INTERNATIONAL CONFERENCE
NAME 09
NATURAL AND MATERIAL SCIENCES

ISBN : 978-602-96044-0-5

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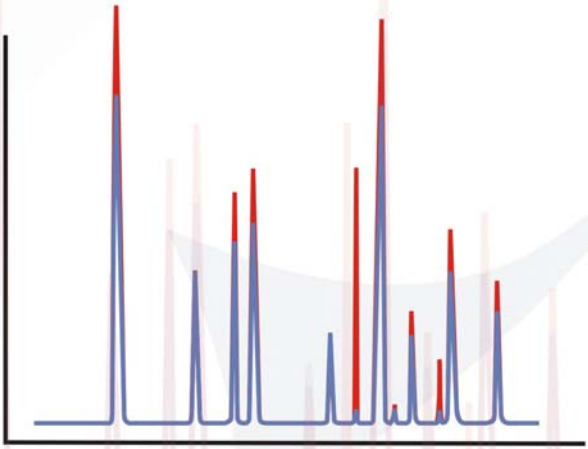

NAMES 09
PROCEEDING

JULY, 3-4 2009. RATTAN INN BANJARMASIN, INDONESIA

Proceeding of International Conference on Natural and Material Sciences

First Published: September 2009

Cover Design : Ori Minarto, AMd
Setting and Layout : Ori Minarto, AMd

Publisher:
Fakultas Matematika dan Ilmu Pengetahuan Alam
Universitas Lambung Mangkurat
Jl. Jenderal Ahmad Yani Km 35,8 Banjarbaru
Phone : (0511) 4773112
Fax : (0511) 4773112

ISBN : 978-602-96044-0-5

FOREWORD

The International Conferences on Natural and Material Sciences 2009 (NAMES09) was conducted on the 3rd and 4th of July 2009 in Banjarmasin, Indonesia. The aim of the conference was to initiate international network of scientific collaboration in research and education of natural and material sciences. The conference was attended by 68 active participants that discussing diverse issues of natural and material sciences including Physics, Material and Chemistry, Applied Mathematics, Biology, Pharmacy, and Natural Products. In addition, 16 posters of research results on the topics were exhibited.

Editor

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Prof. Dr. Che Husna Azhari

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TEACHING STATISTICAL CONSULTING: ENABLING SKILLS TRANSFER AND ADDING VALUE

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A statistical consultant needs to understand the scientific process in order to develop models suitable for testing, have the quantitative expertise to apply the statistical test appropriately and communicate the issues involved effectively. A successful consultant will not only address the problem but will teach the client something about statistics and with this transfer of skills enable the client to make better decisions in the future.

This paper will discuss the skills that need to be acquired by a statistical consultant and cover some techniques developed to teach these skills in the Master's Degree in Statistics and Operations Research at RMIT University in the first semester of 2009. The author draws on over 40 years as a consultant developing testable models for medical researchers, business analysts, government policy makers and academic researchers with examples where ingenuity was required to handle non-standard decision problems.

NATURAL MEDICINES

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Natural products were the only drugs available for along time, and among the modern drugs in use today about 40% are natural origin. These include many of our most important drugs for which no synthetic substitutes exist. These are isolated from the producing organisms, purified and compounded into tablets, injectables etc for direct use as drugs. Other drugs are derivatives of natural products where the chemical structure has been modified to yield a product with desirable pharmacological properties.

Lately, supplement products based on natural products have been very popular and marketed worldwide. These products are completely different in term of their development and applications to that of modern medicines discussed above. Some examples of drugs used today of natural origin and supplement products will be presented in this lecture.

Keywords: *Natural products, modern drugs, supplements*

NANOPARTICLE PRODUCTION FOR SUPPORTING NATIONAL INDUSTRY

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It is believed that nanotechnology will become the next industrial revolution. Indonesia, a country with abundant of natural resources and 4th largest in population, has to take advantage for development of nanotechnology. This required appropriate strategy regarding to Indonesia's potential and capability in advancing technology. Main focus for developing nanotechnology in Indonesia consist 5 areas, which are nanomaterial, nano-pharmaceutical & healthcare, energy, nanobiotechnology and nano-electronics and device. It is predicted that nanoparticle consumption will increase 10 time during 2005 to 2010. Indonesia has great potential in supplying nanoparticles for their application in industry. That's why Indonesia must strengthen technology to produce nanoparticles, along with supporting technology.

Keywords: *Nanoparticle, nanomaterial, national industry, supporting*

NANOSENSORS (OPTICAL SENSORS FOR DETECTION OF ENVIRONMENTAL POLLUTANTS AND TOXINS)

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Detection of environmental pollutants and toxins produced as a result of extensive industrial and agricultural activities is of high importance nowadays. The list of chemicals of interest is long and includes heavy metals, organic chemicals, pesticides, herbicides, etc. Some toxins (e.g. mycotoxins) may naturally occur in agriculture products and food stored in inappropriate conditions. The environmental legislation in EU, US, and worldwide set high standards for minimal concentration of those toxic pollutants, typically are in the ppb (part per billion) range. The detection of the above mentioned analytes in low concentration is a very difficult task, mostly because of their low molecular weight. The use of optical sensors having high sensitivity offers a solution for this problem. The design of specific receptors for every single toxin is another difficult problem. That is why the biosensing approach utilising natural and highly specific receptors, such as antibodies and enzymes, is very promising.

The formation of molecular sensing layers by means of organic film nanotechnology (Langmuir-Blodgett films, electrostatic layer-by-layer deposition, polyelectrolyte microcapsules, etc.) and the development of novel optical techniques for chemical and bio-sensing (particularly those based on the detection of the phase of electromagnetic waves) are the main directions of research work in our research group at Sheffield Hallam University (SHU). The method of Total Internal Reflection Ellipsometry (TIRE) recently adapted at SHU [1] combines the advantages of high sensitivity of spectroscopic ellipsometry and experimental conveniences of Kretchmann SPR (surface plasmon resonance). In contrast to the conventional SPR based on the monitoring the intensity of reflected p-polarised light, the method of TIRE

detects two parameters Ψ and Δ related to the amplitude ratio and the phase shift of p- and s- components of polarised light. As a result the sensitivity of TIRE is about 10 times higher that of conventional external reflection ellipsometry and SPR techniques [2]. The method of TIRE in conjunction with direct immune assay was successfully utilised for detection of different low molecular weight toxins, such as pesticides and mycotoxins, and achieved the sub-ppb level of detection [1-4]. The method of TIRE can easily cope with detection of larger size antigens and thus highly suitable for various biomedical applications.

Further development and scaling down of phase sensitive optical methods for chemical and bio- sensing may utilise planar waveguides. A simple planar waveguide device consisted of a $SiO_2/Si_3N_4/SiO_2$ sandwich structure on silicon wafer can operate as a polarisation interferometer where p-polarised component of light is affected by molecular absorption while s-components is not and thus serves as a reference. The phase shift between p- and s- components developed in the course of adsorption constitutes the output of a sensor. Modelling and test experiments showed further increase in sensitivity in two orders of magnitude [5]. The same waveguide operating in the regime of attenuated total reflection was utilised for detection of traces of heavy metals and pesticides in sub-ppb concentrations in water [6, 7].

References:

1. A. Nabok, A. Tsargorodskaya, A. Hassan, N. F. Starodub, Appl. Surf. Sci., 246 (2005), 381-386
2. A. Nabok, A.Tsargorodskaya, Thin Solid Films, 516 (2008), 8993-9001
3. A. Nabok , A. Tsargorodskaya, A. Holloway, et al., Biosens. & Bioelectron., 22 (2007), 885-890
4. A.V. Nabok , A. Tsargorodskaya, A. Holloway, N.F. Starodub, Langmuir, 23 (2007), 8485-8490
5. A. Nabok, Organic and inorganic nano-structures, Artech House Inc, Boston , 2005
6. A.V. Nabok, S.Haron, A.K. Ray, IEE Nano-Biotechnol. 150 (2003), 25-29
7. A.V. Nabok, S. Haron, A.K. Ray, Appl. Surf. Sci., 238 (2004), 423-428

MATHEMATICS

ABTRACTS

MODELING TECHNIQUES TO MEASURE AND QUANTIFY A PORTFOLIO OF CREDIT RISK

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In this paper, we examined a framework for measuring and quantifying the risk of isolated credit facilities such as loans. We now need to do the same for a portfolio of credit risks. However, this effort requires a different set of tools because we need to include the effects of correlation. Correlation describes the axtent to which loans tend to default at the same time. Intuitively, we would expect that companies would have some tendency to default together. This could happen because the whole economy is in recession, forcing many companies into bankruptcy at the same time, or it could be that the default of one company triggers the default of another company. In this discussion, we describe the five most common approaches used to measure the credit risk of a portfolio. Each approach estimates the probability distribution for the credit losses and specifically estimates the portfolio's expected loss, unexpected loss, and economic capital. This allows us to determine how much capital the bank should hold to maintain its credit rating. Finally, we apply the method to analyze the credit data from some Banking in Indonesian.

Keywords**:** *Distribution, covariance, correlation, expectation, economic capital.*

THE GROUNDWATER POLLUTION ESTIMATION BY THE ENSEMBLE KALMAN FILTER

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In the industrial area in city such as Surabaya, the groundwater quality is influenced by the industrial pollution. Therefore, it is important to estimate the distribution of groundwater pollution. One of the algorithms to estimate is Kalman filter. Kalman filter is combined the data measurement with mathematic modeling. There are many modification of Kalman filter such as Extended Kalman Filter (EKF), that reduce rank square root Kalman filter (RRSQRT filter), Unscented Kalman Filter and , Ensemble Kalman Filter (EnKF). Here we estimate the concentration of groundwater pollution by using the Ensemble Kalman filter (EnKF). In Kalman filter, we guess the initial estimation by one value of those variables, but in the EnKF we generate the ensemble value as the initial estimation. We generate from the normal distribution. Here we choose the industrial area in Surabaya as case study of this problem. We simulate this algorithm by using MATLAB and we compare the accuracy and computational time between the Ensemble Kalman filter with Kalman filter.

CRITICAL SETS OF EDGE MAGIC TOTAL LABELING OF CYCLE AND EXPANDING CYCLE GRAPH

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A paper will study about graph labeling. We will find edge magic total labeling of cycle and expanding cycle graph. In the final, we investigate the critical set of edge magic total labeling on cycle and expanding cycle graph.

