

MAKLUMAT INDUSTRI  
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## MAKLUMAT PERDAGANGAN DAN PERNIAGAAN / TRADE AND COMMERCIAL INFORMATION

### USM EYES BIGGER ROLE IN NATIONAL ROLL-OUT PLAN FOR MSC

Universiti Sains Malaysia (USM) is looking to a more prominent role in the impending National Roll-Out plan for the Multimedia Super Corridor (MSC) via its newly-launched satellite earth station in Penang, sources were quoted.

USM Vice-Chancellor Professor Datuk Dzulkifli Abdul Razak said yesterday the university's second 4.5-metre C-band VSAT antenna, which sits atop the School of Computer Sciences' premises, will enable USM to facilitate more research in areas deemed important in relation to the MSC roll-out. (VSAT technology is a telecommunication system based on wireless satellite technology. The term "VSAT" stands for "Very Small Aperture Terminal". VSAT technology is made up of a small satellite earth station and a typical antenna of 1.8 metres in diameter). Penang and Kulim have been identified as the new centres of development of the MSC outside Cyberjaya. USM has MSC status, while its corporate arm — Usains Holding Sdn Bhd — has MSC incubator-status. Penang's MSC Cyber City project will serve as Phase Two of the MSC rollout. Its proposed Cyber City will see the conversion of a portion of the Bayan Lepas Free Industrial Zone on the island linked northwards to USM's main campus at Minden into the MSC Cyber City. The new antenna found at the satellite earth station is managed by USM's Network Research Group (NRG) from its School of Computer Sciences.

NRG's Network Head and Programme Chairman Associate Professor Sureswaran Ramadass said since the installation, the antenna has been used extensively for research activities within the Asia Pacific region.

The project is led by Keio University of Japan and its partners comprising collaborators and researchers from institutions of higher learning from Asian countries like Thailand, Indonesia and the Philippines.

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### US GROUP SET TO MAKE PENANG ITS HIGH-END PROCUREMENT HUB

Penang will emerge as a key investment hub for international procurement, manufacturing and research and development (R and D) of high-end products if the proposed acquisition of a French microelectronics company by an American organisation is realized, sources were quoted. US-based Shah Management LLC and three of its partners, who plan to buy up TEC France, are looking at establishing an international procurement centre (IPC) at Penang's Multimedia Super Corridor "cyber city" in the Bayan Lepas Free Industrial Zone and a manufacturing presence in Seberang Jaya in mainland Penang. The IPC, which will be established by the end of October this year.

## **MALAYSIAN CHIP MAY LEAD THE WAY**

Malaysia could lead the Asia Pacific region, and perhaps even the world, in realising the “ubiquitous society,” where anyone can track anything, anywhere and at any time, using radio frequency identification (RFID) technology.

Japanese firm FEC Inc. believes that the creation of such a ubiquitous society would be based on the world’s smallest RFID chip, known as the Malaysian Microchip, the Multiband Microchip or simply, the MM Chip.

The MM Chip is touted as the first multifrequency chip that supports all frequencies from 13.56 megahertz (MHz) to 2.45 gigahertz (GHz). In addition, it has a write-once capability that can store 32 bytes of data within its 0.25 sq mm area.

The chip is unique because it comes with an onboard antenna, which operates at the microwave frequency of 2.45GHz, with a readable distance of up to 3mm.

To increase its reading distance, the MM Chip has extra connectors for a 13.56MHz booster antenna and a 950MHz external antenna, which can achieve read distances of up to about 30cm and 50cm respectively. The detection range is from 1mm to 1.7m.

Now, nearly one year after Malaysia acquired the rights for it, the MM Chip has reached the engineering sample stage. A commercial sample of the chip could be made available to applications developers as early as next year. A field test of the engineering sample will commence in October until the end of the year, to be conducted by Japanese and Malaysian partners, to test the chip’s functionality and how it can be adapted to the local environment.

According to FEC (M) Sdn Bhd, a joint venture between the Malaysian Government and FEC Inc. after the field test, the company will move into an “application testing phase” with two to three projects lined up with certain ministries.

Applications developers can then look forward to receiving the MM Chip’s data sheet and development kits for the chipset, readers and tags. The first stage of mass production is scheduled to commence in Japan early next year.

