 10, 20 and 30 wt.% in a twin-screw extruder and injection moulded into dumb-bell shaped specimens for tensile and thermal (thermogravimetric analysis, TGA) tests. Water absorption test was carried out in distilled water for 1440 hours at room temperature (about 25°C) and a relative humidity of 60-65. The results revealed that increase in mangrove loadings gave rise to higher water absorption with treated composites reaching saturation earlier than their untreated counterparts; the earliest and latest water absorption equilibrium/saturation were observed at 480 h and 792 h for 10 wt.% treated and 30 wt.% untreated composites respectively. The dry composites maintained higher tensile strength and modulus, but lower tensile strain than the wet composites irrespective of treatment. Scanning electron microscope (SEM) of tensile fractured surfaces confirmed an improved mangrove-HDPE interaction of treated composites at both dry and wet conditions. The TGA showed that the maximum degradation temperature of dry composites are higher than the wet composites. Overall, the treated composites at dry and wet conditions indicated better tensile and thermal stability than the untreated mangrove-filled HDPE composites.

Keywords: Mangrove particle, tensile strength, modulus, thermogravimetric analysis, moisture absorption

Performance Evaluation of Server-side Golang and Node.JS as a Web Backend

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Today various web application backend platforms are available to use. Each platform has their advantages and disadvantages, which makes developers challenging to choose the appropriate platform for their projects development. Node.js and Golang (Go) were popular platforms that widely used as web application backends. Node.js is well known for its speed and reliability for applications which have massive files and heavy network load because it uses an event-driven, non-blocking, and asynchronous approach. Go is an open source programming language whose size is concise and suitable for use of microservice architectures where the application structure consists of many interconnected services.

This study aims to compare the performance of Golang and Node.js as web applications backend regarding response time, CPU utilization, and memory usage by using MySQL and MongoDB as databases. To simulate the actual web server workload, the flow of data traffic on the server follows the Poisson distribution. The result shows that the combination of Go and MySQL is superior regarding CPU utilization and memory usage, while Node.js and MySQL combination is superior regarding response time.

Keywords: Performance evaluation, Node.js, Golang, MySql, MongoDB

Achieving the Sustainable Development Goals (SDGs) through Women Empowerment Program under Community Development and International Cooperation (CDIC) Course

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Sustainable Development Goals (SDGs) is an ambitious agenda under United Nations Development Programm (UNDP) to solve global problems. In achieving the goals, the project requires a combined effort of all sectors. Developing means to involve, to empower and to evolve the community to the betterment of life. One of the approaches in developing a community is through empowerment program. Empowerment approach values the community as the main factor of the development. It provides a platform for the community to gain their common goals. The theory of empowerment includes processes and outcomes. This research studies the empowerment program for women in a community development project area under the Community Development and International Cooperation (CDIC) Course. The CDIC Course is a join program between Department of International Relations of Universitas Islam Indonesia and Alternative International Development Program of Songkonghoe University, South Korea. The program selects some villages in Yogyakarta Provinces as the target area of the project. In this project, the students take the leading role as the coordinator, mediator and facilitator. The idea of the project is to improve the capacity of the people, especially the women's group as an effort to achieve the SDGs. This paper focuses on the analysis of how CDIC Course involves the students to participate in the project and shows the impact of the project on the target community.

Keywords: CDIC, Development, Empowerent, SDGs, UNDP.

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Geographically Weighted Polynomial Regression: A Goodness of Fit Test Using ANOVA Type

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Geographically weighted polynomial regression (GWPolR) is a spatial model with varying coefficients and polynomial relationships between response and some predictors. It is a generalisation of geographically weighted regression (GWR) model. By this generalisation, it has more parameters and better goodness of fit measures than the GWR. Nevertheless, it is important to decide statistically whether the GWPolR model describes a given data set significantly better than a GWR model or not. It seems that there has not been a formal way to achieve this work. So, to carry out the task this paper aims to derive an ANOVA type test statistic and provide a guideline for performing the test in practice. In this paper, the authors gave some data examples for application of the test procedure. Those examples show that the test procedure performs well and provides a feasible way to choose an appropriate model for a given data set.

Keywords: geographically weighted polynomial regression, spatial nonstationarity, varying coefficient, goodness of fit.

The Boundedness of Bessel-Riesz Integral Operators on Lebesgue and Morrey Spaces

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We consider the Bessel-Riesz Integral operators, where its nice applications for elementary properties of Schrodinger operators is considered. In this talk, we will consider its boundedness in Lebesgue spaces, also in Morrey spaces, that serves as a generalization of Lebesgue spaces. To consider its boundedness, we use Young inequality, and also the boundedness of maximal functions in Lebesgue and Morrey spaces.

Keywords: Bessel-Riesz Operators, Fractional integrals, Morrey spaces

***In vivo* Assessment of Antidiabetic Activity of Ketapang (*Terminalia catappa* L.) Leaves Extract on Streptozotocin-Induced Diabetic Mice**

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Tropical almond or ketapang (*Terminalia catappa* L.) is a native plant of Southeast Asia, commonly used as traditional medicine by locals. The purpose of this study was to determine the effect of ketapang leaves crude extract (KLCE) on body weight, fasting blood glucose level, tissue glucose tolerance, as well as Langerhans islet diameter of diabetic mice. This study used 36 strain male Balb/c mice (*Mus musculus*). Ketapang leaves were collected from Tropical Disease Center yard, Universitas Airlangga, Surabaya and the crude extract were obtained from ethanol extraction. The samples were divided into 6 groups: KN (normal group), KD (negative control group), KM (positive control group giving 6.5 mg/kg body weight of metformin), and KP1 (treatment group giving 50 mg/kg body weight of KLCE), KP2 (100 mg/kg body weight of KLCE), and KP3 (200 mg/kg body weight of KLCE). The diabetic condition was induced by the intraperitoneal injection of multiple low-dose streptozotocin (STZ), 30 mg/kg body weight, for five consecutive days. KLCE and metformin suspension were administered orally for 14 days in STZ-induced diabetic mice. On day 15, mice were sacrificed. Data on the body weight, fasting blood glucose level, tissue glucose tolerance, and Langerhans islet diameters were analyzed. Interestingly, the result showed that the administration of KLCE could increase mice's body weight, tissue glucose tolerance, Langerhans islet diameter, and also reduce the fasting blood glucose level. Thus, it can be concluded that KLCE is a promising antidiabetic agent due to its active antioxidant properties.

Keywords: antidiabetic, ketapang (*Terminalia catappa* L.), streptozotocin, diabetic mice

ANTI-NEUROINFLAMMATORY ACTIVITY of MORIN-LOADED NIOSOMES IN LIPOPOLYSACCHARIDE (LPS)-INDUCED BV2 MICROGLIA CELLS.

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Chronic inflammation in the brain plays a critical role in major neurodegenerative diseases such as Alzheimer's disease, Parkinson disease and multiple sclerosis. Microglia, the resident macrophages and intrinsic components of the central nervous system, in its activated form, appears to be the main effector in this pathological process. Morin is a flavonoid isolated from certain fruits and Chinese herbs that has known medicinal and healing properties. Morin was loaded into a niosome formulation to improve its delivery and permeation across the blood brain barrier into brain and its bioavailability to reach target cells. In this study, we investigated the anti-inflammatory effects of morin-loaded niosome on LPS-induced BV2 cells. Cell viability was estimated with MTT assay. Cells pre-treated with morin-loaded niosomes showed an increase in cell viability as compared to untreated cells when induced with LPS. The production of nitric oxide (NO), a pro-inflammatory mediator was also evaluated. Level of NO in cells pre-treated with morin-loaded niosomes showed a decrease of NO in a dose dependent manner as compared to cells treated with LPS only. Taken altogether, morin-loaded niosomes showed a good potential for an anti-inflammatory agent in the intervention of neurodegenerative diseases.

Keywords: Neuroinflammation, morin-loaded niosomes, LPS, BV2 microglia

THE EFFECTS OF *Lactobacillus rhamnosus* PROTEIN FOR INCREASING LEUCOCYTES, MACROPHAGE CELLS AND ANTIBODY TITRE OF PROSTATE HYPERPLASIA MOUSE

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Prostate hyperplasia could be caused by inflammation in the prostate and urethra. Inflammation could increase cell proliferation. *Lactobacillus rhamnosus* is a probiotic bacteria, a lactic acid bacteria that could increase specific and nonspecific immune system to cure. In the present study, the effect of the *L. rhamnosus* protein on the numbers of leucocytes and macrophages, also on the antibody titre of hyperplasia prostate mice was examined. Sixty male mice were grouped into six groups. One group was the control group and the other groups were treatment groups (adding with 2, 4, 6, 8, and 10 µg/ml of *L. rhamnosus* protein by orally every day for 30 days). Each mouse was injected with 3 mg/kg body weight of testosterone hormone 4 times in 30 days for inducing prostate hyperplasia. On the thirtieth day, the blood from the heart was taken for leucocyte counting and the peritoneal fluid was collected by washing the peritoneal cavity of each mouse with PBS for macrophage counting. Supplementation with *L. rhamnosus* protein in prostate hyperplasia of mice resulted in a significant increase in the total of leucocytes, macrophages and the antibody titre. At 60 µg/mL concentration of *L. rhamnosus* protein had the maximum effect in all parameters.