Keywords: *Edge magic total labeling, cycle graph, critical set.*

THE APPLICATION OF ENSEMBLE KALMAN FILTER TO ESTIMATE HEAT CONDUCTION DISTRIBUTION

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The Ensemble Kalman Filter (EnKF) is a data assimilation method designed to provide estimates of the state of a system by blending information from a model of the system with observations. This method uses an ensemble (statistical sample) of state estimates to represent nonlinearity. One point that has to be considered when using EnKF is the size of ensemble. It is highly related with error estimates and computational cost. The goal of this paper is to investigate the relationship between size of ensemble, error estimates and computational cost in two dimensional heat conduction models. We use numerical simulation using MATLAB to accomplish the goal. The result can be used as a reference to decide the appropriate size of ensemble.

DETERMINING THE LATEST COMPLETION TIMES IN PROJECT NETWORKS WITH FUZZY ACTIVITY TIMES USING FUZZY NUMBER MAX-PLUS ALGEBRA

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The activity times in a project network are seldom precisely known, and then could be represented into the fuzzy number, that is called fuzzy activity times**.** This paper aims to determine the fuzzy latest completion times and fuzzy float times in the project networks with fuzzy activity times using fuzzy number max-plus algebra. The finding shows that the project network with fuzzy activity times can be represented as a matrix over fuzzy number max-plus algebra. The project networks dynamics can be represented as a system of fuzzy number max-plus linear equations. The fuzzy latest completion times for each node in the project networks is a solutions vector of the modified system. The fuzzy float times for each activity in the project networks can be determined by using some operations of matrices over interval max-plus algebra.

Keywords: *max-plus algebra, fuzzy number, project network, fuzzy activity times,* latest completion times.

OPTIMIZATION OF FUZZY RELATIONS OF FUZZY TIME SERIES MODEL USING COMBINATION OF SINGULAR VALUE DECOMPOSITION AND *QR* FACTORIZATION METHODS AND ITS APPLICATION TO FORECASTING INFLATION RATE

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Modelling fuzzy time series based on table lookup scheme (Wang's method) from training data was done. The Wang's method is a simple method that can be used to overcome the conflicting rule by determining each rule degree. The weakness of fuzzy time series model based on the method is that the fuzzy relations may not be complete so the fuzzy relations can not cover all values in the domain. Generalization of the Wang's method has been developed to construct completely fuzzy relations. But too many fuzzy relations result complex computations. This paper presents a method to optimize fuzzy relations using combination of singular value decomposition and *QR* factorization methods. Then, this method is applied to forecast inflation rate. The prediction of inflation rate using the proposed method has a higher accuracy than that using the Wang's method and generalized Wang's method.

Keywords: *fuzzy relation, fuzzy time series, singular value decomposition, QR factorization, inflation rate.*

MEAN-MVAR PORTFOLIO OPTIMIZATION UNDER CAPM BY NON CONSTANT VOLATILITY

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In this paper, we investigated the optimal safety first models properties of portfolios build under the traditional mean-variance (VAR) or mean-modified value-at-risk (MVaR) approachs with those created the Roy Criteria, Kataoka criteria, and Telser criteria. Unlike asset allocation procedures that build on volatility or MVaR as a measure of risk and portfolios selection, the use of those criteria and the risk-return relation of the optimal portfolio trades off between mean, variance, skewness and kurtosis. We identify efficient portfolios under the three competing frameworks and analyze their optimal allocations.

Keywords**:** *Variance, Modified Value-at-Risk, Safety first models, Portfolio selection, Efficient frontiers.*

THE USE OF GAMMA AND BURR DISTRIBUTION TO ESTIMATE THE PROPORTION OF NON-CONFORMANCE FOR NON-NORMAL TREATMENT TIME DATA

(Case Study of Cervical Cancer Patients at Ulin Hospital, Banjarmasin)

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Process capability has been applied in the field of medical to improve the detection of medical problems. In this paper, sixty-nine cervical cancer patients' data obtained from Ulin Hospital, Banjarmasin, Indonesia, and their treatment time data have been used to assess the condition of patients with respect to the progress of their cancer with the upper specification limit (USL) value equal to 8 days. The data set departs from the concept of normality.

Gamma distribution with parameter α and β has been assumed as the appropriate fitted distribution for the observed data, with p-value greater than 0.250 at 5% significant levels, to estimate the proportion of non-conformance (PNC) with respect to the USL. Burr distribution with parameters c and k has also been applied as a comparison to Gamma distribution in estimating PNC.

Estimate of α and β for Gamma distribution can be obtained either using *Minitab* or *Mathematica*. On the other hand, Burr distribution parameters c and k of Burr distribution can only be achieved by *Mathematica* since it is not the most common distribution in statistics and therefore some statistical packages cannot recognize the form of its distribution unless it is symbolically specified.

Maximum Likelihood method has been applied for estimating the parameters. Consequently, the obtained values of estimated parameters will be used in calculating the proportion of non-conformance (PNC).

The results show that Burr distribution provides a better estimate of PNC in treatment time with the smallest estimated error/residual of 0.018.

Keywords: *Proportion of Non-Conformance (PNC), Treatment Time, Cervical Cancer Data, Gamma Distribution, Burr Distribution, Maximum Likelihood Estimation (MLE).*

EFFECT OF CORRELATION TO LOGISTIC MODEL AND PROBIT MODEL ON MULTIVARIATE BINARY RESPONSE

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In this paper, we discuss effects of correlations to parameters logistic regression and probit model on multivariate binary response. We assume that each of n individual observed T response. Y_{it} is t^{nd} response on i^{nd} individual/subject and each response is binary. Each subject has covariate X_i (individual characteristic) and covariate Z_{ijt} (characteristic of alternative j). Individual response i can be represented by $\mathbf{Y}_i = (Y_{i1},....,Y_{iT})$, Y_{it} is t^{nd} response on i^{nd} individual/subject and each response is binary. In order to simplify, we choose one of individual characteristics and alternative characteristics. We studied effects of correlations using data simulation. Methods of estimations used in this study are General Estimating Equations (GEE) and Maximum Likelihood Estimator (MLE). We generate data and estimate parameters using software R.2.8.1.

Keywords: *Random Utility Model, Simulated maximum likelihood estimator, GEE, simulator GHK , Newton-Raphson*.

INCIDENCE ALGEBRA OF NON LOCALLY FINITE POSET

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In Mathematics area, specifically algebra, The incidence algebra is defined only for locally finite partially ordered set (poset). It is related to the operation of multiplication.
If we change it into arbitrary poset, we have to be aware with the operations. Here we show the characteristic of incidence algebra of non locally finite poset dealing with invertibility, idempotent and regular elements.

Keywords: *incidence algebra, non-locally finite poset.*

KRIGING METHOD IS USED TO ESTIMATE MINERAL RESERVES

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A study about Kriging method has developed over 30 years. Kriging is an estimation method that gives the best unbiased linear estimates of point values or block averages. There are three types of Kriging estimators : ordinary kriging used when the mean is unknown, kriging the unknown mean value and simple kriging used when the mean is known. This study shows how to use the fitted 3D variogram model to krige point values then block grades and presents the structural analysis for a mineral deposit. As the model has a high nugget effect, a large kriging neighbourhood is required and shows what happens when smaller neighbourhoods are used.

Keyword : *Kriging Method, Best Unbiased Linear Estimators*.

THE GENERAL SOLUTIONS OF NONLINIER DIOPHANTINE EQUATION

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Diophantine equation consists of two groups, that are linear Diophantine and nonlinear Diophantine equations. Both having different method in searching integer solution. Nonlinear Diophantine equation more complex than linear Diophantine equation. Nonlinear Diophantine equation has the solution which different each other as according to its equation form. The Pythagorean theorem explains that the sum of the squares of right triangles is equal to its hypotenuse squares. In Pell's equation, which is in general form of $y^2 - nx^2 = m$, where m and n are integer. If n negative, hence the equation has only a finite number of solutions. If n is a square number, is that $n = a^2$, hence the equation reduces to $(y - ax)(y + ax) = m$. The most interesting case of the equation arises when n is a positive integer not a square.

This research result indicates that one of way to find general solutions of nonlinear Diophantine are with finding primitive solution. The Pythagorean triples which are in form of $x^2 + y^2 = z^2$ and $x^2 + ky^2 = z^2$, with $(x, y, z) = 1$ that mean is the greatest common divisor of $x, y,$ and z is 1, and also Pell's equation which is in form of $y^2 - nx^2 = 1$, with k is prime and n is a positive integer which is not a square have many solutions.

Keywords: *Diophantine equation, Pythagorean triple, Pell's equation.*

REVISED SIMPLEX METHOD

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Revised simplex method is sequel of standard simplex method, this method is developed first by Dantzig and kith to settle a variety weakness in standard simplex method. Revised simplex method do to count trick that equals standard simplex method which is from basis solution that knew towards the other basis solution by substitutes one basis vector with one nonbasis vector, that will raise objective function point.

The base difference with standard simplex method which is concern table purpose process. In simplex method points of $\mathbf{Y}_j$, $\mathbf{X}_B$, $\mathbf{z}_j - \mathbf{c}_j$ and $\mathbf{z}$ accounted by earlier been transformed on each iteration, but in revised simpleks method by points of $\mathbf{Y}_j$, $\mathbf{X}_B$, $\mathbf{z}_j - \mathbf{c}_j$ and $\mathbf{z}$ not necessarily been transformed all, but can accounted direct if acknowledged $\mathbf{B}^{-1}$.

Keywords : *Simplex method, Revised simplex method.*

BIOLOGY

ABTRACTS

THE POTENTIAL MEDICINAL PLANTS IN NIPAH MANGROVE AREA AT PULAU RIMAU DISTRICT, BANYUASIN REGENCY, SOUTH SUMATRA

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Nipah forest as one of mangrove area which dominantly grow in Banyuasin area at South Sumatra has potency in providing diverse of potential medicinal plants. But because of mangrove exploitation such as convertion and continuously harvest of nipah leaves, it was threated in lossing the potential medicinal plants species which not explored and used optimally yet. So its necessary to identify the species of potential medicinal plants which contained in the nipah mangrove. The research used survey method in sampling the plants and used literature study in finding out the potency of medicinal properties of the plant. Sampling of the plant used 6 transect with 50m distance between transect. Each transect contained continous 6 quadrat plots, within 100m^2 for the tree class, 25 m^2 for sapling class and 4m^2 for seedling class at each plot. Based on survey and literatures, it was identified that there were 14 species of 21 species, and 12 from 17 families which had potential medicinal uses.