FEC Malaysia is in the process of identifying potential partners that have the capability and compatible technology to produce the MM chip locally.

The MM Committee (MMC) is believed to be identifying suitable partners and collaborating with local universities to continue with research and development of the chip, sources were quoted.

## **REGIONAL HUB FOR WAFER FABRICATION**

Malaysia may soon become a major hub for wafer fabrication activities in the Asia-Pacific through initiatives by Kulim Hi-Tech Park (KHTP) to strengthen its position in the region, sources were quoted.

KHTP, which was recently conferred Multimedia Super Corridor (MSC) cybercity status, plans to include such activities as one of its major milestones by bringing in integrated circuit design houses and companies in wafer packaging, test, assembly and related services.

According to Kulim Technology Park Corp, which manages the park, KHTP currently has about 10 such companies rendering support to Silterra, the first and only wafer fabrication plant in Peninsular Malaysia and also a tenant of the park.

Its Group Chief Executive Officer Datuk Ahmad Shukri Tajuddin said the cluster of wafer fabrication companies could play a dual role in the park, including to continue supporting Silterra’s operations. The other is to attract other wafer fabrication companies to locate their operations in the park.

To achieve this, the park intends to fully leverage its cybercity status, which invariably has the additional pulling power to attract more companies to locate their operations in its premises. (KHTP and the Bayan Lepas Area in Penang were recently given the MSC cybercity status by the Government to mark the initial stage of the MSC rollout nationwide.)

## **BRAUN TO INCREASE EFFICIENCY OF ASIA-PACIFIC**

B. Braun, a global supplier of healthcare products, intends to increase the efficiency of its distribution in the Asia Pacific region by between 20% and 30% with its new Regional Distribution Centre (RDC) in Penang, sources were quoted.

The move is expected to increase port usage that will benefit freight forwarders, thus indirectly helping to boost the economy in the state.

B. Braun Asia Pacific President Datuk Hans Peter Brenner said the company was in the midst of acquiring tax-free status for the movement of its goods in Penang.

The tax-free status is expected to be concluded with the Ministry of International Trade and Industry and Malaysian Industrial Development Authority by the end of this year. Penang was chosen as a location for its RDC ahead of China due to the speed in which goods could be cleared by Customs and that such a move was cheaper. He said the RDC will procure and consolidate goods from inter-company manufacturing plants throughout the world. In addition to warehousing and handling of goods, the RDC will also perform value-added services such as customer service, order processing, distribution and transportation, quality assurance and control, bulk-breaking, packing and kitting, labelling and cross-docking.

## **MAKLUMAT PENGELUARAN / PRODUCT INFORMATION**

### **CIBA TARGETS INNOVATION IN PLASTICS ADDITIVES**

Ciba Specialty Chemicals believes that the development of new technologies in additives can not only accelerate the displacement of traditional materials by plastics but also open new markets for polymers, sources were quoted.

The company, which is the world market leader in plastics additives, plans to boost the functionality of plastic products through the use of additives as, for example, growth promoters, oxygen scavengers, biocides and biodegradables.

Ciba recently introduced a photoselective additive for plastic films for greenhouses that converts UV-light into red light by luminescence. Red light is highly beneficial for growth in plants.

"The film is being used in the greenhouses of rose growers who have been able to increase yields by 40 percent," explained Andreas Thuermer, an R&D executive in Ciba's plastic additives division. "We believe it can be applied to other horticultural sectors like vegetables."

Among Ciba's other new products is a hydrophilic additive for polypropylene that enables the polyolefin to be used in hygiene products such as diapers. Ciba is putting a lot of effort into the development of non-halogenated flame retardants, which have the potential to substantially exceed the current 3 to 5 percent growth rate in the flame retardant market, based on their environmental compatibility.

### **MICROSOFT HAS NEW TAKE ON VIRTUALIZATION**

Microsoft promises to ease server application migration and simplify test environments with the forthcoming release of Virtual Server 2005, an application that virtualizes the Windows 2003 Server operating system, sources were quoted. Virtual Server 2005 allows administrators to concurrently run multiple operating systems or multiple instances of Windows 2003 Server. Virtual Server 2005 is a browser-managed product, which allows administrators to manage virtual machines from most anywhere using Internet Explorer. Microsoft believes Virtual Server 2005 will be used primarily as a method to migrate legacy applications.