Keywords: *Lactobacillus rhamnosus*, immune system, hyperplasia prostate

Esterification of Palm Fatty Acid Distillate to Synthesize Group V Base Oil

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Palm fatty acid distillate (PFAD) originates from the refining of crude palm oil and was reported to have free fatty acids (FFA) of over 89% leading it to be a suitable feedstock for laundry soap, animal feed, oleochemical processing and biodiesel. Majority of the FFAs found inside PFAD are palmitic and oleic acids (46.9 and 36.7% respectively) with traces of linolenic, stearic and myristic acids as well. Due to its high FFA content, PFAD was selected to be a potential feedstock to synthesize polyesters which falls under Group V of the API Base Oil guidelines. The price of PFAD is much lower than using oleic and palmitic acid as feedstocks for esterification and hence, cost of raw materials are lowered. Synthesis of polyesters was performed while varying reacting conditions such as temperature, time, feedstock:polyol ratio and catalyst type. Reaction was studied with two different polyols: trimethylolpropane (TMP) and neopentyl glycol (NPG). Conversion of PFAD to polyesters was determined using chemical composition analysis such as gas chromatography (GC-MS) and acid value tests. Based on the study, it was found that non-catalytic route of reaction lead to conversions above 60% while catalytic route lead to conversions above 89% via p-toluene sulfonic acid (PTSA).

Keywords: PFAD, esterification, trimethylolpropane, neopentylglycol, bio-lubricant

Rheological and Release Studies of Diphenhydramine Loaded Liposomal Gel

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Diphenhydramine hydrochloride (DPH) is an antihistamine commonly used to treat allergies. Topical formulations of diphenhydramine are developed to soothe itchy skin. However, the adverse effects associated with diphenhydramine hydrochloride often restrict its use. Taking into account of the aforementioned issue, the use of colloidal carrier system such as liposome has played an indispensable role in prolonging the therapeutic effect of drug. Hence, related side-effects of the drugs are minimized. The most common approach to formulate topical and transdermal liposomal delivery system is *via* incorporation of liposomes into gel. However, it is important to study whether the drug loaded liposome shows any influence on the rheological properties of the gel. This study aims to investigate the rheological properties of liposomal gel upon incorporation of DPH loaded liposomes in 0.25 % (w/v) carbopol gel. It was found that in the presence of DPH, the elastic modulus, critical strain and cohesiveness of liposomal gel has reduced significantly. We hypothesized that increasing the concentration of gelling agent could help to enhance the elasticity of the gel after incorporation of DPH. On the other hand, *in vitro* release behavior of the liposomal gel was also investigated. As expected, DPH loaded liposomal gel exhibited slower release compared to plain DPH gel over a period of 48 hours.

Keywords: Diphenhydramine hydrochloride, rheology, liposomal gel

Thermal Decomposition Study of Chicken Skin Fat in TGA/DTG Analysis and Pyrolysis Process

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Chicken skin fat (CSF) is one of the solid waste sources which are underutilized and usually ended in land fill. In this work, the efficiency of slow pyrolysis of chicken skin waste thermal decomposition was studied using TGA/DTG analysis by determining the apparent activation energy *via* model-free isoconversional method. In the present work, CSF was decomposed under inert flow up to 900°C in four different heating rates (5, 10, 15 and 20°C/min). TGA analyses showed that the main decomposition occurred from 340 to 440°C and the entire CSF was decomposed thereafter. No further decomposition was observed above 500°C since the remaining chicken skin waste had decomposed into bio-char. Differential thermal analysis (DTG) showed that the highest and the lowest heating rate resulted the same thermal conversion of CSF at 500°C and hence the lowest heating rate at 5°C/ min with the lowest apparent activation energy has been considered as the efficient decomposition condition to bio-oil. The pyrolysis of CSF was further investigated using a fixed bed reactor. The product was analyzed by using GC-MS where the bio-oil demonstrated different classes of organic compounds and complex mixture such as hydrocarbons (alkanes, alkenes, and cyclic compounds), aldehydes, ketone, esters and carboxylic acids. It is proposed that the CSF undergone cracking around 340 to 440°C to produce mostly long chain hydrocarbons as its decomposition pathway.

Keywords: Pyrolysis heating rate, chicken skin fat, kinetic, activation energy, TGA/DTG

Characterizing the Consumer's Behavior in the Adoption of Patient Social Network Systems for E-Patient Activities

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The e-patient movement and participatory medicine have risen the awareness of health literacy among the consumers, people of non-medical professionals. The consumers have been actively participating in a dedicated patient social network system (such as PatientLikeMe) to share health information and experience with others who encounter similar conditions. This patient collaboration provides valuable healthcare resources to develop an effective participatory medication among patients, caregivers, and medical professionals. This study aims to investigate what motivates the patient to participate in a patient social network system and how they engaged in e-patient activities, such participating in a discussion about a specific disease, comorbidity, or home treatment; and conducting an online consultation with medical professionals. The behavioral model is constructed based on the integration of Affective Events Theory (AET) and Self-Determination Theory (SDT). The AET is used to model the structure, the cause of affective driven behavior, and the consequences in the form of affective response. While SDT is used to model passion (i.e., engagement in patient social networks) and its relationship with behavior. The data analysis and the model testing are based on the Partial Least Square Structural Equation Modeling (PLS-SEM) using the responses of 428 patient social network users. The result indicates that the emotion of a particular event (such as medical history or past experiences) triggers the consumer's intention to participate in health information sharing and other e-patient activities. The findings from this study suggest the implementation of advanced personalization in a patient social network system to promote the consumer's participation. The advanced personalization includes emotion recognition based on the consumer's text analysis and the improvement of the patient's recommender system based on multiple parameters.

Keywords: health information sharing, behavioral model, patient network social system, affective events theory, self-determination theory

Social Identity Formation of Children in Deaf Art Community Yogyakarta-Indonesia

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This research paper discusses the formation of identity of children in the Deaf Arts Community Yogyakarta in Indonesia and the factors that may arise due to identity identification. Discrimination problem of persons with disabilities is often encountered, it greatly affects one's psychology, especially to determine their identity. In Indonesia there are many communities that accommodate people with disabilities to develop themselves, giving equal opportunities to people in general, including those conducted by the Deaf Arts Community. This is a qualitative research, with documentation studies and direct interviews with community members as resource persons. Referring to the analysis of the theory of the interpellation of Althusser and Marcia. The author uses Marcia's Interpellation Theory and Social Identity to analyze the formation of children's identities in the Deaf Arts Community Yogyakarta. The results show that there is a strong influence of ideology adopted by Deaf Arts Community Jogja in identifying members of the Deaf Arts Community Yogyakarta and other groups that do not belong to them. In addition, many influential driving factors include volunteers, parents and the society as individual social environments. The results of this study can help readers to be wiser people in socializing with other individuals both from the majority or minority, and from the same or different groups.

Keywords: social identity, ideology, interpellation, exploration, commitment.

On the Fractional Order of von Bertalanffy Growth Model

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The von Bertalanffy growth model has been applied in describing fisheries growth and bullhead growth. The model was derived from the von Bertalanffy ordinary differential equation. On the other hand, fractional derivative was used in the study of viscoelastic medium (a medium with viscosity and elasticity properties), image signal processing, and population growth modeling. In this paper, we extend the classical von Bertalanffy differential used into the fractional order model. We also study equilibria and their stability of the fractional order model. In addition, we applied the fractional order model to describe the dynamic of poultry growth, where the poultry growth data was cited from the literature.

Keywords: fractional order, von Bertalanffy growth model, poultry growth.

Cadmium Ion Absorptivity on Magnetite, Silica/Alumina, and Cellulosic Materials

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Absorptivity of small molecules in the surface of adsorbent depend on the dynamics in the interface, which depends also on some parameters, including the adsorbate's reactivity, adsorbent's surface activity as well as the porosity and tortuosity of the matrix. The solid-liquid interface with all their inherent complexity determines the behavior of adsorbate particles, while external condition from surface solution also plays their roles. Three types of surfaces on Cadmium ion absorptivities are described by the aid of spectroscopic methods. Atomic spectroscopy was the main tool to show the ions in the solid-liquid interfaces of magnetite, bio-silica from rice husk ash, commercial alumina, and cellulosic materials. The presence of co-ions Lead(II) shifted the Cadmium ion adsorption behavior, which in turn implying adsorption-desorption in physical interaction on different surface layers. Analysis of surface behavior can be applied to surface properties utilization in some applications. Moreover, building chemistry concepts for environmental processes would be beneficial.

Keywords: Cadmium ion, Magnetite, Silica/Alumina, Cellulose acetate, Lead(II) ion

Anodized Copper as a Simple Electrochemical Sensor for Glucose

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This work investigates the use of anodized copper as an electrochemical sensor for glucose. The anodized copper is easily prepared by applying a potential of +2 V vs Ag wire to a strip of cleaned copper in 0.1 M sodium hydroxide for 10 minutes. The sensor is able to sense glucose reliably to at least 10 mM in 0.1 M sodium hydroxide under quiescent condition with a mean sensitivity of 369 $\mu\text{A}/\text{cm}^2 \text{ mM}$ ($R^2 = 0.9953$) and the relative standard deviation of the sensitivity is 5.9 % (n=10). Limit of detection (LOD) and limit of quantitation (LOQ) are calculated to be 359.83 μM and 1090.41 μM , respectively. The sensor is evaluated against potential interfering chemicals such as hydrogen peroxide, fructose, ascorbic acid, and uric acid. It is found that in 0.1 M sodium hydroxide, the sensor is insensitive towards all tested chemicals except for fructose, where it responded with the same magnitude as towards glucose.

Keywords: Copper, Glucose, Electrochemical sensor

Kinetic Study of Esterification Reaction of Terpinyl Acetate from Turpentine Oil Catalyzed by Activated Natural Zeolite

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Turpentine oil contains α -pinene as its major compound (82%). This paper presents the kinetics study of terpinyl acetate formation by "*in situ*" esterification reaction of α -pinene. The reaction was conducted at various temperatures, namely, 30, 40 and 60°C for 1, 2, 3, and 4 hours. The optimum condition was found to be at 40°C for 3 hours of reaction which achieved 74.12% conversion based on α -pinene and 28.87% product selectivity. The reaction exhibited close to the second-order reaction type two. The reaction rate constant and reaction rate at 30, 40 and 60°C are 0.0003, 0.0019, and 0.001 h⁻¹; and 1.12; 7.04; and 3.69 mol L⁻¹ h⁻¹, respectively. The activation energy for reaction conducted at 1, 2, 3 and 4 hours are 12.96, 24.19, 87.65, and 49.01 kJ/mol, respectively.