Keywords: *Medicinal, Potential, Plant, Species, Mangrove, Nipah*

BULB AND LEAF DEVELOPMENT AND BIOACTIVE NAPHTOQUINON DERIVATIVE CONTENT OF RED BULB PLANT (*Eleutherine americana* Merr.)

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Red Bulb plant (*Eleutherine americana* Merr.) is commonly used as a traditional medicine because it contains bioactive naphtoquinon-derivatives. Naphtoquinones usually used as antimicrobial, antifungal, antiviral and antiparasitic agents. They are deposited in cell vacuoles. This present study was aimed to investigate the anatomical structure of bulb and leaf of red bulb plants during their development and their naphtoquinon derivative contents. Red bulb plants were grown on soil in a greenhouse and in the open field. The development were assesed six times (P_1 – P_6) in a two week interval. Plants grown in the field were assesed twice at fourth week and twelfth (P_2 & P_6). The parameters examined were the diameter and length of bulbs, leaf number, thickness of epidermis layer and mesophyll tissue, number of stomata and naphtoquinon-derivative contents. The thicknes of epidermis layer and mesofil tissue were analyzed by preparing slides using paraffin embedding method. The number of stomata was determined using leaf clearing method. Naphtoquinon derivative contents were analyzed using HPLC. Significant differences were determined by Anova followed by Duncan Multiple Range Test (DMRT) with 5% significance level.

During plant development, a significant increase was observed in the diameter and the length of bulbs as well as in the thickness of mesophyll and epidermis layers of the leaves. Fewer stomata were found on the dorsal than the ventral surface of the leaves. The size parenchymal cells increased. In addition to an increasing of the size of vascular bundles, more phloem and xylem components were also observed. The naphtoquinon content could be detected in leaves and bulbs since the first observation (second week). The content of bioactive compounds in bulbs increased significantly as the size of parenchymal cells increased for both plants grown in the green house and open field plants at fourth week and twelfth (P_2 & P_6). No significant difference in the content of bioactive compounds of leaves was found during development, despite the rise in the thickness of mesophyll and the constituting cells as the location of synthesis.

Keywords: *Development, bulbus, leaf, Eleutherine americana, Naphtoquonone*

THE EFFECTS OF DURIAN WOOD SKIN EXTRACT (*Durio zibethinus* Murr) OF OVARIUM MICROANATOMY STRUCTURE AND FEMALE MICE UTERUS (*Mus musculus* L)

Rusmiati

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The study of medicated plants for infertility is an interesting field since South Kalimantan is known for its flora diversity. Besides, synthetic infertility medicines cause the intolerable side effects. The study is conducted to justify the scientific advantages of the infertility of durian wood skin extract. Twenty for female mice of 3 months old with similar weights are grouped based on the Complete Random Design, with 2 x 4 factorial pattern and n = 3. The extract concentration used is 10%, 15% and 20%. Each extract is given to mice for 0.5 ml a day for every 25 – 30 mg of their weights for 30 days. One day after the extract is stopped, a surgery is carried out to see the changes for the given of durian wood skin extract (Observation I). The rest of the mice are kept but the extract is no longer given for 30 days. The next day, the surgery is conducted to see the cell recovery power (Observation II). The observed parameter is the number of follicle cells and the thickness of miometrium and endometrium in uterus. The ovarium and uterus are made into microanatomy slides using paraffin method and HE colouring. The data is analysed using Anava, $\alpha = 0,05$ and then tested by DMRT. The result shows that the durian wood skin extract is potentially reduce the number of follicle cells in ovarium and the the thickness of miometrium in uterus.

Keywords: *infertility, durian wood skin, ovarium, uterus*

ABUNDANCE AND DISTRIBUTION OF POPULATION *Mangifera casturi* AS BUSINESS AND UTILIZATION CONSERVATION UNIQUE PLANT SPECIFIC SOUTH KALIMANTAN

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This study aims to determine abundance, distribution, morphology and characterization of local-level knowledge of the business community Banjar conservation and utilization of plant Mangifera casturi fruit typical of South Kalimantan. Characterization of tree morphology is done directly in the field. A survey research study was conducted with the environmental survey, PRA (Partisipatory Rural Appraisal) techniques with semi-structural interview is on the list of questions. Kasturi the abundance of trees in the Village Limamar, Kalampaian Middle Village, the Village and Village Begantung Roots Mangkalawat some 122 trees by selecting the location of trees that gather. This aims to facilitate the observation and monitoring in stages. Most of the locations where the growth is in the garden / moor. In general, trees have a diameter stem kasturi range 1-1,5 meter that shows the age of trees kasturi more than 50 years. Average high trees ranged between 20-25 meters. Therefore, the tree kasturi more dominant than the existing plants around. Banjar community, especially those in the fourth location of the village had never conducted business kasturi tree preservation. Some of the respondents plan to cut down trees will be planted kasturi for cultivation of crops such as rubber, rice, or orange. This can result in trees that kasturi kepunahannya status is extinct in situ akan increased to disappear. The tree that was most used by people around the fruit is consumed directly or sold, as much as 98%. Only some 2% kasturi trees used for wood or wood houses

Keywords: *Kasturi, distribution, characterization, conservation*

THE DIFUTION PERIOD AND THE CONCENTRATION EFFECT TO *Cryptotermes cynocephalus* LIGHT TERMITS MORTALITY AND BAMBOO WULUNG'S SAMPLE OF WEIGHT REDUCTION WITH LENTREK PRESERVATIVES

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Bamboos are plants of enormous importance to the rural people in several ragion of Asia. Bamboo Wulung in Indonesia are used to building materials, handcraft, and furniture but in spite of its many excellent properties; bamboo is liable to biological deterioration. Therefore, a preservative treatment is regarded as necessary. Preservative for bamboo can prevent biological deterioration and make the lifetime is longer than usual. This research aim to investigate the effect of diffusion period and concentration preservating material to *Cryptotermes cynochepalus* Light termits mortality and bamboo weight reduction.

This research uses fresh bamboo for 2;3 and 4 days difution period in 0.00625%; 0.00750% and 0.01% concentrate of Lentrek preservatives. The size of sample were 5 cm x 3 cm x the thickness of bamboo. Samples were attacted to 50 *C. cynocephalus* Light for 6 weeks.

The experiment result showed that the concentration of Lentrek increased for *C. cynocephalus* Light mortality and weight reduction samples but the difution period wasn't effected. Concentration and difution period interaction wasn't efected significanly. Bamboo Wulung difution preservative with Lentrek on 0.01% concentration for 3 days effitient to prevent C. cynocephalus Light attack.

THE EFFECTS OF EXTRACT *Piper retrofractum Vahl* EXPOSURE TO THE QUALITY OF SPERMATOGENESIS MICE (Mus musculus L) SWISS WEBSTER

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The research aims is studying the effects of extract Piper retrofractum Vahl exposure to the quality of spermatogenesis mice (Mus musculus L) Swiss Webster. This research has been done on June until December 2006 at Physiology laboratory, Department of Biology, Sriwijaya University. It was design using the Complete Randomized test at 5% rate of precision, then continue with Duncan's Multiple Range Test. There are four groups of mice with different treatment and each treatment was replicated 6 times. They were control by giving aquadest, treatment by giving a dosage of extract 0,25 mg/g bodyweight (bw), 0,33 mg/g bw, dan 0,50 mg/g bw. Extract was given at a volume 0,1 ml/10g bw and administrated by oral during 34 days. The result showed that extract of P retrofractum Vahl caused increase of spermatogonia average, spermatogenesis and increase quality of spermatozoon morfology , progressive motility speed, viability and progressive motility of spermatozoon.

Keywords : *Piper retrofractum Vahl, spermatogenesis*

ABUNDANCE OF ODONATA AROUND THE FORMER QUARRY POND ON THE DISTRICT CEMPAKA, BANJARBARU

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It was carried out by the research about abundance of odonata around the former quarry pond on the district Cempaka, Banjarbaru. Found eight species of dragonfly (*Anisoptera*) and three species of damselfly (*Zygoptera*). The highest abundance type of Odonata in the former quarry pond on the District Cempaka is *Ischnura snegalensis* of 6.5 individuals per locations, and *Tholymis tillarga* about 6,1 individuals per location. The lowest density in the *Gynacantha bayadera* of 0.1 individuals per location. The highest amount of kinds of Odonata in the first pool about 45 individuals and the lowest in the eight pool about 17 individuals. Based on the results of research studies concluded that the location and nature of physics and chemistry of water affect the biodiversity of Odonata. Therefore, it is recommended the development of advanced research to the pattern of population dynamics and to learn Odonata potential role in District Cempaka Banjarbaru associated with rehabilitation capabilities using various types of land.

Key words : *biodiversity, odonata, dragonflies, damselfly, pond*

EFFECTS OF ORGANIC NITROGENOUS COMPOUNDS ON EFFICIENCY OF BIODEGRADATION OF FLEXIBLE PALM OIL BASED POLYURETHANE BY *Aspergillus niger*

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The efficiency of biodegradation of Palm oil based polyurethane (PBPU) by *Aspergillus niger* using submerged batch fermentation in minimal nutrient medium (MNM) containing ME (10g/l), YE (10g/l) and peptone (10g/l) was compared to cultures lacking ME and peptone but containing YE (1.5g/l) and glucose (10g/l). This latter combination of YE and glucose concentrations had been shown previously to produce adequate biomass concentration for initiation of PU biodegradation. Cultures were performed at 30^{o}C and agitated at 250 rpm for 8 weeks. Samples were taken at a 2 week-intervals and progress of biodegradation was monitored using SEM and FTIR. *Aspergillus niger* was shown to be capable of degrading PU in both cultures achieving 90-100% reduction of ester bond (peaks at 1715cm^{-1}) and appearance of acid fraction at 1685cm^{-1} after 2 weeks of incubation. SEM analysis showed changes in the physical structure of the PUs where distorted and collapsed pores became more evident the cultures progressed. The PUs disintegrated into fragments. No growth and degradation was observed when cultivation was carried out without the inclusion of the components studied. There was also no noticeable changes of PUs in blank cultures were observed. These results showed that supplementation of YE and glucose at low concentrations managed to support growth and biodegradation as efficient as what was achieved in media containing high concentrations of YE, ME and peptone. Therefore, by providing less nutrients to enable generation of adequate biomass concentration, initiation and efficient biodegradation was achieved.