### **CLEAN SWEEP**

Using an RTP long fiber compound, HP-Industrial of Denmark has designed a one-piece broom handle to meet the stringent sanitation requirements of the food and pharmaceutical industries, sources were quoted. Smooth and completely sealed, with no joints or seams, the new design is said to eliminate areas where bacteria could develop. The foremost design requirements for the HP project were strength and rigidity. Moreover, the handle's 60-80 inch length demanded a material with high flow characteristics and a generous processing window. Thus, says RTP, it recommended a 100 Series long glass fiber-reinforced polypropylene compound with a flow-enhancement package.

To meet design requirements, an injection mold with a flow length of 80 x 1.25 inch (200 x 3.2 cm) was built, and an internal core was used to achieve a consistent 0.08-inch (2-mm) wall thickness throughout the handle. Processing adjustments provided a smooth, resin-rich surface.

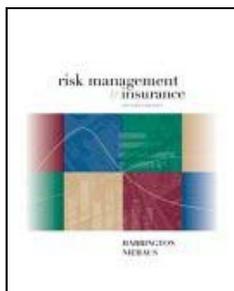
According to HP, the surface finish is equal to that of an unfilled resin; there is no visible evidence of the reinforcing fibers. Because of the compound's heightened resistance to creep and fatigue, the handle is able to hold dimensions well, both out of the mold and through time under load, RTP adds.

The company points out that the compound also meets design requirements for chemical and heat resistance to withstand repeated cleaning with hot water or steam, detergents, and disinfectants.

Moreover, says RTP, it meets the FDA's extraction limits for polypropylene, and it is fully recyclable.

### **NEW INSECTICIDE APPROVED**

The EPA has granted federal registration to a new, unique mode of action chemistry, which will provide broad-spectrum control of plant bugs, stink bugs and other mid to late season insect pests. The product, Diamond, will be marketed by Uniroyal Crompton, sources were quoted. Diamond controls insects by interfering with chitin development, which causes the target pest to produce a weak or malformed exoskeleton. Applied early when insect pests are in their larvae/nymph stage, the product prevents juvenile tarnished plant bugs, clouded plant bugs, stink bugs, armyworms, loopers, budworms, bollworms, cotton leaf perforators and salt marsh caterpillars from reaching the next stage of growth.



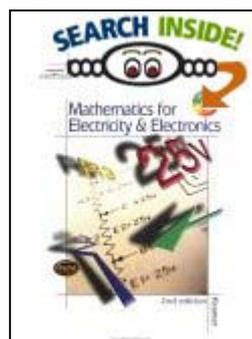
**RISK management and insurance.** Scott E. Harrington, Gregory R. Niehaus. 2<sup>nd</sup> ed. Boston: McGraw – Hill/Irwin, 2004. (HG8054.5. H311 2004)

This second edition of *Risk Management and Insurance* continues its innovative approach that instructors embraced in the first edition – providing readers with a broad perspective of risk management and a conceptual framework for making risk management and insurance decisions to increase business value and individual welfare. This text also enhances the ability of students to think critically and analytically to solve real business problems. In addition to focusing on these goals, this edition presents broadened coverage of personal risk management and corporate risk management issues, making this text more flexible for principles of insurance, risk management and insurance, or corporate risk management courses.

**HOUSING and planning year book 2003.** London: FT Prentice Hall

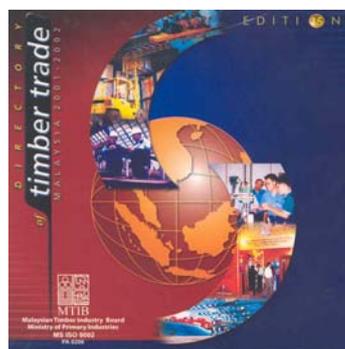
(rHD7999.A3H842)

The information contained in this *Housing and Planning Year Book* is divided into two main categories: services offered by statutory bodies – central government offices and local authority housing and planning departments, and services offered by non-statutory organizations – housing advisory bodies, housing associations, major builders, professional associations and other allied organizations. The book has therefore been split into two parts to reflect these different services.