Keywords: α -Pinene, Terpinyl Acetate, Kinetic Reaction

The Effort of Kampung Naga to Maintain the Culture Identity Thourgh Local Resistance Concept in Globalization Era

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In this era we can sense the current of globalization. It makes the world limitless, which means the industrialized and the developing countries can experience technologies. Nowadays, every country can easily access other countries' information by the technology, for example television and internet access. However, in fact, there is an anti-globalization movement which uphold the mores and the cultures such as Kampung Naga in Tasikmalaya regenc, Indonesia. It makes the Kampung Naga unique because its people live rather locally than globally. . The Kampung Naga people do not use any sort of electricity nor technology. This paper will discuss the main objectives: how do the people of Kampung Naga in Tasikmalaya Regency try to maintain the culture identity thourgh local resistance concept in globalization era? This research reviews the resistance of Kampung Naga in the concept of local resistance in globalization by reviewing the behavior which anti-globalization. The people of Kampung Naga assume that globalization brings negative effects. They do not want the globalization be the reason for the people to leave the mores.

Key words: globalization, alter globalization, local resistance

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The Use of Smartphones Against the Attitudes of Junior High School Students in Communicating to Parents

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This paper focuses on finding out how to use smartphones on the attitudes of junior high school students in communicating to parents in Yogyakarta, Indonesia. According to 2015 data from the kominfo.go.id website at least 30 million children and adolescents in Indonesia are internet users, and digital media is currently the main choice of communication channels they use. The study found that 80 percent of respondents surveyed were internet users, with evidence of a strong digital gap between those living in urban areas and are more prosperous in Indonesia, with those living in rural (and less prosperous) areas (kominfo.go.id, 2015). In some cases, many of us see that children basically just make the house a temporary stopover to show their emotions because their father and mother are busy. The lack of communication links can lead to an estrangement of emotional relationships. This study uses qualitative methods to see the relationship between smartphone use by children and their communication patterns with their parents. Therefore, this paper argues that the impact from the use of smartphones to the pattern of communication with parents is tangible.

Keywords: *Communication, High School Student, Smartphone, Parent, Yogyakarta*

The design control of airplane's movement by the influence of leader for tracking a desired path

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Airplanes should fly in compliance with the predetermined flight track to avoid accident. This paper discusses how to design the optimal tracking control from airplanes with the influence of a leader. There are four steps in designing the control of airplane's movement through leader influence. Firstly, we will modify the airplane model by adopting Fossen model [4]. Secondly, we will determine the trajectory that will be tracked by the movement of airplanes. Thirdly, we will design the control of airplane's movement by using tracking error dynamics methods to the leader and the agents. Finally, the numerical simulation output will be shown by error tracking of airplane's movement towards desired path followed by agents and the leader of the planes.

Keywords: plane model, tracking, error tracking, numerical simulation.

Azo dye decolorization by a novel ascomycotina fungus *Letendraea helminthicola*

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A novel ascomycotina fungus *Letendraea helminthicola* has isolated from raw textile wastewater with the ability to decolorize Congo Red (CR) up to 90% within 24h. The process was optimized using one-factor-at-a-time (OFAT) developed by the application to determine the effective decolorization rate. The investigated variables were solution pH (4-9), oxygen supply (anoxic and shaking), dye initial concentration (30-400 mg L⁻¹), temperature (25-35 C) and carbon and nitrogen source. The optimum conditions of pH, oxygen supply, dye initial concentration and carbon and nitrogen source for maximum decolorization rate of CR were achieved as 6, shaking, 300 mg L⁻¹, 25 C, glucose and yeast extract 0.1% (w/v), respectively. According to gas chromatography-mass spectroscopy studies, CR was biotransformed into different much simpler compounds based on the carbon and nitrogen source. Decolorization of CR could be worked in two process *i.e.* biodegradation involving the metabolite fate product and biosorption leading the active absorption using the live cell of the fungus. This study clearly suggests that this fungus was an appropriate biodegradation agent as also as absorbent for the removal of CR from aqueous solution.

Keywords: one-factor-at-a-time (OFAT), *Letendraea helminthicola*, biotransformation, biosorption, decolorization

Recyclable Fe₃O₄ Nanoparticles for Effective Degradation of Methylene Blue in Water by Photo Fenton Reaction

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The negative impact of industrial dye used on the environment necessitates the development of efficient methods for treating dye-contaminated wastewater, e.g., ion exchange, coagulation, Fenton's oxidation, photocatalytic degradation, and adsorption. Among the numerous materials used for dye removal, Fe₃O₄ is particularly interesting due to its ability to act as an adsorbent and a Fenton catalyst, being easily separable by application of a magnetic field. Herein, we describe a co-precipitation-based synthesis of Fe₃O₄ nanoparticles (particle size = 11 nm, surface area = 147.12 m² g⁻¹) from iron sand and investigate their effectiveness for methylene blue (MB) degradation. The above nanoparticles could promote the decomposition of MB both in the dark (via adsorption) and under UV light irradiation (via Fenton-type degradation), exhibiting the additional advantage of recyclability. Thus, MB degradation efficiencies of 76.32, 76.08, and 68.52% were achieved in the first, second, and third cycles, respectively, indicating that the prepared magnetic material is a promising recyclable catalyst for the decontamination of dye-containing wastewater. The photo Fenton reactions take to account for reproducibility of MB degradation.

Keywords: Fe₃O₄ nanoparticle, methylene blue, wastewater, Fenton, adsorbent

Antibacterial activities of zinc oxide nanoparticle-loaded soft contact lenses

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Soft contact lenses are one of the best forms of vision correction despite a high risk of keratitis incidence. Contact lenses that incorporate antibacterial properties may help to reduce the risk. Zinc oxide nanoparticles (ZnO-NPs) have demonstrated antimicrobial properties. It is an attractive alternative to silver nanoparticles or antimicrobial peptides for biomaterial surface coatings to prevent infection. In this study, the ability of zinc oxide nanoparticles-loaded soft contact lenses to prevent the growth of *Staphylococcus aureus* (gram positive) and *Pseudomonas aeruginosa* (gram negative) was investigated. Commercial contact lenses were rinsed with phosphate buffered saline (PBS), and then soaked in various concentrations of ZnO-NPs (≤ 50 nm) suspension in PBS (pH 7.4) for coating. Stability test on the nanoparticle coating was performed by measuring its absorbance for 28 days. The coating of ZnO-NPs on contact lenses reached its optimum on day 7. Subsequently, the coated lenses were transferred into 1.5 ml bacteria suspension and incubated at 37 °C. *Staphylococcus aureus* and *Pseudomonas aeruginosa* (10^5 cfu) were used in bacterial adhesion assay. The antibacterial effects of ZnO-NPs coated contact lenses against both strains were evaluated after 24 hours. The bacteria adhering onto the lenses were cultured using pour plate method for cell enumeration and assessed for the percentage of reduction.

Keywords: Bacterial adhesion, *Staphylococcus aureus*, *Pseudomonas aeruginosa*,
nanocoating, nanotechnology.

Creative Experiment: Preparing physics teacher candidates to become inquirers

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Preparing physics teacher candidates as professionals requires optimal and earnest effort. Not only provide them with knowledge but also with adequate teaching skills. One that is trained is creativity in designing and carrying out inquiry experiments. This study aims to analyze the effect of inquiry-based learning on creative skills of 25 physics teacher candidates in designing basic physics experiments using tools and materials in their surroundings. Based on the results of this study obtained data that it turns out that the physics teacher candidates are observant enough to see opportunities to design creative useful experiments from recycled materials in their environment and give hope that they can become inquirers.

Keywords: creativity, inquirer, physics teacher candidates, basic physics

Preliminary study on nutritional supplement consumption among athletes in selected universities

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Nowadays nutritional supplements are widely used in all levels of sport. Despite of its good benefits, nutritional supplement also associated with health issue and doping cases which became the major concerns for most athletes including the varsity athletes. Based on the previous studies, there is gap identified which is most studies conducted on elite athletes in the western countries. Thus, this study will focus on student athletes in selected universities in Malaysia. This study aims to identify the type of nutritional supplement; identify the nutritional supplement consumption; and study the relationship between nutritional supplement and type of sports. Moreover, questionnaires are distributed to 100 varsity athletes and the findings show the type of supplement used by them is thermogenics; protein product; energy type; creatine and others. Next, the frequency of nutritional supplement consumption among them is 38% and the highest reason by the athletes is to improve athletic performance (54%) and the lowest reason is to improve physical appearance (4%). Furthermore, it is identified that athletes involved in contact sports and team sports use higher nutritional supplement compared to the individual sports such as tennis. Results indicate it is a need for nutrition education among the varsity athletes to achieve the Government's effort to develop high performance athletes.

Key words: type of sports, student-athlete, health, physical appearance, energy.