EVALUATION OF GLUCOSE AND COMPLEX NITROGENOUS SOURCES CONCENTRATION FOR BIODEGRADATION OF PALM-BASED POLYURETHANE BY A*spergillus niger*

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The importance of inclusions of glucose, yeast extract, malt extract and peptone in minimal nutrient medium (MNM) for biodegradation of palm based polyurethane (PU) by *Aspergillus niger* was evaluated. Biodegradation of PU by the fungus was compared when performed in 500ml of MNM in the presence of glucose (5g/l) to when yeast extract (0.02g/l), malt extract (10g/l) and peptone (10g/l) was included. Cultivation was carried out for eight weeks at 30°C with agitation rate at 250 rpm. Samples were obtained at a 2-week intervals and PU biodegradation was monitored using scanning electron microscope (SEM) and fourier transform infrared (FTIR) by assessing content of ester bond present. The cultures which had the nitrogenous compound showed better growth and the highest PU degradation with a 100% decrease in ester bond after eight weeks of incubation. SEM analysis of samples showed progress deterioration and collapse of PU pore structures. PU dumbell shaped were reduced to fragments at the end of the experiment. However observations of the cultures showed high density of biomass was achieved after 48 hour of growth when no signs of biodegradation were evident. Further experiments indicated that the fungus achieved similar biomass concentration (8g/l) even in the absence of PU and this was shown to be caused by the presence of malt extract and peptone. The cultures achieved stationary phase at 48 hour suggesting that PU degradation probably started during stationary phase which explained the long period of time taken (8 weeks). Therefore, both malt extract and peptone were excluded from the medium and experiments were carried out to determine concentration of yeast extract and glucose to cease the growth and allow biodegradation to start during log phase. Results showed that glucose and yeast extract at the concentration of 10g/l and 1.5g/l, respectively, significantly enhanced the efficiency of PU biodegradation by the fungus.

DIALLEL ANALYSIS OF AGRONOMIC CHARACTERS OF UPLAND RICE (*Oryza sativa* L.) FOR ADAPTATION TO ACID RED YELLOW PODZOLIC SOIL

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So far the way to overcome chemical soil problems for upland rice development in acid soil is by the use of liming and the use of fertilizers or in the same way called a high input approach, so that this kind of approach becomes uneconomical and inefficient.

To redress the balance in order to this kind of approach becomes more economical and efficient, and on the other hand becomes a low input appoach, it is important to build and develop a new variety of upland rice through a plant breeding program that conducted in target environtmental conditions, in order through this program of breeding will bring out one individual of plant that have tolerant to acid soil in one hand and have a high yield potential in the other.

The objectives of this research were (1) to estimate the genetic parameters of the agronomic characters for adaptation to acid soil, (2) to study types of gene action effects in the agronomics characters inheritance, (3) to investigate the agronomic characters connected with production potential for greater selection efficiency.

This experiment was conducted from September 2002 to April 2003 in a green-house measuring 4 x 14 square meters, at the field station of the Agricultural Faculty, University of Palangka Raya, Central Kalimantan.

A half diallel analysis was performed among seven genotypes of parent with different genetical background i.e. Situgintung, Jatiluhur, Gajah Mungkur, B8503E-TB-9-0-3, Krowal, CT6510-24-1-3, IR 64 and twenty one genotypes of offspring (F_1) results were obtained of crossings in all possible combinations of parent as the experimental material. This material was arranged in a complete block design with four replications. Ten kilograms of red yellow podzolic soil were placed into pots forty centimeters apart. One seed was grown in each pot.

Diallel analysis was conducted for all characters observed with Hayman's approach. The significance testing of genotypic differences showed that all characters observed had highly significant genotype differences. Then the genetic parameters were estimated following the Hayman method. The

results of the genetic parameters estimation indicated that additive, dominance and non-allelic interaction of gene effects had an important role in controlling all inheritanced characters. The role of the dominant gene action effects was greater than the additive effect, except for a number of productive tillerings, and in high plant yield, and in one thousand (grams) grains. The simple model of additive-dominance was sufficiently detected through the absence of non-alellic interaction testing as the results showed non significant differences, and the (Vr, Wr) graph analysis, were detected in a number of productive tillerings, flowering time and one thousand grain (grams) characters. In contrast, non-allelic interaction (epistasis) was found to be highly significant in other characters. This indicated the simple model additive-dominance was not sufficient to explain all inherited characters for adaptation to acid soil. Non-allelic interaction of gene action (epistasis) was present in high plant yields, at the time of harvesting, in long panicle , in a number of primary panicle branches, in the number of grains per panicle, in a number of full grains per panicle, grains with a high percentage per panicle, grains with a low percentage per panicle, and in a number of grain yield.

All characters exhibited overdominance, except for a number of productive tillerings, high plant yields, and one thousand (grams) grain that exhibited partial dominance, detected again from the additif effect value where there was greater than dominant effect value ($D > H_1$), degree of dominance where there was smaller than one ($(H_1/D)^{1/2} < 1$), and the (Vr, Wr) graph analysis, where the regression line intersecting/cut the Wr axis above the origin.

The number of groups of genes which control the characters and exhibit dominance (h^2/H_2) detected for all characters were found in one group of genes.

The value of heritability in a narrow sense for half of characters observed was more than 65.5%, and the value of heritability in a broad sense has a relatively high score within the scale of 84.1 – 94.4% , and environmental effects were low. There was a positive and significant correlation between grain yield with a number of productive tillerings and there was negative and significant correlation between grain yield and one thousand (grams) in weight of grain.

The number of productive tillerings could be used as criteria of selection on grain yield and selection should be conducted on early generations with the pedigree method of breeding, however selection for other characters for adaptation to acid soil in a breeding program should be conducted on advanced generations. The bulk population or diallel selective mating (DSM) method of breeding would be suitable.

REGULATION OF *PDF1.2* EXPRESSION BY DEFENCE AND ABIOTIC STRESS SIGNALLING PATHWAYS

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PDF1.2 (At5g44420) gene, that represent pathogen response gene, was employed in this study to investigate the interaction between pathogen and stress signalling pathways. Macroarray technique and Reverse Transcriptase Quantitative PCR were used to observe the gene expression profiles in wild type and Arabidopsis mutants plants affected in jasmonic acid (*jar1-1*), ABA *(aba2-1, abi1-1* and *abi2-1*), and ethylene *(etr1-1*, *ein2,* and *ein3)* signalling, following treatment of signalling chemicals, i.e. MJ, ABA, and ethylene, *Fusarium oxysporum* inoculation and abiotic stress e.g. salt and drought treatments. This study confirms the previous finding that ethylene and jasmonic acid signaling concomitantly regulate *PDF1.2* expression. Mutation in *JAR1-1*, *ETR1-1*, *EIN2,* and*EIN3-1* all block the induction of *PDF1.2* expression by methyl jasmonate and ethylene treatments as well as *Fusarium* infection. This study also revealed that *PDF1.2* expression is negatively regulated by ABA and drought. The negative regulation may be mediated by deactivation of a protein phosphatase 2 A (PP2A) which is involved in JA signaling or by degradation of ethylene signaling component *EIN3.* Inhibition of *PDF1.2* expression by ABA was not blocked by mutation in either ethylene signaling genes or the ABA synthesis gene *ABA2*, suggesting that the inhibition of *PDF1.2* expression by ABA is not regulated in the same way as the ABA inhibition of germination and root growth. In addition, mutation in *ABA2* inhibited the induction of *PDF1.2* expression by ethylene treatments. This result supports the previous finding that *ABA2* may be integrated with the ethylene signalling pathway. Similarly, mutation in abscisic acid insensitive genes *ABI1/ABI2* inhibited the induction of

PDF1.2 expression by methyl jasmonate indicating that the *ABI1/ABI2* may act as positive regulator of jasmonic acid signalling as is required for the induction of *PDF1.2* expression. Taken together, our results suggest that increased susceptibility of plants to pathogens upon ABA treatment or abiotic stress challenge maybe due to the repression of JA- and ethylene-dependent pathogen response gene expression.

INDUCTION OF SOMATIC EMBRYO FROM LEAF EXPLANTS ON RAMIN (*Gonystylus bancanus*) BY IN VITRO TECHNIQUE

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Seed production of Ramin was lack and irregular should be solved through the promotion of other sources of planting materials such as tissue culture. The aim of the present study was the induction of somatic embryo from leaf explants. The first leaf of seedling was utilized as sources of explants cultured on Murashige and Skoog (MS) media with various concentration of cytokinin and auxin. The result of this study indicated that 2, 4-Dichlorophenoxy acetate acid (2,4-D) at 4, 6, and 8 ppm combined with 0.5 ppm Benzyl adenine(BA) were more effective on the induction of callus than 0 ppm and 2 ppm. The concentration of BA (2, 4, 6 8, and 10 ppm) have effect on the induction of somatic embryo compared to control (0 ppm). At 4 ppm BA has produced the highest of the mount of somatic embryo (6 embryo). BA at 10 ppm has produced the highest of callus weight (4.67g).

Key word: *explants, induction, callus, somatic embryo*.

EDIBLE MUSHROOMS FROM SWAMP FOREST, NYARU MENTENG, CENTRAL KALIMANTAN

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Arboretum Nyaru Menteng (65.5 ha) is one of swamp forest conservation in Central Kalimantan Province. The aim of this study is to observe kind of edible mushrooms from swamp forest, Nyaru Menteng. The method were obtained throught inverviews with villagers and also observation in the forest since February to May, 2009. Our tentative results described edible mushrooms from this place grown on wood and soil. The mushroom grown on the wood were *Pleurotus ostreatus* (oyster mushroom, jamur tiram putih, kulat puti), *Pleurotus sapidus* (jamur tiram coklat), *Tremella fuciformis* (white jelly, jamur kuping agar), *Auricularia yudae* (red jelly, jamur kuping merah, kulat bitak). The mushroom grown on the soil was "kulat siau" (Dayak Ngaju language). The next future we want to study ecology and physiology of edible mushroom from this place.

CHEMISTRY

ABTRACTS

CHARACTERIZATION OPTIMUM CONDITION AND THERMAL STABILITY OF CRUDE THERMOPHILIC PHYTASE ISOLATED FROM ISOLATE AP-17

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Crude thermophilic phytase is produced by isolate AP-17 that has been isolated from Kawah Ijen Banyuwangi. Based on morphology test to identify the gram type of microorganism, isolate AP-17 has a bacill cell type and identified as positive gram bacteria. This isolate is assumed as Bacillus type. Crude thermophilic phytase isolated from AP-17 has the optimum temperature at 75 ^{o}C, with activity 0,1413 U/mL, and it has the optimum pH in pH 6 , with activity 0,0875 U/mL. The enzyme is stable when heated at 75 ^{o}C for three hours.