**MATHEMATICS for electricity and electronics.** Arthur D. Kramer. 2<sup>nd</sup> ed. Albany: Delmar/Thomson Learning, 2002. (fTK153. K89 2002)

With more than twice as many exercises and examples, this 2<sup>nd</sup> edition of *Mathematics for Electricity and Electronics* equips future electronics technicians/technologists with an understanding of essential algebra and trigonometry principles while it sharpens their ability to think quantitatively, predict results accurately, and troubleshoot effectively. Complete with the latest ideas and technologies, this edition features expanded coverage of basic arithmetic and algebra, earlier introduction of calculator examples, extensive discussion of DC and AC fundamentals, and all-new chapter on statistics.



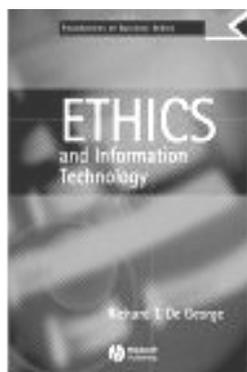
**DIRECTORY of timber trade Malaysia 2003-2004.** Seri Kembangan: Malaysian Timber Industry Board, 2003. (rHD9766.M2M241)

As in the previous issues, this 16<sup>th</sup> edition of *Directory of Timber Trade Malaysia 2003* contains researched and updated information under the headings: *Malaysian Timber Industry Board, Forestry & Infrastructure, Timber Trade Associations, Useful Contacts, General Information and Listings of Companies*. This Directory provides a handy research and promotional tool to touch base with the timber industry in Malaysia, as well as to explore and nurture business potential worldwide.



**BIOPHARMACEUTICALS: biochemistry and biotechnology.** Walsh, Gary. 2nd ed. Whitehouse Station: John Wiley & Sons, Ltd., 2003. (RS380.W224 2003)

Provides a current overview of the science and applications of biopharmaceutical products. Discusses the latest developments and presents a greater focus on actual commercial products and how they are manufactured. Includes new information on biopharmaceutical drug delivery and how genomics impact the industry.



**The ETHICS of information technology and business.**

De George, Richard T. Malden: Blackwell Publishing, 2003. (HF5387.D318 2003)

The book explores a wide range of topics, including marketing, privacy and the protection of personal information; employees and communication privacy; intellectual property issues; the ethical issues of e-business; Internet-related business ethics problems; and the ethical dimension of information technology on society.



**NANOELECTRONICS and information technology: advanced electronic materials and novel devices.**

Waser, Rainer, ed. Weinheim: Wiley-VCH, 2003. (T174.7.N187 2003 f)

Providing an introduction to electronic materials and device concepts for the major areas of current and future information technology, the value of this book lies in its focus on the underlying principles. Illustrated by contemporary examples, these basic principles will hold, despite the rapid developments in this field, especially emphasizing nanoelectronics. There is hardly any field where the links between basic science and application are tighter than in nanoelectronics & information technology. As an example, the design of resonant tunneling transistors, single electron devices or molecular electronic structures is simply inconceivable without delving deep into quantum mechanics.



**CHEMISTRY of the environment.** Spiro, Thomas G., Stigliani, William M. 2nd ed. Upper Saddle River: Prentice Hall, 2003. (TD193.S759 2003)

This book covers topics such as energy flows, supplies, fossil fuel, nuclear and renewable energy, and energy utilization; the greenhouse effect; climate modeling; chemistry of the ozone layer; air pollution; redox potential and water pollution; toxic chemicals; and acid rain. Featuring an unsurpassed marriage of chemical principles with issues of environmental concern, this book is unrivaled in terms of its ability to explain the chemistry behind the headlines.



**ORGANOMETALLIC compounds in the environment.** Craig, P.J., ed. 2nd ed. West Sussex: John Wiley & Sons, Inc., 2003. (QD411.R467 2003)

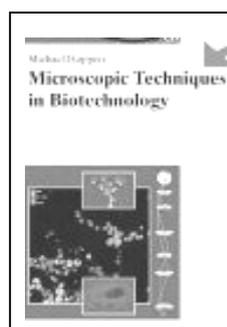
The Second Edition of *Organometallic Compounds in the Environment* covers all the recent developments in analytical techniques and reports all the new work that has been achieved since the first book.