Incorporation of Nitrogen by Plasma Focus Irradiation

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The experiment is carried out with the 3 kJ dense plasma focus (DPF) with Mather type coaxial electrode. Nitrogen with the initial pressure of 1 to 3 mbar is used as a filling gas. In the experiment, nitrogen beam of energy density of $1-10 \times 10^{10} \text{ J/m}^3$ and energy about 100 keV were produced. Effect of irradiation of the nitrogen ion beam onto the Zinc Oxide (ZnO) nanowire layer is investigated. In each irradiation, the target sample is treated by the nitrogen beam for a brief duration of up to few hundred nanoseconds. After the pinch phase of the plasma, a plasma jet may also be produced. The plasma jet consists of metallic plasma due to erosion of the inner electrode during the discharge. In this case the copper plasma jet achieved a velocity of $3 \times 10^7 \text{ cm/s}$. The contact of the plasma jet with the target may lead to destruction of the sample surface due to the heavy copper particles. The incorporation of the nitrogen onto the target is achieved with an attenuator. The target sample of ZnO nanowire layer is grown by solution method. After the irradiation, the samples are characterized with field emission scanning electron microscope (FESEM), x-ray spectroscopy (XRD) and x-ray photoelectron spectroscopy (XPS). The XPS result shows that nitrogen atoms have been successfully incorporated into the ZnO nanowire film. The morphology of the ZnO nanowire layer remained with no visible deformation. The energetic nitrogen ion beam potentially can be used for nitrogen doping of ZnO, to give the p-type counterpart from its n-type native entity.

Analytical Applications of Cyclodextrins and Metal-Organic Frameworks

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Cyclodextrins (CDs) and metal-organic frameworks (MOFs) are utilized in many diverse fields of analytical chemistry, due to their propensity to form reversible inclusion complexes and recognize analytes selectively. This feature shows how these materials can serve analysts in sample preparation, sensitivity and selectivity improvement, enantio-separation and creating single-molecule sensors. In this presentation, we focus mainly on various strategies in the preparation and modification of cyclodextrins and metal-organic frameworks and their corresponding applications in analytical chemistry.

Effect of (SnO₂:TiO₂) Nanoparticles on Charging Performance of Integrated DSSC-Supercapacitor

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Energy is a major requirement in everyday life. The harvesting energy, as well as the storing energy, is crucial to being developed. Many individual research of DSSC or other solar cells systems, as well as the energy storage systems, have significantly improved. Many disadvantages are arising. To overcome the problem, it is necessary to combine the solar cells and their storage in one integrated system. In this report, we show the charging performance of electrical energy from DSSC into supercapacitor. In this study, we simply describe the synthesis of various photoanodes of SnO₂/TiO₂ composite nanoparticles with variations of wt% TiO₂ 0%, 9%, 18%, 27%, 36%, and 100%. The films have been prepared using the screen printing method followed by blending with dye β -carotene and combined an additional layer of ZnO symmetric supercapacitor to become a solar-supercapacitor. It is found from X-RD analysis showed that TiO₂ and SnO₂ particles were successfully synthesized with the grain size ranged from 8.9 nm to 26 nm. The energy gap produced by SnO₂/TiO₂ composite nanoparticles is 3.07 to 3.15 eV. The addition of TiO₂ nanoparticles increases the efficiency of solar cells. The performance of optimum solar cell SnO₂/TiO₂ composite nanoparticle in TiO₂ variation was 36% with J_{sc}, V_{oc}, Fill Factor, the efficiency of 0.388 mA, 0.806 V, 0.452 and 0.819% respectively. The charging from DSSC into supercapacitor was detected the increase of capacitance under light illumination. It is shown that the supercapacitor is able to store the energy produced by the conversion of light into electricity in the solar cell.

Keywords: DSSC, Solar-Supercapacitor, β -carotene, SnO₂/TiO₂, charging

Effect of Different Terminal Substituents on the Mesomorphic Behavior of Azo-Ester Based Liquid Crystals

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A series of new polymerizable liquid crystalline macromers containing azo-ester linkage with lateral methyl substitution and different terminal unit which consists of alkoxy groups substituents (–OCH₃, –OCH₂CH₃ and –OCH₂CH₂CH₃) were successfully synthesized and characterized. The chemical structure of the new macromers were confirmed by FT-IR and ¹H NMR. The mesomorphic behavior and thermal stability were investigated by using differential scanning calorimetry (DSC), optical polarizing microscopy (POM), and thermogravimetric analysis (TGA). Thermogravimetric study revealed that all three compounds exhibit two-staged thermal decomposition. Onset decomposition temperature (T_{onset}) for all the compounds are above 310°C and these results indicate that the synthesized compounds are of excellent thermal stability. Results from POM shows the nematogenic liquid crystal (LC) phase behavior for all the compounds and exhibit wide mesophase temperature range.

Keywords: azo-ester; lateral methyl; alkoxy; mesomorph phase behavior; thermal property

Chemometrics in Authentication of Bentong Ginger

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ABSTRACT

Overview of Chemometrics, Computational Chemistry Research Group, and facility at Data Intensive Computing Center will be present. The research areas included Chemometrics, Quantum Mechanics, Molecular Mechanics, Simulations, Automation and Big Data Analytics. Focus will be on the application of chemometrics approach in authentication of Bentong Ginger. Briefly, the performance of hydrodistillation on the essential oils derived from Bentong gingers were modeled with a factorial design and optimized for quantitative recovery. The influence of extraction factors on the quality of the oils were evaluated with principal component analysis based on the corresponding gas chromatography-mass spectrometric fingerprints which revealed the association between chemical variability and the extraction processes. By controlling the analytical process, the sample variation were investigated via chemometric tools. The results suggested some characteristic volatiles of the oils derived could serve as chemical describers to enhance the discrimination capability between the Bentong ginger samples and others by linear discriminant analysis. In term of the elemental variability, chemometric assisted inductively coupled plasma-mass spectrometric fingerprinting provides another mean to authenticate the geographical origin.

Keywords: Essential Oils, Food, Pattern Recognition, Traceability, *Zingiber officinale*

PATTERN ANALYSIS OF BOOKS CIRCULATION USING GENERALIZED SEQUENTIAL PATTERN ALGORITHM

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ABSTRACT

The Library is an information center that functions to provide, process, and disseminate sources of information / library materials needed by the academic community. The association rule method using the Generalized Sequential Pattern algorithm can be used to analyze the pattern of borrowing books at the library. The variables used are member code, book borrowing date, title and book subject. The results of the pattern of this system can explore information about the relationship between books in each transaction carried out by visitors. The purpose of this study is to provide information to visitors about related books and recommendations of related books. The results of the analysis of book borrowing data using a minimum support and a minimum confidence so that the output generated by the system is based on the input in the form of rules, book titles and subject rules on the pattern of data borrowing books in the library. All patterns formed are sequential rules. The results of the research are rules that can be used to support the progress of library management.

Keywords: Data Mining, Rule Association, Generalized Sequential Pattern, book borrowing, pattern analysis

Analisis Kemampuan Menafsirkan Informasi dalam Berpikir Kritis Aljabaris

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ABSTRAK

Penelitian ini bertujuan untuk mendeskripsikan kemampuan menafsirkan informasi dalam berpikir kritis aljabaris siswa. Sumber data dalam penelitian ini adalah siswa kelas VIII SMP Negeri 2 Ambarawa. Jenis penelitian deskriptif kualitatif, pengumpulan data dengan metode tes dan wawancara. Berpikir kritis aljabaris diukur dengan mengacu *Watson-Glaser Critical Thinking Appraisal (WGCTA)*. Hasil tes berpikir kritis aljabaris mengacu Watson-Glaser dianalisis secara deskriptif kuantitatif, kemudian dipilih 6 subjek masing-masing 2 subjek yang termasuk kelompok atas, menengah, dan bawah untuk dilakukan wawancara. Triangulasi dilakukan dengan menggunakan 2 subjek yang berbeda utk setiap tingkatan dan perbandingan hasil tes dan hasil wawancara. Hasil penelitian ini menunjukkan bahwa subjek kelompok atas mampu menafsirkan informasi rendah sampai sedang, subjek kelompok menengah mampu menafsirkan informasi rendah sampai sedang, dan subjek kelompok bawah kemampuan menafsirkan informasinya rendah.

Kata kunci: Menafsirkan Informasi, berpikir kritis aljabaris

DEVELOPMENT OF CRITICAL THINKING ABILITY THROUGH EDMODO ASSISTED PROBLEM BASED LEARNING MODEL

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Abstract

The purpose of this research is to develop critical thinking skills of students participating in the Medical Nuclear Physics course, through Edmodo's assisted Problem Based Learning (PBL) model. Aspects of critical thinking skills developed consist of classifying, assuming, hypothesizing, analyzing, evaluating and conclusions. The research design used quasi experiment, one group pretest and posttest. The results showed that every aspect of critical thinking skills were developed, classifying, assuming, hypothesizing, analyzing, evaluating and conclusions were increases. The results of the normalization gain test are on the medium criteria except assuming that the criteria is high.

Keywords: Edmodo, PBL, critical thinking

MULTICULTURAL EDUCATION BASED SCIENCE LEARNING THROUGH TRADITIONAL GAME TO IMPROVE STUDENTS' SCIENTIFIC ATTITUDE AND CRITICAL THINKING

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Purpose – This research was conducted to know the influence of multicultural education-based science learning through the traditional game with inquiry model to improve students' scientific attitude and critical thinking.

Methodology – The design used was quasi-experimental design with nonequivalent control group design. Samples were taken using purposive sampling technique. A sample of 72 students in junior high school was selected. Data is collected by observation, documentation, and test. Students' scientific attitude improvement was measured through observation that its improvement was seen in each meeting and tested to know the difference between experiment class and control class. Critical thinking skill was measured through pretest and posttest, then the improvement was seen by counting N-gain, its significance was seen through significant t-test, and the difference was seen by using paired t-test.

Findings – The result showed that students' scientific attitude improved in every meeting and the result of paired t-test showed that experiment class was better than control class. Students' critical thinking aspect improved in every meeting which was shown with N-gain result. The improvement result was significant, and experiment class was better than control class in critical thinking.