Keywords: *Isolate AP-17, crude thermophilic phytase, enzyme activity, optimum condition*

REMOVAL OF Cd(II) IONS IN AQUEOUS SOLUTION BY *Saccharomyces cerevisiae* BIOMASS IMMOBILIZED ON SILICA GEL

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The use of *Saccharomyces cerevisiae* biomass (SCNI) from beer industry fermentation waste, which immobilized with silica gel (SCI) for the removal of Cd(II) from aqueous solution at different pH, interaction times and initial Cd(II) concentration. A number of similar experiments for silica gel (SG) were also conducted as comparison The experiment was conducted on batch method. The experimental results were analyzed by Langmuir and Freundlich isotherm model. The results showed sorption of Cd(II) optimum at pH 6.0, sorption rate constant (k_s), which obtained from pseudo-first order sorption model, were 4.10^{-5} min^{-1} for SCI, $3.\ 10^{-5}$ min^{-1} for SCNI and $1.\ 10^{-4}$ min^{-1} for SG. The equilibrium data indicated that SCI and SCNI sorbents tend to follow Freundlich isotherm model, while SG was Langmuir isotherm model.

Keywords: *Cd (II), sorption, isotherm Langmuir, isotherm Fruendlich, sorption rate constant, sorption capacity, immobilization, Saccharomyces cerevisiae*

OXIDATION ACTIVITY AND ^{18}O-ISOTOPE EXCHANGE BEHAVIOR OF Mn ZIRCONIA

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Mn–ZrO_2 samples with varying concentrations of Mn 5,10 and 20 mol% have been prepared by sol-gel technique and calcined at 600°C. XRD characterization of the samples with a Mn content of 5, 10, 20 mol% reveals the stabilization of zirconia into cubic (fluorite) phase. The BET surface area of these samples was in the range of 91 to 123 m^2/g. The activity of these samples was investigated by ^{18}O-isotope exchange and by catalytic reaction studies in complete oxidation of CH4 and CO with gas Chromatography. ZrO2 without Mn for comparation was almost inactive in complete methane oxidation, whereas Mn-containing sample was more active.The Mn–ZrO_2 with 20 mol % Mn was found to be the most active sample in the series, which has the maximum amount of Manganese in the substitutional position. This confirms that the presence of Mn species in substitutional positions along with oxygen vacancies in zirconia lattice are substantially responsible for the catalytic activity in CH4 and CO oxidation as well as in complete heterogeneous ^{18}O exchange processes. The light-off temperature for 50% conversion of CH4 (T50) decreases with an increase in Mn content up to 20 mol % and matches well with the results of ^{18}O exchange measurements. The shapes of the curves of T50 and Texchange follow a similar trend indicating that both CH4 oxidation and ^{18}O exchange processes occur *via* a completely heterogeneous mechanism.

Keywords: *Mn-zirconia, Mn-zirconia catalyst, cubic zirconia, CH4 oxidation, methane combustion, ^{18}O isotope exchange.*

THE EFFECT OF ACIDITY AND BOILING TIME ON THE IRON BINDING PATTERN BY DIETARY FIBER OF YARD LONG BEAN

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The aims of the study are: to find the effect of pH and boiling time variation upon yard-long bean on the iron binding pattern through adsorption constant (K_{ads}) and effective stability constant (K_{eff}), and to describe the iron binding site in functional groups of the dietary fiber of yard-long bean. The iron binding pattern was analyzed using Langmuir- Scatchard graph methods. The results showed that pH increasing-boiling time decreasing could increases iron binding percentage, K_{eff}, K_{ads}. The iron binding pattern through complex compound formation is more dominant than adsorption and involving two specific binding sites. It occurs at hydroxyl, carboxyl, and aliphatic eter functional groups.

Keywords: *dietary fiber, iron binding pattern, acidity (pH), boiling time*

THE RESEARCH AND DEVELOPMENT OF AUDIO-VISUAL AID LEARNING TO IMPROVE CLASSROOM INSTRUCTION ON ATOMIC ABSORPTION SPECTROSCOPY

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Four-D model has been adopted in developing Compact Disc (CD) as an audio-visual aid learning. It contains basic prinsiple of Atomic Absorption Spectroscopy and how to operate the instrument correctly. The purpose of this research is to improve classroom instruction. This research result show that using the CD has attracted the students so that during the learning process no student did "non-academic activity". All students stated that the using of the CD made them easier to understand the steps of operating the instrument. About 96.0% of students wrote that they are happy followed the lesson, 68.6% wrote that this kind of method quite new., and 96.8% stated that the language and pictures are clear enough The observation of students activity in lab showed that 94.1% of students were able to operate the instrument and analyze the sample correctly.

Key words: *four D model, audio-visual aid learning, atomic absorption spectroscopy*

PARTIAL PURIFICATION AND CHARACTERIZATION OF CHITINASE PRODUCED BY *Burkholderia pseudomallei*

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Chitinase enzyme is produced by the bacterial *Burkholderia pseudomallei* which has been isolated from field mud. The enzyme was precipitated by the addition ammonium sulphate up to 50% resulted in 1.3-fold increase than crude extract with specific activity 7.31 U/mg. Chitinase was optimally active at pH of 5.0 and at 35°C. The enzyme was stable from pH 3 to 5 and up to 40°C, an apparent K_M value of 1.51 mg/mL and V_{maks} 0.35 µml/mL hour. Among the metals thet were tested, the Cu^{2+} dan Fe^{2+} completely inhibited the activity enzyme but activated there is Mn^{2+} in 10 mM concentration.

Keywords: *Chitinase, characterization, B.pseudomallei, precipitated*

SYNTHESIS OF NaA ZEOLITE FROM RISE HUSK AS SUPPORT AND CATALYST ON DENITRIFICATION

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Denitrification has been studied on NaA zeolite, Sn and Pd supported on NaA zeolitefrom rice husk. This reaction is an alternative method to reduce the nitrate concentration. Generally, the denitrification reactions involve the use of Brønsted acid catalysts. NaA, Sn/NaA and Pd/NaA were structure characterized using XRD and FT-IR. Surface characterization of catalysts were determined by N2 adsorption for spesific surface area and pyridine adsorption for acidity. The specific surface area of NaA, Sn/NaA and Pd/NaA are 18,03; 1,43 and 2,97 m^2/g respectively. The catalytic activities were determined based on nitrate conversion. Catalytic activities is increasing with converted nitrate concentration. The nitrate conversion from lower to high are NaA < Sn/NaA < Pd/NaA. This conversion is proportional with acidity of catalyst. Those catalysts were high selektivity in N2 product .

Keywords: *Catalyst, Denitrification, NaA zeolite, Sn and Pd.*

USE OF CHEMICALLY MODIFIED CHITOSAN BEADS FOR PAPAIN IMMOBILIZATION

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Chitosan beads were prepared by using a cross-linking agent metal ion and the metal ion- chitosan beads were employed in papain immobilization process. Studies on free and immobilized papain systems for determination of optimum pH, optimum temperature, thermal stability and reusability were carried out. The results showed that free papain has been optimum pH 6,5 and optimum temperature 55 ^{o}C while the immobile papain had optimum pH 8 and optimum temperature 85 ^{o}C. The thermal stability of the immobilized papain, relative to that of the free papain, was markedly increased. The residual activity of papain immobilized on chitosan bead- metal ion was about 25% after 12 cycles of batch operation.

Keywords: *papain, immobilization, chitosan*

DIGLUCOSYLATED 1,2 METABOLITE AS A BIOTRANSFORMATION PRODUCT OF MEFENAMIC ACID BY CELL SUSPENSION CULTURES OF *Solanum mammosum* L

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Biotransformation reaction using plant cell suspension cultures serve as a tool in the structural modification of compounds those have useful therapeutic activities. Various plant cell cultures are able to convert a few organic compounds that were added to them exogenously.
The objective of the present work is to study the biotransformation of mefenamic acid using cell suspension cultures of *Solanum mammosum.*
The experimental method consist of cultivating and multiplying the cell cultures of *S.mammosum*, extracting the cell mass by maserating using methanol, isolating and purifying the biotransformation products using reverse phase-HPLC of Agilent 1100 series instrument with UV detection at 254 nm, structure elucidating using Nuclear Magnetic Resonance Bruker Avance 400 MHz, 500 MHz, and the mass spectra determination using Bruker Esquire HCT instrument for LRESIMS and Micro Tof Q instrument for HRESIMS.
From the toxicity test, it was found that the concentration of substrate added to the cell suspension cultures is 100 mg/L. A biotransformation product, named: mefenamic acid-7-*O*-*β*-D-(*β*-1,2-O-D-glucopyranosyl)-glucopyranosyl ester was isolated from cell suspension cultures of *Solanum mammosum*, following administration of the therapeutic agent mefenamic acid. It was identified using various spectroscopic methods: 1D and 2D NMR, those are the ^{1}H-NMR, ^{13}C-NMR, HSQC, HMBC, COSY, 1D *selective* NOESY, and TOCSY spectrum experiments, and the mass spectra determination by HRESIMS. This is a **new** compound with no previous reports from natural sources.

Keywords**:** *Solanum mammosum, mefenamic acid, biotransformation, cell suspension cultures, glucosylation, mefenamic acid-7-O-β-D-(β-1,2-O-D-glucopyranosyl)-glucopyranosyl ester*.

TECHNOLOGY DEVELOPMENT BASED ON ADVANTAGE OF INDONESIAN RESOURCES AS MATERIAL SINTESIS OF SUNSCREEN COMPOUNDS OCTYL PARAMETOXY CYNAMAT

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Rhizome of Kaemferia galangal L contains Ethyl p-methoxcycinnamic (EPMS), its are dominant compounds about more than 2% with isolation process in room temperature. Ethyl p-methoxcycinnamic (EPMS) form ester was very potential as sunscreen which this compounds can absorbed UV light. Nowaday, utility of sunscreen compounds is not only for cosmetic product, but also can use in healthy product because skin safety is not only needed for protecting skin beauty, but also to enclose entirely function to skin healthy.

Ethyl p-methoxcycinnamic (EPMS) structure was contains polar groups and non polar one, in this methoxcycinnamic (EPMS) case compoundscan soluble to several type of solvent with variation of polarize to isolate Ethyl p-methoxcycinnamic (EPMS) from Rhizome of Kaemferia galangal L, need to try with several type of solvent to get suitable solvent. Its able to ekstract Ethyl p-optimally.