- Covers the general importance and characteristics of organometallic species.
- Includes general developments in analytical techniques.
- Discusses several minority elements including antimony and selenium.



**BIOTECHNOLOGY and biopharmaceuticals: transforming proteins and genes into drugs.** Ho, Rodney J.Y. & Gibaldi, Milo. Whitehouse Station: John Wiley & Sons, Ltd., 2003. (RS380.H678 2003)

Focuses on the role biotechnology plays in the discovery and development of therapeutic drugs. Discusses the process of transforming a macromolecule into a therapeutic agent and examines each class of macromolecules with respect to its physiological role and clinical application.



**MICROSCOPIC techniques in biotechnology.** Hoppert, Michael. Weinheim: WileyVCH, 2003. (QH207.H798 2003)

Text discusses representative examples of biological material to be investigated in the context of biotechnology, and provides instructions for their preparation. Discusses imaging by application of electron microscopy, and describes specialized approaches of imaging.

**STATISTICAL process control and quality improvement.** Smith, Gerald M. 5th ed. Upper Saddle River: Pearson Prentice Hall, 2003. (TS156.8.S648 2004)

This “mathematics-friendly” volume introduces readers to basic concepts and applications of Statistical Process Control (SPC). Readers get a solid foundation in control charts—including setting scales, charting, interpreting, and analyzing process capability. Problem-solving techniques are emphasized, and all learning is linked to the implementation of SPC in the workplace. The volume offers an introduction to quality concepts and statistical process control, quality issues, variation and statistics, an introduction to tables, charts, and graphs, probability and the normal distribution, control charts, variables charts for limited data, attributes control charts, problem solving, gauge capability and acceptance sampling.

**MAKLUMAT PENYELIDIKAN DARI USM**  
**RESEARCH INFORMATION FROM USM**

**CHITOSAN: A NATURAL BIOPOLYMER FOR THE ADSORPTION OF RESIDUE OIL FROM OILY WASTEWATER**

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**ABSTRACT**

Chitosan, poly $\beta$ -(1,4)-2-acetamido-2-deoxy-D-glucose (N-deacetylated) was used as an adsorbent to adsorb the excess oil from oily wastewater. Chitosan is a biodegradable cationic biopolymer achieved by the extensive deacetylation of chitin obtained from prawn shell waste. Palm oil mill effluent (POME) is one of the major problematic oily wastewaters in Malaysia. Preliminary analysis showed that POME contains ca. 2000 mg/l residue oil. A bench scale study of the adsorption by chitosan of residue oil in POME was conducted using jar test apparatus. Effects of experimental parameters such as the dosage of chitosan in powder and flake form, contact time, mixing rate, settling time and pH were studied in order to obtain the optimum conditions for the adsorption of residue oil from POME. The results obtained showed that chitosan powder at a dosage of 0.5 g/l and employing a contact time of 15 min, a mixing rate of 100 rpm, sedimentation for 30 min and a pH value of 5.0 provided the most suitable conditions for the removal of residue oil from POME. The removal efficiencies obtained were ca. 97-99%. FT-IR spectra and SEM micrographs of chitosan before and after adsorption were presented to prove that the residue oil had been adsorbed by chitosan.

**REMOVAL OF HEAVY METAL IN INDUSTRIAL WASTEWATER BY COAGULATION METHOD**

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**ABSTRACT**

A feasibility study using hydroxide precipitation and coagulation-flocculation for the treatment of wastewater containing heavy metals such as lead and zinc has been carried out. Concentrations of heavy metals in the wastewater range from 1-7 mg/L for lead and 3-150 mg/L for zinc. Aluminum sulfate (alum), polyaluminium chloride (PAC) and magnesium chloride ( $MgCl_2$ ) have been used as coagulants to investigate the effectiveness of the coagulation method for the removal of individual heavy metals in the synthetic wastewater. Parameters such as pH, types of coagulants, coagulant dosages and the effect of coagulant aid dosages on the flocs settling time have been studied. The effect of pH on the solubility of metals has also been studied. Jar tests were conducted to determine the optimal operating conditions. Alum, PAC and  $MgCl_2$  of concentrations 1200 mg/L, 150 mg/L and 200 mg/L can achieve up to 99% removal for Pb concentration of 7 mg/L in a pH range of 6.5-7.8, 8.1-8.9 and 9.7-10.9 respectively. Individual Zn with concentrations below 90 mg/L can be removed by precipitation method. Beyond 90 mg/L, coagulation method is needed in order to remove Zn from the wastewater effectively.