Significance – The results of this study are important for teachers if they want to improve the scientific attitude and critical thinking skills of students. The use of traditional games makes students more excited, while the use of inquiry models trains students to think critically.

Keywords: science learning, multicultural, traditional game, inquiry, scientific attitude, critical thinking.

Gold Mineralization of Kecamas Quarry, Pahang, Malaysia

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The Kecamas quarry near Kechau Tui is one of the important shear-zone related gold deposits in the Central Belt of Peninsular Malaysia. The deposit is located along NNE trending splays from the main Bentong-Raub Suture Zone, a major terrane boundary that marks the collision of the Sibumasu and East Malaya terranes during the Indosinian orogeny (Triassic). Late Permian limestone characterize the Kecamas quarry and the country rocks have undergone low-grade regional metamorphism. The limestone sequence is mostly massive, hard, fine- to medium- grained and has sedimentary features such as oolitic fabric. Wall rock alteration is characterized by silicification and sericitization. The primary gold mineralization is structurally controlled by the sub-vertical right-lateral faults and shear zones. There are two styles of mineralization in Kecamas quarry, namely, tetrahedrite-rich quartz veins and galena-rich quartz veins mineralization. Gold mineralization is confined to quartz veins and disseminations in the wall rock. The quartz (and minor carbonate) veins have the ore assemblage of tetrahedrite, pyrite, galena, chalcopyrite and sphalerite, with gold/electrum as visible gold and refractory in sulfides. Gold fineness varies from 747 to 956, with Au/Ag ratios in the ore from from 0.3 to 1. The bulk ore chemistry indicated the geometric mean values of Au and Ag are 17 ppm (2 - 170 ppm, 1 σ variation range; n = 21) and \approx 130 ppm (63 - 320 ppm, 1 σ variation range; n = 8), respectively. Wall rock sulfidation is possibly responsible for the bulk of the gold precipitation and hydraulic fracturing with pressure/temperature decrease are thought responsible for the precipitation of slightly later Ag-rich gold and electrum. The broader geotectonic context of ore formation is probably lithospheric delamination and this deposit can be considered as mesozonal orogenic gold deposits.

Keywords: Gold mineralization, orogenic gold, Bentong-Raub Suture Zone, gold fineness, mining

Automatic Identification of Ring Enhancing Lesion Pattern in Cases of Brain Infection and Metastasis Brain Tumor Based on Invariant Moment Features Classification

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ABSTRACT

The brain infection and metastasis brain tumor in CT Scan examination have similar ring-enhancing lesion patterns. This research aims to develop a program that aids the radiologists to identify these brain disorders. The radiologists often have difficulties and mostly subjective when distinguishing the ring-enhancing lesion whether brain infection or metastatic brain tumor, especially in patients with no previous history of the disease. With these limitations, this research produces a Computer Aided Diagnose (CAD) system in order to assist the radiologists in brain disorders observing from the images of CT scan brain scanning. The CAD system is supported by features extraction method which is generated using the combinations of Hu's invariant moment features. The decision maker uses the backpropagation neural network method to classify the brain disorders based on their invariant moment features that could help the radiologists when identifying the brain abnormalities. The results of brain abnormalities identification including normal, brain infection, and metastasis brain tumor give the good performance with 88.9% accuracy, 86% sensitivity, and 100% specificity.

Keywords: CT scan, identification, invariant moment features, backpropagation, neural network.

The Performance of Nonparametric Regression for Trend and Seasonal Pattern in Longitudinal Data

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ABSTRACT

Nonparametric regression is a method used to investigate the functional relationship between predictor variables and response variables, where regression curves estimated by certain functions will approach the corresponding data patterns based on their characteristics. The current nonparametric regression analysis does not only use cross section data but also uses longitudinal data. Longitudinal data is data with repeated measurements for each observation subject. In the measurements for each subject there may be a trend, seasonality, or a combination of both. In addition, in the cross-section elements, sometimes such data patterns are encountered. These data patterns are found in various fields such as meteorology, economics, and health sciences. In this study, the performance of nonparametric regression estimators that are often used are applied to longitudinal data to determine which estimator is appropriate in modeling trend and seasonal data patterns. The nonparametric regression estimator used is the truncated spline estimator, the Nadaraya-Watson kernel, and the Fourier series which contains linear functions and complete trigonometric bases. The performance indicators used are the Generalized Cross Validation or GCV values for the optimal quantity parameters for each estimator. In addition, the smallest of Mean Square Error or MSE value and the biggest of determination coefficient can be used as a comparison in determining the best estimator suitable for modeling trend and seasonal data patterns in longitudinal data. This study shows that the Fourier series estimator has the best performance indicators in modeling trend and seasonal data patterns for longitudinal data.

Keywords: nonparametric regression, trend and seasonal data pattern, longitudinal data, performance indicator

Mobile Application for Selecting of Official Motorcycle Workshop in Surabaya Using Fuzzy Method Based on Geographic Information System

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ABSTRACT

Transportation needs in Surabaya are very important to support daily activities. Every year, the number of motorbikes in Surabaya has increased. This increase was also followed by additional distribution of motorcycle workshops as services and maintenance. The purpose of research is to develop a mobile application to assist users in finding and selecting the location of the nearest official motorcycle workshop based on geographic information systems. The decision-making process of system uses fuzzy logic.

The system is made in five stages. The first stage is the needs analysis related to the factors that influence decision-making along with the limitation of values of factors. The influencing factors are workshop distance, road density, number of mechanics, average customer per day and customer recommendations. The second stage is processing data and membership function information. The third stage is fuzzy logic analysis including fuzzification, inference and defuzzification. The fourth stage is the design and construction of the system. The fifth stage of system evaluation.

Based on the results of the evaluation, the system is made according to user needs.

Keywords: mobile applications, search and selection systems, geographic information systems, fuzzy logic

Immunomodulatory potential of polysaccharides from *Coriolus versicolor* against intracellular bacteria *Neisseria gonorrhoeae*

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ABSTRACT

For many years, people use natural product from plant and fungal to improve immune response against microorganism. This study was aimed to investigate the immunomodulatory properties of polysaccharides (PS) from *Coriolus versicolor* in mice infected by intracellular bacteria *Neisseria gonorrhoeae*. Thirty six female Balb/C mice were divided into six groups: normal control, negative control, positive control, P1 (PS before infection), P2 (PS after infection) and P3 (PS before and after infection). PS was administrated for 10 days. *N. gonorrhoeae* was infected twice with two weeks gap from the first to second exposure with dose of 10^6 cells. One week after the end of treatment, level of oxidants, innate immune responses and adaptive immune responses were measured. This study showed that PS administration could restore the number of leukocytes as normal but could not enhance the number of phagocytes and its activity. PS administration also showed immunosuppression activity by lowering NO levels in P2 and P3 groups ($P < 0,05$). This result showed that PS prevent over-expression of pro-inflammatory cytokines by decreasing phagocytic activity. Contrast with innate immune response result, PS administration could significantly increase IFN- γ level in P1, P2 and P3 groups ($P < 0,05$). Level of antibodies was significantly increased in P3 group ($P < 0,05$). PS administration also showed increase level of TNF- α but the difference was not significant ($P > 0,05$). PS enhance adaptive immunity due to capability of *N. gonorrhoeae* that able to survive and replicate in phagocytes. Thus, PS from *Coriolus versicolor* could be potentially be used as natural immunomodulator against intracellular bacteria.

Keywords: polysaccharide, immunomodulator, *Neisseria gonorrhoeae*, immune response

Assessing Nutritional Status of Children in East Java Province, Indonesia Using Local Standard Growth Charts Based on Multi-Response Local Linear Estimator

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ABSTRACT

In Indonesia, standard WHO-2005 growth charts are used for assessing of nutritional status of children up to five years old. The samples used to design WHO-2005 standard charts are children from Brazil, Ghana, India, USA, Norway, and Oman that have different physical conditions from children in Indonesia. Usage of standard growth charts from other countries cause incompatibility with Indonesian's children growth. Anthropometry measurements used to measure children physical growth are not only weight but also height and body mass index. Among weight, height and body mass index of children, there are significant correlations between each other, so that they are better modeled by multi-response than single response. The children growth around one year old grow rapidly, and then decrease slowly along with increase of children's age, so the local modeling of children growth charts are more suitably modeled by using local linear model approach. In this paper, we design local standard growth charts, i.e., weight for age, height for age and BMI for age of children up to five years old by using samples from children in East Java province, Indonesia. Next, we use these local standard charts for assessing nutritional status of them. The percentage of normal nutritional status of children in East Java province, Indonesia based on the local standard charts are higher than those based on WHO-2005 standard charts.

Keywords: Nutritional Status, Children Up To Five Years Old, Local Standard Growth Charts, East Java Province, Multi-Response, Local Linear Estimator

Fabrication and Characterization of Breast Phantom Based on Gelatin-Glycerin-TiO₂ for Continuous Wave Diffuse Optical Tomography

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ABSTRACT

The fabrication and characterization breast phantom based on gelatin-glycerin-TiO₂ as breast simulation tissue is proposed and investigated. A sample preparation is done by mixing 3 grams of gelatin per 10 ml of saline. The sample is added by glycerin with variation concentration of 85%, 90%, 95% and 100% as sample a, b, c and d. The sample d is optimum is able to survive at room temperature for 126 hours. Then, sample d is added by TiO₂ given variation includes 0,010 grams, 0,015 grams, 0,020 grams and 0,025 grams. All samples are tested the homogeneity and absorption coefficient phantom using Continuous Wave Diffuse Optical Tomography (CW-DOT) with wavelength of 780, 808 and 830 nm. The results shows the optimum sample characterization is achieved at wavelength of 830 nm with variation of TiO₂ 0.025 grams. The absorption coefficient breast phantom is obtained at 0.167 mm⁻¹. The CW-DOT can be applied at material characterization.