The solvent is use from selected isolation process in room temperature are hexane has result 2,111%, ethanol 1,434%, ethyl acetat 0,542% and aquades 0%. The suitable solvent to isolate Ethyl p-methoxcycinnamic (EPMS) from Rhizome of Kaemferia galangal L is hexane. Further, way of acting isolation process with variation of temperature. At 40^{o}C has result 7,236%, 50^{o}C has result 8,873%, 60^{o}C has result 8,765% and at 70^{o}C has result 7,218%. The highest percentation at 50^{o}C.

Ethyl p-methoxcycinnamic (EPMS) can hydrolysis, ethyl from this ester will be come alcohol i.e athanol. Ethanol can entirely to pore and damage skin tissue (carcinogenic). To safety Ethyl p-methoxcycinnamic (EPMS) for skin, so ethyl group from EPMS is change or substitute with else group which it longer chain

non carcinogenic and reduce solubility in water. Temperature optimation of sintesis oktil p-methoxcycinnamic from EPMS has result % sintesis i.e : at 70-78 ^{o}C has result 60,4%, at 0-88 ^{o}C 94,7%, at 90-98 ^{o}C 88,9%, at 100-108 ^{o}C 93,0%, and at 110-118 has result 93,5%. Percentage optimum from isolation result get at 80-88 ^{o}C.

Cu AND Pd SUPPORTED ON MgF_2 AS CATALYST ON DENITRIFICATION

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Denitrification with Cu and Pd supported on MgF_2 has been studied. The reaction is an alternative method to reduce the nitrate concentration. Generally, the denitrification reactions involve the use of Brønsted acid catalyst and MgF_2 is one of the non toxic Brønsted acid catalysts. Cu and Pd supported on MgF_2 in this research were prepared and characterized using X-ray diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), measurement of specific surface area with N_2 adsorption and acidity by pyridine adsorption-FTIR. The catalytic activities were determined based on nitrate conversion. Result of this research indicated that MgF_2, Cu/MgF_2, and Pd/MgF_2 serve the purpose of supported catalyst with nitrate conversion 58.70, 60.35, and 65.28%, respectively. These conversion values are proportional with its acidity and reverse with surface area of catalyst respectively. Analysis of denitrification using GC-TCD showed that N2 was the main product with selectivity MgF_2 11.48% < Cu/MgF_2 24.58% < Pd/MgF_2 67.67%.

Keywords: *Catalyst, denitrification , MgF_2, Pd and Cu, support.*

MgF_2 AS CATALYST AND SUPPORT ON DENITRIFICATION

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The using of MgF_2 as catalyst and support for denitrification has been studied. The reaction is an alternative method to reduce the nitrate concentration. Generally, the denitrification reactions involve the use of Brønsted acic catalyst. MgF_2 is one of the Brønsted acid catalysts. Loading metal Sn, and Pd on support should increased the activity and selectivity of catalyst. MgF_2 were syntesis by sol-gel method and characterized using X-ray diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), measurement of specific surface area with N2 adsorption and acidity by pyridine adsorption-FTIR. The catalytic activities were determined based on nitrate conversion. Result of this research indicated that MgF_2, Sn/MgF2, and Pd/MgF_2 serve the purpose of supported catalyst with nitrate conversion 58.70, 61.69, and 65.28%, respectively. This conversion value showed a linear correlation with its acidity and reverse with surface area respectively. Analysis of denitrification using GC-TCD showed that N2 was the main product with selectivity MgF_2 11.48%, Sn/MgF_2 32.34%, and Pd/MgF_2 67.67%.

Keywords: *Catalyst, denitrification, MgF_2, Pd, Sn, support.*

CHITOSAN PREPARATION WITH MULTISTAGE DEACETYLATION OF CHITIN AND ITS DETERMINATION OF DEGREE OF DEACETYLATION AND MOLECULAR WEIGHT

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Study of chitosan prepared with chitin deacetylation by multistage alkali treatments has been done. Chitin was extracted from Lampung white shrimp's (Litophenaeus vannamei) shell. The FTIR spectroscopy was used to determine degree of deacetylation chitin/chitosan. Viscometry was used to determine molecular weight of chitosan. The effect of chitin deacetylation by multistage alkali treatments to degree of deacetylation and molecular weight in comparison with continuous alkali treatment was studied.
The results showed that chitosan prepared by multistage alkali treatment had higher degree of deacetylation than those of obtained by continuous alkali treatment. Multistage alkali treatment does not influence the chitosan's molecular weight. Though, alkali concentration very having effect on deacetylation process, but not for depolymerization process.

Keywords: *chitin, chitosan, multistage treatments, degree of deacetylation, molecular weight*

EFFECT OF COAGULANT IMPREGNATION WITH $CaCl_2$ DUE TO AN ULTRAFILTRATION MEMBRANE PORES STRUCTURE

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The research of an effect of coagulant impregnation with $CaCl_2$ due to ultra filtration membrane pores structure had been done. Aims this research are to study an effect of $CaCl_2$ impregnation in coagulant, permeability, perm selectivity, mechanical properties and to know an optimum composition of $CaCl_2$ that impregnated in coagulant. Synthesis of membrane dope using three components are Polysulfone (PSf) as polymer, N,N-dimethylasetamide (DMAc) as solvent, and Polietilenglikol (PEG) as an additive. In this research, synthesis of polysulfone membrane using phase inversion technique with immersion precipitation processes. In immersion precipitation processes, coagulant impregnate was done using $CaCl_2$ by concentration variation are 0%, 0,5%, 1%, 1,5%, and 2% w/w. Characterization of membrane includes permeability, perm selectivity, stress, strength, modulus young and morphology analysis using Scanning Electron Microscope (SEM). The result is showed that the highest permeability that membrane hold with $CaCl_2$ impregnate is 0%, while the highest perm selectivity with $CaCl_2$ impregnated is 0.5% w/w. For stress, strength and young modulus, values of stress are same for all membranes, except at $CaCl_2$ concentration of 1% is the lowest. The highest strength in $CaCl_2$ impregnated is 1.5% w/w and the highest young modulus in $CaCl_2$impregnated is 2% w/wt. Analysis of membrane morphology is showed that $CaCl_2$ impregnated on coagulant of 0.5 % w/w yielded the best composition with membrane resulted with sponge's structure with an anisotropic pore magnification.

Keywords*: coagulant, membrane, polysulfone, $CaCl_2$, impregnation*

PHARMACY

ABTRACTS

PREPARATION AND CHARACTERIZATION OF INSULIN LOADED ALGINATE-CHITOSAN MICROCAPSULES FOR ORAL DELIVERY SYSTEM OF INSULIN

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Chitosan coated alginate microcapsules were developed for oral delivery system of insulin. Small sized alginate microcapsules were prepared by emulsification-internal gelation method. The influence of process and formulation parameters was evaluated on the formation and morphology of microcapsules. Microcapsule morphology was examined by using a scanning electron microscope and particle size distribution was determined by using a particle size analyzer. The microcapsules were then coated with chitosan by two-stage method. Insulin was encapsulated into the microcapsules for evaluating their drug loading characteristics. The results indicated that alginate microcapsules obtained had a mean diameter of about 50μm, in which the concentrations of emulsifier, calcium carbonate, and acetic acid were significantly affected the microcapsule formation. High encapsulation efficiency (93%) was obtained at the alginate and chitosan concentration of 4% and 0.3%, respectively.

Keywords: *alginate chitosan microcapsules, emulsification-internal gelation, oral insulin delivery*

APHRODISIAC ACTIVITY OF METHANOL EXTRACT OF BAWANG DAYAK (*Eleutherine palmifolia*) BULBUS TO *Rattur Norvegicus*

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The Study of aphrodiasiac activity methanol extract of Bawang Dayak Bulbus to Rattur Norvegicus (male rats). This Study might provide data on the variation dose based on male rats performances (Introduction, Climbing, and coitus). An animal model was divided into 4 groups (n=5): group I-III (100, 200, 250 mg/Kg BW), group IV (negative control 50 mg/Kg BW of CMC Na 0,5%). The data of introduction, climbing, and coitus observation was analyzed using one way pattern analysis variances at the confidence level of 95%. The results showed at dose 250 mg/Kg Bw was highest potential (introduction 65,98%; climbing 70,23%; coitus 74,07%).
Keywords: Bawang Dayak, *Eleutherine palmifolia*, aphrodisiac, male rats, rattur norvegicus

THE ANTIPYRETIC EFFECT OF SAMBILOTO HERB (*Andrographis paniculata* Ness) WITH KUNYIT RHIZOME (*Curcuma domestica* Val) WITH COMPARISON 1:3 IN MICE (*Mus musculus*)

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Sambiloto (*Andrographis Paniculata* Ness) and kunyit (*Curcuma domestica* Val) is a plant that recognized by Indonesian people and were used as a traditional medicine. The combination of both of them were used to reduce fever.

The purpose of this research was to know the antipyretic effect of sambiloto herb with kunyit rhizome with comparison 1:3 to mice and compared with paracetamol as a positif control . The herb of sambiloto and the rhizome of kunyit were extracted by infusion methode with destilated water (*aquadestilata*). Mice were used in all experiments, performed in five group, there were a positif control, negative control, and group of infusion were 5% of sambiloto's herb combine with 15% of kunyit's rhizome, 10% of sambiloto's herb combine with 30% of kunyit's rhizome, and 15% of sambiloto's herb combine with 45% of kunyit's rhizome. Paracetamol was used as a positif control, and aquadestilata as a negative control. Pepton 12,5 % 0,05 ml/30,00 g intramuscular, as a pyretic agents.

Kolmogorov-Smirnov was used to see a data distribution. A one way analysis of variance (ANAVA) was used to determined any significant differences ($p<0,05$) between means. The results of this research showed that group of infusion which were contain of 5% of sambiloto's herb combine with 15% of kunyit's rhizome, 10% of sambiloto's herb combine with 30% of kunyit's rhizome, and 15% of sambiloto's herb combine with 45% of kunyit's rhizome have an antipyretics effect, but they weren't as well as antipyretics effect of parasetamol 65 mg/kg BB.