**TURBULENCE MODELS FOR HEAT TRANSFER IN BOUNDARY LAYER FLOWS**

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**ABSTRACT**

A new near wall differential turbulence model is introduced for velocity and thermal fields in the boundary layer flows in the present project. The new model takes into account the asymptotic behavior of turbulent scales near the wall region and for free turbulence region using the composite time scale. For the velocity field the Kolmogorov turbulent time scale is introduced as a lower limit. The developed model for the velocity field is used for modeling the turbulent heat transfer in the turbulent boundary layer flows. Predictions of the new models (for velocity and thermal fields) are compared with experimental data, with encouraging improvement in results. The new models are published in four research papers.

## PHYTOCHEMICAL AND BIOLOGICAL STUDY OF MELASTOMA MALABATHRICUM L., A LOCAL PLANT USED IN TRADITIONAL MEDICINE

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### ABSTRACT

The aqueous methanolic extracts of the leaves and flowers of *Melastoma malabathricum* were separately partitioned with solvents and chromatographed on silica gel and sephadex LH20 columns. Three urs-12-ene triterpenoids, viz. ursolic acid, 2 a-hydroxyursolic acid and asiatic acid, along with  $\beta$ -sitosterol 3-O- $\beta$ -D-galactopyranoside, glycerol 1,2-dilinolenyl-3-O- $\beta$ -D-galactopyranoside and glycerol 1,2-dilinolenyl-3-O-(4,6-di-O-isopropylidene)- $\beta$ -D-galactopyranoside were isolated from the leaves. The presence of three olean-12-ene triterpenoids, the isomers of the three aforementioned urs-12-ene triterpenoids, was indicated from  $^{13}\text{C}$ -NMR evidence. The ethyl acetate soluble part from the flower extract yielded ellagic acid and six flavonoids which were identified as quercetin, kaempferol, kaempferol 3-O-a-L-rhamnopyranoside, kaempferol 3-O- $\beta$ -D-glucopyranoside, kaempferol 3-O- $\beta$ -D-galactopyranoside and kaempferol 3-O-(2'', 6''-di-O-E-p-coumaryl)- $\beta$ -D-galactopyranoside. The last compound is an uncommon natural product, previously reported only once from a plant. Both the extracts and some of the fractions showed antibacterial activity. Regarding the pure components, asiatic acid from the leaves was active towards *Bacillus subtilis* and *Staphylococcus aureus* while ellagic acid, quercetin and kaempferol isolated from the flowers were the most potent.

## DEVELOPMENT AND PHYSICO-CHEMICAL CHARACTERIZATION OF INSTANT STARCH FROM SAGO STARCH

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### ABSTRACT

Successful efforts have been made to develop starches that can dissolve in cold/ambient water ( $\sim 25^\circ\text{C}$ ). Granular cold-water soluble (GCWS) starches, developed using corn, waxy corn and tapioca starches, are available commercially. To further enhance the usage of sago starch in food products, the development of GCWS sago starch was undertaken. In this study, GCWS sago starch was prepared using alcoholic-alkaline treatments. The native starch was treated with mixtures of aqueous solutions of ethanol and NaOH at different temperatures to affect the solubility of the starch granules. Response Surface Methodology (RSM), was employed to study the interactions among three factors (temperature, ethanol concentration and NaOH concentration) that were found to affect the percentage of cold-water solubility of the GCWS. The low (-1) and high (+1) levels were set for each factor at  $25^\circ\text{C}$  and  $35^\circ\text{C}$ , 40% and 60%(w/w) ethanol, and 3M and 4M NaOH. Maximum cold-water solubility obtained was  $83.4 \pm 0.8\%$  using a combination of  $30^\circ\text{C}$ , 3.5M and 4M NaOH and 33.2% ethanol. A higher treatment temperature and NaOH concentration enhanced cold-water solubility whereas a higher percentage of ethanol decreased it. Paste clarity (measured as % transmittance of a 1% starch solution) was found to be positively correlated with the degree of cold-water solubility. No Maltose crosses appeared when the GCWS starches prepared from these treatments were examined under polarized-light microscopy, which indicated changes of crystalline structures. Size exclusion chromatography analyses of the GCWS starches were identical with those of their native starch counterpart, which indicated there was no detectable degradation of starch molecules during the preparation. Most of the GCWS starches displayed higher viscosities and better freeze-thaw stabilities than those of their native starch counterparts.