Keywords: Breast phantom, gelatin, glycerin, titanium dioxide, and optical tomography.

Chickfeed Application for Effective Cost Broiler Feed Based on Dual Simplex Method

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ABSTRACT

The cost of feed ranked as the largest expenditure of the total production. The farmers face difficulty to determine the quality and quantity of feed in accordance with the needs of livestock and economical cost. We proposed to develop android based application system by using dual simplex method for resolving broiler feed formulation problems. The system was called ChickFeed. This study consisted of three stages. Firstly, the determination of a mathematical model to minimize the objective function for cost effective broiler feed using dual simplex algorithm. Secondly, the development of ChickFeed application using waterfall method. Thirdly, the system evaluation based on usability, accuracy, functional completeness, performance, and the overall system. From our experimental results, the system was running well based on the black box testing. Testing of eleven functional cases between the expected and actual outputs was appropriate. Furthermore, the examination of three until seven decision variables was equal with other linear programming software such as Lindo. Moreover, the system has been evaluated by five prospective users through questionnaires. The calculation of Likert Scale was 87.43%. The proposed application was considered very important for farmers to minimize broiler feed cost and very useful with an offline system due to the limitation of internet connection for rural areas.

Keywords: Linear Programming, Dual Simplex Algorithm, Feed Formulation, Android, Black-Box

Effects of Sucrose Concentration and Immersion Frequency on Biomass and Flavonoid Production of *Gynura procumbens* (Lour.) Merr Callus Culture in Temporary Immersion Bioreactor

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ABSTRACT

The study aimed to investigate the effects of sucrose concentration and immersion frequency on biomass and flavonoid production of *Gynura procumbens* in temporary immersion bioreactor. Concentration of sucrose could influence the production of biomass and secondary metabolite while liquid culture method often suffers from asphyxia and hyperhydricity from long immersion. Temporary immersion bioreactor could solve these problems by way of regulated immersion frequency. Callus was obtained from stem nodes and stem internodes grown in MS agar medium supplemented with 0.1 mg L⁻¹ 2,4-D (2,4-dichlorofenoxyacetic acid) and 0.1 mg L⁻¹ IAA (indole acetic acid). In temporary immersion bioreactor modified from RITA, calli were cultured in MS liquid medium supplemented with various concentration of sucrose (3%, 5%, and 7%) and immersion frequencies of 15 min, interval 12 h and 5 min, interval 3 h. Cultures were maintained for 28 days. Results showed that combination of sucrose 5% and immersion frequency 15 min, interval 12 h produced the highest biomass. On the other hand, combination of sucrose 7% and immersion frequency 15 min, interval 12 h produced the highest flavonoid.

Keywords: *Gynura procumbens*, temporary immersion bioreactor, biomass, flavonoid, callus culture

THE STUDY OF PLASMA PARAMETER AND THE EFFECT OF EXPERIMENT SET UP MODIFICATION BY USING MODELING SOFTWARE

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ABSTRACT

The plasma technology has grown and become important in many sector, especially in the industrial sector. The characterization and the improvement of the experiment set up were important to achieve the optimum process and better result in the plasma processing. The characterization process can be done by using plasma measurement devices and modeling software. In the present study, the modeling software was utilized to characterize the plasma parameter. The characterization process were focus in the plasma parameter i.e. electron and ion density. Furthermore, the modeling software was employed to design and modifying the experiment set up. The COMSOL software was utilized to study the effect of electron density. The pressure and DC-bias voltage were varied during the modeling process. The high electron density was achieved in the high pressure. In parallel, the high electron density was achieved in the high DC bias voltage. JMAG software was utilized to modify and analyzing the experiment set up. Originally, the electric field distribution was concentrated in the electrode and DC-bias plate. The strong electric field was indicated with green color. The electric field distribution was moved to the center area in the modification of experiment set up. The modifications of experiment set up provided the new way to confine the electric field. The high concentrate of electric field was indicated the high movement of electron and effective for plasma processing process.

Keywords: plasma, electron density, plasma modeling, electric field, and plasma diagnosis

Characterization Sperm Quality and Fertility of The *Cyprinus carpio* after Exposed of Copper Heavy Metal

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ABSTRACT

Water pollution by heavy metal waste from industry, agriculture and other human activities affects the reproductive health of aquatic biota, especially freshwater fish. The purpose of this study was to analyze the quality of sperm *Cyprinus carpio* after exposure to copper heavy metal. The sample used was gonad mature fish, 1-1.2 kg, 1-2 years old for male and 1.5 kg, 1.3-3 years old for female. The sperm and egg of fish were taken by striping with repetition treatment from six times. The concentrations of copper used were 0 (control), 10, 25, 50 and 75 ppm examined the sperm quality (duration of motility and viability), DNA fragmentation, MDA levels, and fertility of fish. The data were collected after sperm were incubated with variation of copper concentration for five sec. Observation of sperm using inverted and fluorescence microscope. The results show that the exposure of 10 ppm copper did not effect of the mass and individual sperm motility, viability, and fertility of the fish, but it has effected of the sperm DNA fragmentation. If the concentration was increased (25 ppm and more) could decreased of sperm quality, fertility, and it was increased the MDA levels of sperm significantly ($P < 0.05$) after exposure of copper.

Keywords: Copper, Sperm Quality, DNA Fragmentation, MDA, Fertility

Effects of Curcumin Antioxidant Activities on MDA Serum And Lead Levels In Mice Liver

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Human and animals can accidentally be exposed to heavy metals as free radicals from the environment such as lead (Pb). The objective of the research was to evaluate the antioxidant activities of temulawak curcumin in mice that were exposed to lead. Study was conducted in twenty five male mice grouped into five categories of treatments: P1 (control), P2 (Pb 75 mg/kg BW), P3 (Pb 150 mg/kg BW), P4 (Pb 75 mg/kg BW + curcumin 20 ppm), P5 (Pb 150 mg/kg BW + curcumin 20 ppm). *In vitro* antioxidant activities of curcumin were found to be strong with IC-50 value of 10.5 ppm. In addition to increased lead concentration in the liver from the exposure, the increase in malondialdehyde (MDA) serum level was also observed. The administration of curcumin helped to reduce MDA serum levels significantly. In conclusion, curcumin has the potential to subjugate the effects of lead exposure.

Keywords: Antioxidant, Curcumin, Lead, Liver, MDA

Effectiveness and Risk of Using Ovoid and Vaginal Cylinder Applicators in Brachytherapy of Indonesian Patient Cervical Cancer

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Brakiterapi is one method for treating cervical cancer by bringing the radiation source closer to the tumor using the help of an applicator. There is an organ at risk (OAR) that has the chance to receive radiation, namely the bladder and rectum. This study aims to determine the dose received, the difference in dosage, and the level of safety of OAR using an ovoid applicator and vaginal cylinder. A total of 8 data on radiation doses of the bladder and rectum using ovoid and vaginal cylinder. The initial dose is 6 - 8.5 Gy. Calculation of doses using the 3D method is to calculate the dose on 2cc volume (D22) using a dose volume histogram (DVH). The dose of OAR radiation was analyzed using independent t test. The average dose received by the bladder is 4.8475 Gy for the use of ovoid applicators and 4,75125 Gy for vaginal cylinders. The average dose received by the rectum is 5,50375 Gy for the use of ovoid applicators and 5,16375 Gy for vaginal cylinders. There were no significant differences in the doses received by the bladder and rectum for patients treated with ovoid applicators and vaginal cylinders ($p = 0.877$ and $p = 0.548$). Safe applicators produce small doses for OAR. Both applicators have the same level of security based on statistical tests. However, the vaginal cylinder gives a smaller dose to the OAR. Because of the results of previous studies, vaginal cylinder applicators are more effective in the treatment of cervical cancer, so it is better to use this type of applicator.

Keywords: Brachytherapy, Radiation Dosage, Applicator, Ovoid, Vaginal cylinder, DVH, Bladder, Rectum

MULTI-DOCUMENT AUTOMATIC TEXT SUMMARIZATION FOR BAHASA INDONESIA BY USING CENTROID-BASED

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Automatic Text Summarization (ATS) is a computer application that creates a summary of the document automatically to produce the most important information from the originating document. By using feature extractions, sentence weighting is required to get the most important information. This research is conducted a multi-document ATS for Bahasa Indonesia by using centroid-based feature extraction that has 3 phases, namely pre-processing, sentence weighting, and sentence selection as a summary. One hundred documents online from detik.com are used to evaluate the system. F-measures as a combination of precision-recall is used to measure performance of the system. Results from experiments show that F-measures value of the system is 0.47, higher than Auto Summarization feature of Microsoft Word with F-measures value of 0.20.

Keywords: Automatic Text Summarization, Multi-document, centroid-based, Bahasa Indonesia

Kinship analysis of *Merremia* sp plants in Baluran National Park

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Merremia peltata is a liana plant with fruit like grapes that has ability to suppress other vegetation in the forest. This ability can cover the soil quickly and reduce soil disturbances (erosion) and loss of nutrients. The purpose of this study was to find out (1) how *Merremia Peltata* molecular DNA from various sampling locations based on chloroplast gene? (2) How is the relationship between *Merremia peltata* from various sampling locations with molecular biosystematics analysis based on chloroplast gene? The sample of this study was carried out by taking the leaves of *Merremia peltata* plants in five forest locations in Baluran National Park. There are three activities in this study, namely (1) DNA isolation, (2) gene sequencing analysis, and (3) data interpretation with the help of bank genes. The results obtained were the *Merremia* genus with three species, namely *Merremia peltata*, *Merremia tuberosa* and *Merremia umbelata*. The conclusions obtained were (1) obtained *Merremia* genus with three species, namely *Merremia peltata*, *Merremia tuberosa* and *Merremia umbelata*, and *Dioscoria zingiberases*, *Dioscoria glabra*, *Dioscoria fordii*, *Erycibe coccinea*, *Classus hexangularis* and *Dichandra micrantha* from various sampling locations in the national park Baluran. (2) kinship between samples of species found in the national park Baluran are *Merremia peltata*, *Merremia tuberosa* and *Merremia umbelata* (family *Convolvaceae*) closer to *Erycibe coccinea* (family *Convolvaceae*) and further with *Dioscoria zingiberases*, *Dioscoria glabra*, *Dioscoria fordii* (family *Dioscoreaceae*) and *Classus hexangularis* and *Dichandra micrantha* (family of *Vitaceae*).