ACTIVITY METHANOL EXTRACT BUNGUR PUTIH LEAVE (*Langerstroemia speciosa Pers*.) TO DECREASE OF GLUCOSE IN BLOOD

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The aim of this research was to know the activity methanol extract bungur putih leave (*Langerstroemia speciosa Pers*.) to decrease of glucose in blood. The intend of this research namely to know the effect of methanol extract bungur putih leave to ward decreation of glucose content on mice blood. The animals experiment are 20 mice which are devided in to 4 group. The firs group is control group by using CMC Na 0,5% b/v (negative control), group second, thir, fourth are given methanol extract doses 500, 1000, and 1500 mg/kg BW. Measurement of the blood glucose level was done every 30 minutes during 120 minutes using spectrophotometer, Doses variation of the methanol extract showed that the dose of 1000 mg/kg BW gave the best antidiabetic activity (%) followed by doses 1500 mg/kg BW (%) and 500 mg/kg BW (%). This experiment showed that increasing doses of the methanol extract can increase the antidiabetic activity.

Keywords **:** *bungur putih, glucose, extract*

PHYSICS

ABTRACTS

SPECTRAL SIMULATION OF ALANINE CRSYTAL

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Simulation of X-band continuous wave-electron paramagnetic resonance (CW-EPR) experimental spectra of γ-irradiated ℓ-α-alanine crystal was carried out by using SOPHE and XEPR programs version 3.0. The aim was to confirm the existence of radicals induced by irradiation in the system. Six different X-band experimental spectra recorded from a number of defined crystal orientations to the external magnetic field B were simulated. The "axial" spectra, refer to the simulated spectra when the external B field was parallel to the crystal axes and that was measured at room temperature, confirm the simultaneous presence of the SAR, R2 and R3 radicals with the appropriate proportions. The "planar" spectra, refer to the simulated spectra when the B field was on the crystal planes, however, does not exactly fit to the experimental spectra. Together with the simulation outcomes, the problems that appear during the work, as well as the solutions proposed to overcome those problems will be discussed. (153 words)

Keywords: *ℓ-α-alanine, SOPHE, XEPR, EPR, paramagnetic sites, SAR, ENDOR, axial and planar spectra*.

NUMERICAL SIMULATION USING FIVE EQUATIONS TURBULENT MODEL OF NATURAL CONVECTION IN CUBICAL ENCLOSURE HEATED FROM THE SIDE

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The paper presents the study of turbulent natural convection in a cube using five equation of turbulent kinetic energy, dissipation, scalar velocity scale, elliptic function, and temperature variance (k- ε-v^2-f-θ^2). The objective of the study is to test the ability of the new turbulent model in the cubical enclosure heated from the side at sufficiently high turbulence level and in several numerical grids. The simulation is carried out at the highest Rayleigh number Ra = 5 x 10^{10} and at the finest grid of 62 x 62 x 62. The nonunform grid is applied in order to capture important physical turbulent near the boundaries. The numerical simulation is performed using control volume method with central differencing scheme. The convergent solution is obtained at relatively small computational time. For the simulated case, good agreements with available experimental and previous turbulent models are obtained. The proposed new turbulent model proves its computational robustness. In addition, the model is able to predict considerably good physical turbulence and provides less mathematical complexity that makes the model can be useful for both research and industrial applications.

Keywords: *Turbulent model, Natural Convection, Numerical simulation*

BOUNDARY ELEMENT SOLUTION FOR INVERSE ACOUSTIC INVOLVING INTERIOR AND EXTERIOR PROBLEM

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The determination of acoustic field due to radiation and scattering has been examined by many researchers in acoustics**.** Such problem may be called a direct problem. Another case in acoustics is the reverse of the direct problem, where the acoustic parameters such as pressure, particle velocity or acoustic impedance on the source surface are to be determined based on the information of acoustic parameters in the field points. The problem is known as inverse problem. The numerical solution uses in this thesis is Boundary Element Method. The major advantage of this method is the reduction of the dimension of the problem being solved, wherein only the boundary of the surface needs to be discretized. For example, a three dimensional problem may be solved using two-dimensional treatment. For axisymmetric sources, the dimension of problem can be further reduced wherein one dimensional treatment.

This paper presents an inverse solution for acoustic radiation and scattering problems involving interior and exterior domains. Formulation for axisymmetric sources is presented for acoustic radiation in interior domain. Test cases are shown involving spherical, cubical and cylindrical bodies for both radiation and scattering problems. The results of the inverse solutions are compared with the true (original) values on source surface in which a good agreement was obtained.

Keywords: *direct problem, inverse problem, Boundary Element Method, acoustic inversion, interior domain, exterior domain, radiation, scattering*

BIOREFINERY FOR PALM OIL MILL EFFLUENT (POME) IN THE PRODUCTION OF FINE CHEMICALS AND BIOHYDROGEN

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Palm oil mill effluent (POME) has been used as fermentation medium to produce useful bioproducts such as acetone, butanol, ethanol (ABE) and biohydrogen via anaerobic fermentation. Studies on direct use of POME using *Clostridium acetobutylicum* NCIMB 13357 and *C. saccharoperbutylacetonicum* N1-4 have been carried out in batch culture. The effect of concentration of sedimented POME, the effect of initial culture pH and the use of immobilized cells for ABE production was investigated. Results show that *C. acetobutylicum* NCIMB13357 grown in 90% sedimented POME with initial pH 5.8 produced the highest total ABE concentration ($4gL^{-1}$) and 31mL hydrogen. However, butanol production was maximum ($1.82gL^{-1}$) in the culture with the initial pH of 6.0. Immobilized cells of *C. saccharoperbutylacetonicum* N1-4 indicated that ABE production from POME could be enhanced when high concentrations of cells at solventogenic growth phase were maintained in the Ca-alginate support.

Keywords: *Biorefinery, POME (Palm Oil Mill effluent), anaerobic fermentation, acetone-butanol-ethanol (ABE), biohydrogen*

METALLURGY VIEWPOINT ON MALAY *KERIS* BLADE – A PRELIMINARY REVIEW

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Keris-making, though look so simple, involves a lot of scientific principles. It is a traditional method that underlies the principles of, among others, forging, quenching, tempering and etching. Traditional methods of preparing and procedure of making the blade are briefly introduced with the discussions from the viewpoint of metallurgy. Such traditional methods are also revealed to be consistent with the modern science and technology. This paper discusses part of a small effort to understand this materials selection process as used in many parts of the blade, from the perspective of materials science. In general, the steel suitable for the body of the blades possesses some ductility to facilitate forging (hammering) whereas the edge is harder and is made of steel with higher carbon content.

DURABILITY ANALYSIS OF A QUAD FLAT NO-LEAD PACKAGE: A CASE STUDY TO OBSERVE THE DELAMINATION EFFECTS BETWEEN THE COPPER LEADFRAME AND EPOXY LAYERS

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This paper presents the durability analysis of a semiconductor package with two types of copper leadframe. Both types of leadframe, i.e. a good and an oxidised leadframes, were used in the fabricating process of a Quad Flat No-Lead (QFN) package. Determining the adhesiveness of die strength and determining the strength of the leadframe are important for obtaining higher durability between the leadframe and an epoxy layers. A statistical analysis of the die shear test and the cyclic strain test of a QFN package was performed in this paper. From the application of the t-test method, the p-value shows a significant difference in die shear stress depending on leadframe condition. Based on a process capability ratio (C_{pk}) above one, the leadframe in good condition showed better processing capability than the oxidized leadframe. According to the cyclic tests performed in this study, the good leadframe package showed a higher die strength value and lower micro strain compared to the oxidized leadframe. In addition, the oxidized leadframe package a poor surface to attach adhesive and a higher micro strain on cyclic load, resulting a negative effect on package durability, such as a crack phenomenon at the epoxy interface between the die and the leadframe. This occurrence may ultimately cause delamination, which occurs between the die and the leadframe die pad.

Keywords: *Die strength, delamination, good leadframe, oxidized leadframe, QFN package.*

CHARACTERISATION OF AuAl INTERMETALLIC MORPHOLOGY ON GOLD BALL BONDS

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Characterisation of gold ball bonding mechanical strength on aluminium is quite well understood but there is relatively little information concerning on the morphology and growth patterns of AuAl intermetallic compound coverage in accurate 3D measurement as compared to 2D images of the projected surface. This paper describes the problems associated while determining the AuAl intermetallic coverage using well known conventional method and compared with the 3D surface imaging technique to explain the bonding parameters effects towards morphology of AuAl intermetallic compound formed. Infinite focus microscope (IFM) was proposed to provide 3D surface measurement on topographical of bonded region with real colour information. Results illustrated by this technique were used as additional information to the conventional method includes cross-section and optical micrographs by scanning electron microscope (SEM) to gain a better understanding on the physical behaviour of AuAl intermetallic compound.

EFFECT OF SURFACE TREATMENT ON FRACTURE PROPERTIES OF SILK FIBRE REINFORCED EPOXY COMPOSITES

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The effect of surface treatment of silk fibre on the interlaminar fracture toughness of silk/epoxy composite has been studied. The woven silk/epoxy composites were produced by a compression moulding technique. Two sets of sample were prepared, in the first sets silk were treated with a surface treatment using a silane-based coupling agent and in the second sets, silk were not treated at all. All the samples have been tested for mode I interlaminar fracture using double cantilever beam specimens (DCB) testing method. It was found that the interlaminar fracture toughness, G_{IC} of the composite in set 1 are higher than set 2 and G_{IC} increases as the number of silane concentration increases. Stable crack propagation is observed for both sets of samples during the tests and the crack propagation areas for the untreated fibres showed all the fibres were bare with no matrix covering them as were seen using Scanning Electron Microscopy. Failure occurred at the fibre-matrix interface with no fibre bridging observed between the two fracture surfaces for all specimens because they are interwoven. The smooth clean surface of the silk fibres is the result of weak interfacial debonding. Samples with treated fibre surfaces showed improved adhesion and increased interlaminar fracture properties. The results give the indication of the effect of the fibre surface treatment and silane concentrations because the thicknesses of all the specimens are the same. In order to increase the interlaminar fracture toughness of silk fibre/epoxy composites, surface treatment using silane based coupling agent gives an improve properties over untreated specimens.

Keywords: *Scanning electron microscopy; surface morphology; fracture properties; coupling agent*.

FRACTURE TOUGHNESS AND FATIGUE CRACK GROWTH BEHAVIOR OF RAIL TRACK MATERIAL

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Fracture toughness K_C and fatigue crack growth behavior of commuter train's rail track material used in Klang Valley, Malaysia was investigated. Two different tests were performed in accordance to ASTM E399 and E647 testing procedures using standard three-point bend SE(B) and compact tension CT specimens, respectively. The results showed that the average K_C value of the rail track material was 43 $MPam^{1/2}$. On the other hand, from the fatigue crack growth test, the threshold stress intensity factor range, the constants C and m of the Paris' Law equation obtained were 5.6 $MPam^{1/2}$, 1.3 x 10^{-12} and 3.54, respectively. Prediction of bending fatigue life of rail track material using the above obtained parameters showed a good agreement with the experimental results.