## INFLUENCE OF LIME ON THE DEFORMATION OF MASONRY MORTAR

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### ABSTRACT

In this investigation, six (6) different mix proportions of masonry mortar were prepared in the form of cubes (100 x 100mm) and cylinders (265 x 75mm) to assess the base characteristic of strains of masonry mortar, involving shrinkage and creep which concerned the time-dependent behavior. All specimens were cured in water:  $20^\circ\text{C}$  and tested at the age of 7, 14 and 28 days. For creep, the cylinder specimens were loaded at the age of 14 days and shrinkage was started simultaneously.

The work has been carried out in a controlled room of 20°C and 65% relative humidity, and readings have been obtained over a period of approximately 70 days. As a result, it was found that the influence of lime content could significantly affect effects in long-term deformation due to a change of mortar type, which should be considered in the design.

## **MOLECULAR MODELING STUDIES OF SOME TANNINS COMPLEXES: AN INSIGHT INTO THEIR CORROSION INHIBITION PROPERTIES**

Rohana Adnan, Marzuki Abdullah and Muhammad Syahren Adzahar  
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USM Main Campus

### **ABSTRACT**

A theoretical semi empirical study was performed on 4 units of flavanoids mimosa tannin,  $C_{15}H_{12}O_5R_1R_2$  (where  $R_1=H$ (Resorcinol)  $R_1=Phlorogucinol$ ,  $R_2=H$ (Pyrocatechol) and  $R_2=OH$ (Pyrogallol) employing AM1 and PM3 method available on Hyperchem Version 7.0 program. This study showed tannin with  $R_1=OH$  and  $R_2=OH$  was more stable compared to the others. Both methods also consistently produced a lowest after optimization energy and the smallest  $E_{LUMO-HOMO}$  for this combination. Total energy and  $E_{LUMO-HOMO}$  for this structure using PM3 method was -93366.90 kcal/mol and -9.050287 kcal/mol respectively. For AM1 method, the values were -100462.5 kcal/mol for total energy and -9.036746 kcal/mol for  $E_{LUMO-HOMO}$ . Furthermore, a similar study was performed on the ferric-tannate complex to understand the parameters that stabilize the complex. This study showed, the addition 2 water molecules lowered the total energy by -15062.1 kcal/mol. The  $E_{LUMO-HOMO}$  was also further lowered to -3.19554 kcal/mol when compared to the structure without any water molecules, -2.75331. This finding had clearly shown that  $H_2O$  molecules played an important role in stabilizing the complex. The stability was assumed to be due to the water molecules making hydrogen bonding with 4 oxygen atoms from tannin, which are directly connected to Fe. This study also proposed dative covalent bonding between Fe and 2 oxygen atoms from the water molecules. The complexation together with the presence of two water molecules had induced great change to the structure especially to the geometries around oxygen-Fe, which seems to be the cause for the lower energy produced.