Keyword ; *Merremia* sp, gene sequencing analysis.

Mesomorphic behaviour of new azo-ester linked liquid crystals

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A series of azo-ester linked mesogen containing liquid crystalline acrylate compounds, M1-M3 having different electron-withdrawing terminal groups (-Cl, -Br, -CN) were successfully synthesized and characterized. The chemical structure and the purity of the compounds has been investigated by using spectroscopic techniques of FTIR, ¹H-NMR and ¹³C-NMR. Thermogravimetric analysis (TGA) was used to study the thermal properties of the investigated compounds. Herein, -Br substituted compound (M2) showed a higher thermal stability as compared to others due to its bigger molecular size. The mesophase behaviour of all the synthesized compounds were investigated by Differential Scanning Calorimetry (DSC) and Optical Polarizing Microscopy (OPM). Throughout DSC and OPM studies, it revealed that all of the compounds showed enantiotropic liquid crystal behaviour and exhibited a nematic type of mesophase. For instance, M1 showed a nematic texture at 139°C with a mesophase range of 67°C. While M2 showed a grainy nematic texture at 134°C with a mesophase range of 100°C. Last but not least, M3 exhibited a Schlieren nematic texture at 156°C with a mesophase range of 82°C as agreement with OPM and DSC result.

Keywords: azo-ester linked materials, lateral methyl substituted, electron-withdrawing substituent, liquid crystalline behaviour

OPTIMIZATION OF ETHERIFICATION OF ALKOXY K-CARRAGEENAN REACTION ON CARBOXYMETHYL KAPPA CARAGEENAN SYNTHESIS

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Carboxymethyl *kappa* carrageenan (CMKC) is the result of carboxymethylation process of *kappa*-carrageenan. Synthesis of CMKC consists of two steps; the first stage is the alkoxy formation step of *k*-carrageenan and the second step is etherification of alkoxy *k*-carrageenan to form CMKC. This article reports the optimization of the etherification of alkoxy *k*-carrageenan by adjusting the ratio between monochloroacetic reagents (MCA) and *k*-carrageenan and the reaction temperatures. In this experiment, CMKC was synthesized in two steps. In the first step, *k*-carrageenan was reacted with NaOH (1:7.2) in isopropanol: ethanol (5:1) at 40 °C, then the results of the first step reaction reacted with MCA in the mass ratio between MCA and *k*-carrageenan are 0.8:1, 2.5:1 and 4.8:1. Then the optimal ratio between MCA to *k*-carrageenan was determined based on the degree of substitution (DS) of hydroxyl groups in *k*-carrageenan by carboxyl groups using the titrimetric method. The value of DS was determined at 1.8:0.8:0.3. To determine the optimal etherification temperature, etherification under the optimal ratio of MCA:*k*-carrageenan at 60, 70 and 75 °C had been performed. The DS was reached for synthesis of CMKC under the ratio of *k*-carrageenan:NaOH (1:7.2), the alkoxy step temperature was 40 °C, and the ratio of *k*-carrageenan:MCA at 1:0.8, at 60-75 °C, were 1.5:1.8:1.2. The optimal etherification temperature determined by the highest DS value of CMKC were produced. By this research the optimal condition to synthesis CMKC was found in isopropanol:etanol media (5:1), under the mass ratio of NaOH:*k*-carrageenan (1:7.2), and the alkoxy formed temperature at 40 °C, the mass ratio between *k*-carrageenan:MCA (1:0.8) and the etherification temperature at 70 °C. The DS reached in the optimal condition was 1.9.

Modified Chitosan for Drug Delivery

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The main challenges during systemic drug delivery are toxic side effects, non-specific interactions with healthy tissues, and premature clearance by the reticuloendothelial systems (RES). Chitosan, a naturally occurring stealth material, is one of the excellent alternatives to prolonged circulation and evasion of immune clearance. However, the use of chitosan in the biomedical field is often restricted by its poor solubility in water. The chemical modification of its reactive functional groups such as amino group or hydroxyl group at the fundamental skeleton of chitosan will improve its properties in diverse fields mainly in pharmaceutical, biomedical, and biotechnological fields. In this study, N-acylated chitosan with unsaturated acyl group of different chain length (C4 – C24) has been successfully synthesized from acylation reaction between the amine group of chitosan and acyl chlorides or anhydrides. The structures were confirmed with the FTIR and ¹H NMR analyses, as well as the change in zeta potential to a negative value after grafting the acyl groups. The successful preparation of O-acylation chitosan was also reported through protected N-phthaloyl chitosan as an intermediate. The particle size of modified chitosan was measured using dynamic light scattering technique. High-Resolution Transmission Electron Microscope (HRTEM) and field-emission scanning electron microscope (FESEM) micrographs exhibit a spherical shape of modified chitosan, whereby the increase in acyl chain length is proportional to the size of particles. Encapsulation of modified chitosan with different drug model showed that encapsulation efficiencies strongly depend on the chain length and drug solubility. Due to its excellent properties, such as biodegradable, biocompatible and non-toxic natural polymer, modified chitosan offers a promising alternative as a material for polymeric nanoparticle drug delivery and coating materials for various drug delivery systems such as liposomes, micelles, and microemulsion.

Keywords: Chitosan; modified chitosan; stealth; polymeric nanoparticle

A transcriptome study on *Rattus rattus* infected with pathogenic *Leptospira* spp.

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Leptospirosis is one of the most common zoonotic and an emerging infectious disease caused by the pathogenic spirochete genus *Leptospira*. Rats are believed to be the main reservoir that are commonly associated with leptospiral infection. It is very crucial to elucidate the host pathogen interaction thoroughly in order to mitigate the circulation of this disease. In this study, RNA was extracted from both healthy and naturally leptospire-infected rats, *Rattus rattus*. The comparative study was done on the healthy and unhealthy kidney and liver tissues corresponding to the infections of *Leptospira interrogans* and *L. borgpetersenii*, respectively. RNA sequencing (RNA-Seq) approach was used for reference-based transcriptome assembly, mapped to the genome of *R. norvegicus* using the BGISEQ-500 platform. Our study evaluates the differential gene expressions (DGEs) of pro- and anti-inflammatory mediators of candidate cytokines and chemokines immune responses in both organs during the infections. Expression of four cytokines namely, tumor necrosis factor- α (TNF- α), interleukin (IL)-1 β , IL-6, IL-10, and two chemokines of macrophageinflammatory protein-1 (MIP-1 α /C-C-type chemokine ligand 3, CCL3) and gamma interferon-inducible protein 10kDa (IP-10/C-X-C-type chemokine ligand 10, CXCL10) were observed from our transcriptome data. When comparing both infected kidney and liver tissues, all the cytokines and chemokines were up-regulated in the kidney with an exception for the anti-inflammatory cytokine IL-10 which was down-regulated in both infected organs. The similar patterns of gene expression were observed in the infected liver, with an addition of IP-10/CXCL10 gene which was also being suppressed in an unhealthy liver as compared to the healthy one. The role and distinctive expression of each cytokines and chemokines described the progression of leptospirosis. These genes were highly related to the immunopathogenesis of leptospirosis. Further downstream analysis using quantitative real-time polymerase chain reaction (qPCR) is necessary to validate the expression of the candidate immune genes in both normal and infected organs.

Keywords: *Rattus rattus*; *Leptospira*; RNA-Seq; DGEs; immune responses

A simple $\text{BF}_3 \cdot \text{Et}_2\text{O}$ promoted *exo*-selective Diels-Alder reaction between chalcones and (4*E*,6*E*)-alloocimene

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Alloocimene is an acyclic monoterpene that acts as a diene in a Diels-Alder reaction. Allo-cimene has four different stereoisomers. In the present work, we examined the reaction of (4*E*, 6*E*)-alloocimene with *trans*-chalcone using commercially available boron trifluoride diethyl etherate ($\text{BF}_3 \cdot \text{Et}_2\text{O}$). In this experiment, a one pot reaction condition was optimized and the adduct was formed via predominantly *exo* transition state. Further experimentation was carried out to investigate the effect of different substituents of *trans*-chalcones on the diastereoselectivity. The final product was purified using silica chromatography and characterized using Nuclear Magnetic Resonance (NMR) and Liquid Chromatography-Mass Spectrum (LCMS). A series of *exo*-selective Diels-Alder adducts were synthesized in moderate yields.