Keywords: *Fracture toughness, fatigue crack growth, stress intensity factor, life prediction, rail track material*.

ALLOYING BEHAVIOUR AND MICROSTRUCTURAL CHANGE OF Ti-10at.%Mo-10at.%Cr ALLOY ON SINTERING

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This study is to investigate effect of sintering on alloying behaviour and microstructural change of Ti-10at%Mo-10at%Cr alloy. Powder metallurgy and sintering were applied for the fabrication of samples. Commercial pure Ti, Mo and Cr powders are used as raw materials, and then the powders were compacted at ambient temperature. Green-compacted powders were sintered at 1573K for various holding times and then furnace cooled. These samples show the existence of α' or α" phases within β matrix. It was also found that Ti and Cr elements have been fully dissolved when the sample was heated for 0.6ks, but this is not so for Mo element. The results show that increase in sintering time could promote diffusion of alloying elements in the samples. Designated chemical composition can be obtained after sintering for 5.4ks although full β phase is not obtained. It can be concluded that alloying of the metallic powders can be occurred through sintering and further heat treatment is needed to obtain the full β single phase.

EFFECT OF ISOTHERMAL TREATMENT ON DENDRITIC MICROSTRUCTURES OF ZA3 ALLOY

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ZA3 is a zinc based alloy with aluminium as its main alloying element. Producing ZA3 product by semisolid metal processing (SSM) offer significant advantages such as the reduction of macrosegregations, porosity and low forming efforts. The thermal and microstructure analysis of ZA3 alloy were studied using differential scanning calorimeter (DSC) and scanning electron microscopy (SEM). The solidus and liquidus of the alloy can be determined by DSC analysis. The changes to the microstructures affected by the isothermal treatment in holding the castings for 3-6 hours at 100^{o}C and heating at glass transition temperature for 0.5-5 hours were investigated. The initial as-cast ZA3 alloy consisted of dendritic microstructure typical of a cast ingot. The major effort in the semi-solid technologies is the generation of small and spherical morphologies. Prior to the generation of the spherical morphologies, the fine grains should be first produced. The results indicated that when the ZA3 alloy was subjected to heat treatment at 280^{o}C for 3 hours, the dendritic arms coalesced and coarsened into a mixture of β+η structure of fine solid grains of less than 100μm.

Keywords: *ZA3; solidus; liquidus; glass transition temperature; dendritic*.

DEVELOPMENT OF $LA_{1-X}SR_XCO_{0.2}FE_{0.8}O_3$ (LSCF) CATHODES FOR INTERMEDIATE TEMPERATURE SOLID OXIDE FUEL CELLS (IT-SOFCs)

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In this work, perovskite oxides $La_{1-x}Sr_xCo_{0.2}Fe_{0.8}O_{3-\delta}$ (LSCF) with x = 0.3-0.5 have been developed using the sol-gel method. The obtained powders were characterised using X-Ray Diffraction (XRD). Fourier Transform Infra-Red (FTIR) analysis was performed to confirm the Fe-O bond in the prepared LSCF powders. The effects of sintering temperature on the density and porosity of the LSCF pellets were then observed using Scanning Electron Microscopy (SEM). Impedance spectroscopy with two electrode configurations were used to identify the electrical conductivity of the LSCF in air at 100-900^{o}C. XRD results showed that pure crystals of LSCF perovskites with orthorhombic structure were fully formed whereas the FTIR results showed that pure LSCF powders were obtained. Despite varying the Strontium content, all the cathodes produced in this research were found to be suitable for use in IT-SOFCs and these LSCF cathodes were found to offer high electrical conductivites at 600-800^{o}C.

MEASUREMENT OF ENTRANS SURFACE DOSE (ESD) FROM COMPUTED RADIOGRAPHY (CR) BY USING THERMOLUMINENSCENCE DOSEMETER (TLD)

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DUAL ENERGY GAMMA RADIATION TOMOGRAPHY SYSTEM

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Tomography is an imaging technique of internal structure of an object that is able to map the physical property of the object (linear absorption coefficient) using non-destructive testing. The basic concept of tomography is reconstruction slices of internal structures of object of several projections of collimated radiation beams that pass through an object.

Dual energy radiation tomography was used in this research by using two radiation sources i.e. an external radiation that transmits gamma radiation placed outside the object and an internal gamma radiation source attached in the object. Simultaneous scanning was done to obtain transmision and emission data.

The object examined was a 45-mm-diameter phantom. There is a hole in a certain part of the phantom with a diameter of 25 mm and is filled with water that contains I-131. Tc-99m gamma radiation source was transmitted from external object.

The results were transmission and emission of tomography sinograms reconstructed to produce transmission and emission images. The two images were combined to produce emission and transmission tomography images.

Keywords : *Tomography, Gamma Radiation, Dual Energy, Sinograms*

SYNTHESIS NANOSILICA FROM CEMPAKA

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Research to obtain new materials with high performance have been carried out, particularly in industrialized countries. One of the programs developed fast enough and until now was actively carried out research, both basic and applied research is field nanosains and nanotechnology. Nanosains and nanotechnology development today has come to dominate the industry, and bahkah has mengeser micro-electronic technology (10-6 m) which has played in the last decades (Edelstein, 1996). Nanomaterial, as part of and nanosains nanotechnology, materials engineering is the order of nanometers (10-9 m) (Kebamoto, 2003). Almost all materials can be made in the form nanokristal and nanoparticles, to produce superior nature, which depend on the processing, manipulation and composition (Gleiter, 1989, Kimura, 1995). Industrial products are expected to use commercial nanomaterial (Inoue, 2003) starting in 2010 (NSTC, 1993).

Exploitation of minerals, such as metal and rock, has been done in the diamond mining areas in the region people Cempaka, South Kalimantan and focused on the fragments generated from diamond mining. The size of fragments obtained ranged from 1.5 to 15 cm. Piles of these fragments are not far from the river running through the mining area, which is most distant 100 m and still is a popular river sedimentation pelamparan (sikumbang, in 1994). From the preliminary investigation found levels of silica (SiO2) cempaka area between 94.4% - 99% (Wianto, 2008).

The availability of natural resources in the form of some material in Banjarbaru, South Kalimantan, such as silica sand, can be further processed as a nanomaterial with unique characteristics. Nanomaterial can be made in the nano size (<100 nm) through the synthesis of gravity method and then through the milling process using a planetary ball milling. Use of equipment X-ray diffractometer (XRD) and scanning electron microscopy (SEM) and transmission electron microscopy (TEM) will produce detailed characteristics of these nanosilika, about the structure, shape and particle size and aggregation that may occur. These results obtained with silica nano material between the

size <100 nm after kopresipitasi process while before the process is after the ball mill obtained grain size> 300 nm is based on the results of XRD method and SEM Scherer. While the results of qualitative and quantitative analysis found that the dominant mineral SiO2 is 98 to 99%, this after going through the washing process to remove the clay and using a magnetic separator to remove magnetic materials.

SYNTHESIS AND CHARACTERIZATION NANOZIRKONIA FROM CEMPAKA

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Zirconia (ZrO_2) is a raw material whose use is very widespread and growing in the industrialized world. Zirconia in addition to widely used as a main component, can be as minor components that could alter the material properties of good mechanical, thermal, and electrical rnenjadi of a better material according to function,. The industry needs to reach 94% of the total average consumption. The amount of consumption in large downstream industries. Some raw materials are estimated to contain these elements are used by the tanning industry is a material industry, ceramic industry and glass (frit-glaze and enamel), Foundri, refractory, and abrasit (basic metal industries and industrial metal goods), electronics components such as materials dielectric, semiconductor and smart materials as sensors and chemical oxygen gas. Zirconia grain size is generally used consist of milled and micronized Zircon Zircon, zirconia became nanozirkonia changes affect the physical and chemical nature of the material. By changing the size of a nano-scale materials into, will get a physical or chemical properties that differ from previous material properties. Examples of special properties of nano materials can be found on the nanozirkonia nature superplastis (able to deform up to 300%).
The potential of South Kalimantan zircon sand is very large ± 500 million tons which can be processed into oxide zirconia or zircon (Zr), which has reached the price of the selling price of USD 7.5 million to Rp 10 million per 25 kilograms, while the price of zircon Rp3800 - Rp4500/kilogram. Nano technology that can transform into nanozirkonia zirconia expected selling price to be 1000 times.

The results obtained so far are: Separation of valuable minerals from impurities by using the advantages of magnetic separation process to produce zircon with high levels and to separate the magnetic material. Zircon sand is then processed through several steps, including: washing, drying, heat treatment at a temperature of 900 ° C for 6, 12, and 24 hours to increase the levels. Zircon (ZrSiO4) which has increased levels were then purified by using a chemical process by adding NaOH at a temperature of 7000 C and then with HCl at room

temperature for zirconia, and then in kalsinasi and characterized by DTA / TGA. The resulting zirconia is in gerus and sifted by size 45 μm, so the resulting mikrozirkonia. Purity ZrO_2 phase has produced mineral content analyzed by using the characterization of X-ray Diffraction.

HUMIC ACID REDUCING PHOSPHATE ADSORPTION ON GOETHITE

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Most highly weathered soils in tropical regions contain high concentration of iron and aluminium (hydr)oxides like goethite and hematite. These (hydr)oxides are the most important minerals responsible for phosphate adsorption in these soils. As a consequency of this, in terms of using them for agricultural purposes, these soils are faced by low bioavailability of phosphate. An experimental study had been carried out in order to get an insight information on effects of humic acid on phosphate adsorption on goethite (α-FeOOH). Phosphate adsorption on goethite was studied by a bath method. A serie of phosphate solution of 0.1 to 0.75 mM P and 0.1 or 0.3 g/l humic acid was added to 1 g/l goethite suspension in background electrolyte of 0.01 M $NaNO_3$ which pH was adjusted to certain range of pH. In the absence of humic acid the phosphate adsorption in more pH-dependent than in the presence of humic acid. This implies that there is a change in charging behaviour of goethite due to the concomitant or previous adsorption of humic acid on goethite. Humic acid reduces phosphate adsorption on goethite much more pronounced at pH < 6, suggesting that in the normal pH of soils, humic acid is very important to make phosphate more available for plants.

Keywords: goethite, humic acid, phosphate adsorption.