## **SYSTEMATIC RELIABILITY-BASED ENVIRONMENTAL DESIGN OF EROSION FOR EFFICIENT ENGINEERED LANDSCAPE PROFILING**

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### **ABSTRACT**

Evolving environmental legislation has received increased attention worldwide in the last two decades (Bradfield, Schultz and Stone, 1996). The focus of concern by the industry, environmental regulatory agencies and members of the public is the potential impacts associated with unstable landscapes which sometimes lead to slope failures, especially in hillside development. Engineered landscape profiles, though stable at the end of construction, may deteriorate over time due to erosion. There is thus a need to increase the base of knowledge on the existing practices of engineered profile design, hillside development, reshaping practices and erosion control. With escalating production costs and the keen competitiveness in the industry world-wide, the necessity to increase the efficiency of engineered profile development is further gaining prominence. This paper reviews the advancement of erosion management research in the industry, economics of landscape profiling, the practical application of the Point Estimate probabilistic technique and the optimum design selection for the systematic planning and reshaping of engineered landscape profiles. The probabilistic engineering design erosion monographs developed is useful in determining and illustrating quantitatively the reliability of final engineered landscape designs and the reshaping costs involved for different soil texture types. Landscape designs, which meet environmentally acceptable levels of reliability against erosion failure at optimum earthmoving reshaping costs, can be obtained using this probabilistic engineering design approach whilst satisfying environmental standards and community expectations for erosion minimisation.

## ANTI-CORROSIVE PERFORMANCE OF WASH PRIMER BASED ON MANGROVE TANNIN

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### ABSTRACT

Aqueous acetone extract from bark of *Rhizophora appiculata* or locally known as “bakau minyak” was tested for anti-corrosive properties by incorporating the powdered extract in wash primer formulation. The anti-corrosive behavior of steel panels treated with water-based formulations was assessed employing salt spray accelerated test (ASTM B 117) in comparison with the standard chromated wash primer. The results indicated that the wash primer formulated solely with tannin as an anti-corrosive agent showed significant anti-corrosive properties in reducing the corrosion of steel. However, the fully tannin-based wash primer showed an inferior performance compared to the chromated primer. On the other hand the superior performance of the tannin-based wash primer had been achieved by a mixture of tannin with zinc phosphate in the ratio of 1:3. The anti-corrosive properties of the mangrove bark extracts seem to be related to the tannin which are capable of chelating with  $Fe^{3+}$  giving a highly stable and insoluble ferric-tannate complexes. The tannin in the wash primer may act as  $Fe^{3+}$  scavengers that converts the ferric ions into ferric-tannate which inhibited the diffusion of dissolved oxygen to underlying steel.

## DEVELOPMENT OF INORGANIC MEMBRANE TO REMOVE OIL EMULSIFIER FROM DOMESTIC WASTEWATER

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### ABSTRACT

The rapid development of membranes in wastewater treatment was a great encouragement to participate and fabricate inorganic membrane. The results yielded to an expansion of knowledge and producing various types of ceramic membrane. The ceramic membrane has a great potential and market, ceramic membrane represents a distinct class of inorganic membranes, especially the metallic coated has many industrial application. The porous ceramic was prepared for to fabricate the supported membrane. A thin film of Aluminum and Zirconium were formed. Unsupported membrane was also prepared. The sol-gel is one of the most useful techniques for preparation of inorganic membrane with fine pores in the nanometer range (1-5 nm). The sol is a stable suspension of colloidal solid particles within soft uniform solution. The gel was obtained based of hydrolysis process with open reflux in 24 hours at 85-90°C. The advantage of sol-gel technology is the ability to produce highly pure  $\gamma$ -alumina and zirconia membrane at medium temperature about 700°C with uniform pore size distribution in a thin film. However, there are disadvantages as sensitivity to heat treatment resulted in cracks on the film layer. There were successful crack free products, but needed special care and time for suitable heat curing, only  $\gamma$ -alumina membrane has the disadvantage of a poor chemical and thermal stability. There was not any opportunity to carry heat treatment at very high temperature above 700°C, where at 900°C, it was expected the transformation of  $\gamma$ -alumina from  $\gamma \rightarrow \theta \rightarrow \alpha$ - alumina may take place. The successful coated on supported membrane product was obtained using  $ZrO_2$ . In this research project, zirconia-coated-  $\gamma$ -alumina membrane coated on ceramic support was developed with implementation of sol-gel technique. The technique will obtain the crack free unsupported membrane, which was expected to have pore size of 1-2nm. The developed crack free membrane in the above section will not have the same strength without the support. The next stage of this work was to carry characterization.

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