Keywords: alloocimene, *exo*-selective, $\text{BF}_3 \cdot \text{Et}_2\text{O}$, Diels-Alder, chalcone, Lewis acid

Development of indazole-based derivatives as potential leucine rich repeat kinase 2 (LRRK2) inhibitors for Parkinson therapy

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Parkinson's Disease (PD) is a degenerative disorder of the central nervous system that affects 1-2% of the global population. The etiology of PD is complex but the most common phenotype is the loss of dopaminergic neurons of the substantia nigra leading to the clinical symptom. Currently available PD treatments mainly address the dopamine deficiencies of the disorder. Levodopa (L-Dopa) is widely used but often cause L-dopa induced dyskinesias. Mutations in Leucine-rich repeat kinase 2 (LRRK2) gene cause PD and are associated with higher activity of the LRRK2 protein. Therefore, modulation of LRRK2 kinase activity by selective small-molecule inhibitor has been proposed as a potentially viable treatment for PD. Herein, we report the *in-silico* study of indazole derivatives M-series, as potential LRRK2 inhibitor. The homology models of LRRK2 were constructed using Swiss-model based on the kinase domain with LRRK2 inhibitors. Docking studies were performed using Autodock 4.0 to predict the protein-ligand binding affinities, while Biovia Discovery Studio Visualizer was used to investigate their binding interactions. The obtained results were compared to a reported LRRK2 inhibitors, indazole MLI-2. The *in-silico* study showed that the M-series represent a promising scaffold for subsequent optimization.

Keywords: Parkinson's Disease, Leucine-rich repeat kinase 2, LRRK2 inhibitors, mutations.

The effects of TiO₂ on the performance of silver coated on side-polished fiber

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This work reports experimental and numerical investigation on the effect of titanium oxide towards the optical fiber surface plasmon resonance (SPR) sensors coated by metallic Ag layer. Then, by varies the refractive index media of liquid, we identified the most sensitive RI acting on the Ag-TiO₂. We numerically investigated the optimal thickness of TiO₂ and the effect of different RI for the performance in the proposed sensor and compared it from typical layer deposited of silver only by using comsol approach. It is shown that the combination of a 40 nm thickness silver inner layer with a dielectric titanium oxide layer of a specific thickness improve sensor performance in terms of sensitivity reading and single noise ratio. Not only does the TiO₂ over-layer offer a cost-effective alternative to gold for overcoming the oxidation problem, but also it allows resonance wavelength-tunability and is compatible with tailoring the sensor working region to the third telecommunication wavelength window around 1550 nm.

Keywords: Surface plasmon resonance (SPR), fiber optic sensor, refractive index (RI), comsol.

Synthesis and Fluorescence Studies of Selected *N*-aryl-2-aminoquinolines: Quenching of Fluorescence by Hydrogen Bonding, Electron-donating and Electron-withdrawing Groups

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A series of *N*-aryl-2-aminoquinolines was synthesized from substitution reaction between 2-chloroquinoline and anilines with different substituent groups gave sufficient yield from 72 - 90%. The fluorescence behavior was investigated in toluene, ethyl acetate and ethanol. The result shows that fluorescence quantum yield of *N*-aryl-2-aminoquinolines was the highest in toluene, followed by in ethyl acetate and finally in ethanol. Lower fluorescence quantum yield was observed in ethanol, indicating that fluorophore-solvent hydrogen bonding caused fluorescence quenching. The bell-shaped Hammett plot of various substituted compounds suggested that both strong electron-donating and electron-withdrawing groups caused significant quenching in the fluorescence quantum yields. Therefore, type of substituent group on phenyl moiety and hydrogen bonding between fluorophore and solvent were found as crucial contributors to fluorescence quenching of *N*-aryl-2-aminoquinolines.

Keywords: *N*-aryl-2-aminoquinolines; fluorescence quenching; hydrogen bonding; substituent effects

Customer Satisfaction Analysis of Online Taxi Mobile App User using Customer Satisfaction Index and Importance Performance Analysis

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Online taxi mobile app is an online public transportation booking application. Many customers were complaining about the poor performance of the application. This study aims to analyze the quality of online taxi mobile app services based on the importance and performance of user perceptions. The Customer Satisfaction Index (CSI) method was used to determine the level of satisfaction of online mobile taxi app customers, and the Importance-Performance Analysis (IPA) method was used to determine variables and attributes that need to be improved based on the Cartesian diagram. Service quality variables in this study are the quality of route recognition, server quality, interaction quality, application quality, service quality, user satisfaction, user complaints, and user loyalty. The results showed that the overall level of online taxi customer app satisfaction with the CSI method was 76.117% which was in the *cause of concern* category. Whereas the Cartesian diagram showed that there were seven attributes to be fixed, seven attributes to be maintained, five attributes considered for improvement, and four attributes to be reduced by the company. The recommendations given were improving application performance, improving service complaint features, increasing speed in location scanning, and improving synchronization between customer and driver.

Keywords: customer satisfaction, customer satisfaction index, importance performance analysis, online taxi mobile app, public transportation

A first-principles study on quantum tunneling of methylhydroxycarbene isomerization in various solvents

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Quantum tunneling commonly occurs in nuclear physics, but nowadays it is observed in molecular as well. For example, isomerization of trans-HCOH to H₂CO is available due to quantum tunneling. Here, we attempt to study isomerization of trans-methylhydroxycarbene (C₂H₃OH) to acetaldehyde and vinyl alcohol using density functional theory (DFT). We determine the path reaction under ten different solvents where the solvents are modeled by the polarizable continuum model. We calculate the tunneling probability using Wentzel-Kramers-Brillouin (WKB) approximation to get the half-life of its corresponding solvent. The results show that the shortest half-life is in aqueous solution, which mean the tunneling rate highly occurs in water solvent.

Keywords: methylhydroxycarbene isomerization; quantum tunneling probability; density functional theory.

The Effect of *Garcinia mangostana* Extract on ALT and AST Levels and Liver Structure in Streptozotocin Induced Diabetic Mice

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Diabetes mellitus has become serious problem health in the world. This research was aimed to determine the effect of *Garcinia mangostana* Crude extract on the destruction of liver structure and the decrease ALT and AST levels of diabetic mice. Twenty four mice male Balb/C strain were divided into 6 groups. Normal control group (KN) which was only induced with water, diabetic control group (KD) which was induced by streptozocin (STZ) 5 days continually, metformin control group (KM), treatment group 1 (P1) by dose 50 mg/kg of *Garcinia mangostana* extract, treatment group 2 (P2) by dose 100 mg/kg of *Garcinia mangostana* extract, and treatment group 3 (P3) by dose 200 mg/kg of *Garcinia mangostana* extract. *Garcinia mangostana* extract was injected for 14 days by per-oral method. Animals in each group were euthanasia injected to get blood samples from intracardiac and liver organ for histological liver injury. Destruction of liver tissue was measured using a light microscope with a magnification of 40x10, the liver samples of each mice was observed in 3 different views for each samples. Statistic analysis showed that crude extract of mangosteen peel has decrease significantly ($p < 0,05$) on the levels of ALT, AST, hidropic, nekrosis, and swollen cell injury injury.. Thus, it can be concluded that the crude extract of *Garcinia mangostana* has regenerate significantly on the destruction of liver tissue and the decrease ALT and AST levels of diabetic mice.

Keywords: ALT, AST, Diabetes mellitus, *Garcinia mangostana*, Liver structure

Third order optical non-linearity studies of graphene on different substrate

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We report investigation of nonlinear optical properties using graphene on glass and polyethylene terephthalate (PET) substrates. Preparation of graphene involves chemical vapour deposition (CVD) process. Sample used have a thickness from 0.34nm to 2nm maximum; consisting single layer to 3 layers maximum. It is known that the two-dimensional material, graphene possesses a promising third-order susceptibility. Here, the Z-scan technique was used in order to measure the nonlinear absorption and nonlinear refraction of the fabricated graphene layers. The corresponding experiments were carried using the femtosecond laser at the 620 nm wavelength. In this work, PET is favoured due to its nature which has potential in flexible electronics devices. Graphene on PET substrate shows better nonlinear properties compare to graphene on glass substrate.

Keywords: graphene, third order nonlinear optics and polyethylene terephthalate (PET)

New Promising Generation Material for Magnetic Solid Phase Extraction of Polycyclic Aromatic Hydrocarbons in Environmental Samples

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Polycyclic aromatic hydrocarbons (PAHs) have been classified as potential organic pollutants containing two or more fused aromatic rings of the carbon and hydrocarbon atom that may possess dangerous threat to our environment and living creatures due to their mutagenic, carcinogenic, and endocrine disrupting properties. The occurrence of these pollutants has become the environmental concern toward public. In this present study, magnetic nanoparticles (MNPs) nanocomposites modified with polyaniline (PANI) coated with newly synthesised dicationic ionic liquid (DICAT) forming MNP-PANI-DICAT were successfully synthesised as new generation material through magnetic solid phase extraction (MSPE) for monitoring of PAHs in environment. MNP-PANI-DICAT was characterised by various techniques and the results were compared with MNP-PANI and native MNP. This new material was applied as a magnetic adsorbent for the pre-concentration and separation of PAHs due to the π - π interaction between PANI shell and DICAT with PAHs compounds. Under the optimal conditions, the proposed method was evaluated and applied for the analysis of PAHs in environmental samples using gas chromatography-mass spectrometry (GC-MS). The validation method showed good linearity (0.005 - 500 $\mu\text{g L}^{-1}$) with the coefficient of determination (R^2) > 0.999. The limits of detection (LOD) and quantification (LOQ) of the developed method (MNP-PANI-DICAT-MSPE) were in the range of 0.0008 – 0.2086 $\mu\text{g L}^{-1}$ and 0.0024 – 0.6320 $\mu\text{g L}^{-1}$, respectively. The enrichment factor (EF) of PAHs on MNP-PANI-DICAT-MSPE were in the range of 7.546 to 29.632. The extraction recoveries of natural water, sludge, and soil samples were ranged from 80.2 – 111.9% with relative standard deviation (RSD) less than 5.6%. The newly synthesised MNP-PANI-DICAT possess good sensitivity, reusability, and fast extraction of PAHs under the MSPE procedure in various environmental samples.

Keywords: Dicationic ionic liquid, Polyaniline, Magnetic nanoparticles, Polycyclic aromatic hydrocarbons, Magnetic solid phase extraction

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1 message

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