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A background image showing a close-up of a hand holding a white sheet of paper, with a blurred background of a building and sky. The image is partially covered by a large, curved, multi-colored band (purple, red, orange) that runs diagonally across the cover.

The
10th
ICON-SCI
International Conference
4 - 5 JUNE
2019

Abstract Book

Welcome Message



With great pleasure, the Rajamangala University of Technology Phra Nakhon (RMUTP) welcomes you to “The 10th RMUTP International Conference on Science, Technology and Innovation for Sustainable Development: Turning Digital Disruptions into Opportunities 2019 (10th RMUTP ICON SCI-2019)”. This event will be held on the 4-5 June, 2019 at the Sukosol, Bangkok, Thailand. We also welcome participants from overseas to Thailand and look forward to giving you a taste of Thailand’s culture.

Our conference provides an outstanding international forum to present and discuss progress in research, development, standards, and applications of the topics related to Science, Technology and Innovation for Sustainable Development.

The 10th RMUTP International Conference will offer high quality activities including research and poster sessions. We feel sure to provide you an engaging environment with an excellent opportunity to exchange new research results, major ideas and start fruitful collaborations. International visitors are also encouraged to experience the Thai culture and attractions around Bangkok. We take this opportunity to thank you for your participation, we hope you enjoy your time and take advantage of our conference. We look forward to seeing you.

Sincerely Yours,

A handwritten signature in blue ink that reads 'Supatra Kosaiyakanont'.

Assoc. Prof. Supatra Kosaiyakanont
President of Rajamangala University of Technology Phra Nakhon
Conference Chair, The 10th RMUTP International Conference

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General Information

Venue:

Place: The Sukosol
Address: 477 Si Ayuthaya Road, Thanon Phayathai,
Ratchathewi, Bangkok 10400, Thailand
Tel: +66 2 247 0123 Fax: +66 2 247 0165
E-mail: thesukosol@sukosolhotels.com
Website: <http://www.thesukosol.com>

Registration Desk

Place: The Sukosol
Hours: Tuesday June 4, 2019 08:00 am – 08:00 pm
Wednesday June 5, 2019 09:00 am – 05:00 pm

Information Desk:

Place: The Sukosol
Hours: Tuesday June 4, 2019 08:00 am – 08:00 pm
Wednesday June 5, 2019 09:00 am – 05:00 pm



Presentation Instructions:

Oral presentations are required to be made by PowerPoint, which should be controlled by the speaker. The oral presentation will be 15 min plus 5 min questions. All speakers are required to load and check the files before the presentation. A PC-compatible computer and a LCD projector will be provided.

Poster presentations are to be mounted at the allocated area. The content of the poster should cover titles, objectives, methodology, results discussion and conclusion. The poster board size should not exceed 90 cm width x 120 cm height as the template available on our website: <http://iconsci.rmuth.ac.th/>

ICON-SCI Awards:

1. ICON-SCI Best Oral Presentation Awards
2. ICON-SCI Best Poster Presentation Awards

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Tuesday June 4, 2019

Registration & Opening Ceremony	
08:00-09:00	Registration
09:00-09:30	Opening Ceremony (Kamolthip Ballroom)
09:30-10:30	Special Talk “Turns Digital Disruption into Opportunity” Mr.Kitipong Tarassirisakul Huawei Technologies Co., Ltd.
10:30-10:45	Coffee Break
10:45-11:45	Special Talk “Marketing capability and corporate investment” Prof. Paresh Narayan Deakin University, Australia
12:00-13:00	Lunch Break in Patummat Restaurant

Special Forum	
Place: Kamolthip Ballroom 1	
13:00-14:30	Aviation & Railway System
14:30-16:00	Global SME

Poster Session	
09:00-17:30	Poster Session
Welcome Reception	
18:00-20:00	Welcome Dinner

Session 1: Sustainability Science	
Room: KINGKAMOL	
Chairman: Dr.Noppakun Sanpo	
Co-Chair: Dr.Putinun Uawongsuwan	
13:30-13:50	EFFECT OF MACHINE PARAMETERS ON THE PROPERTIES OF 3D PRINTED COTTON/PLA FABRICS Josphat Igadwa Mwasiagi
13:55-14:15	EFFECT OF DIFFERENT BINDERS ON THE ADHESION OF Ag/TiO ₂ POWDER ON POLYESTER FIBER AND THEIR PHOTOCATALYTIC METHYLENE BLUE DEGRADATION UNDER Jiravadee Sukitpong
14:20-14:40	THE EFFECT OF PLANT RESIDUES AND BIOCHARS ON ORGANIC MATTER AND NITROGEN IN SOIL Panadda Puttanakhul
14:40-14:55	Coffee Break
14:55-15:15	EFFECT OF SEASON ON WATER QUALITY OF EXTENSIVE AND INTENSIVE SEABASS CULTURE POND AND ASSOCIATED CANALS Nipapun Pansuk
15:20-15:40	SCREENING OF CANDIDATE MUTANTS OF KDML105 RICE USING SALINITY TOLERANCE SCORE AND PHYSIOLOGICAL INDICES Ranjit Singh Gujjar
15:45-16:05	MUTANT OF KDML105 RICE SHOW HIGHER POTENTIAL TO RETAIN TOTAL CHLOROPHYLL AND PHOTOSYNTHESIS CAPABILITY UNDER LOW NITROGEN CONDITION Pennapa Banyen

Session 2: Innovative Technology and Sustainability Engineering	
Room: DUANGKAMOL	
Chairman: Dr.Kanawut Inkaew	
Co-Chair: Dr.Apisit Kositchaiyong	
13:30-13:50	ESTIMATING PRECIPITABLE WATER VAPOR USING DATA FROM THE GROUND MOTION OBSERVED SYSTEM Sukrit Kirtsang
13:55-14:15	GENERATING ELECTRICAL ENERGY FORM PLANT FUEL SYSTEM UNDER HYDROPONIC CONDITION Kanokporn Sompornpailin
14:20-14:40	EFFECT OF MEMBRANE TREATMENT AND OPERATING TEMPERATURE ON PERFORMANCE OF ALKALINE-ACID DIRECT GLYCEROL FUEL CELL Ponkarnan Sangkheaw
14:40-14:55	Coffee Break
14:55-15:15	EFFECT OF SPUTTERING CURRENT ON THE STRUCTURE OF TiCrN THIN FILMS PREPARED FROM MOSAIC TARGET BY REACTIVE DC MAGNETRON SPUTTERING Nirun Witit-anun
15:20-15:40	TRACKING WHEEL TEST OF COMPOSITE INSULATOR IN 22 KV DISTRIBUTION SYSTEM Wichet Thipprasert
15:45-16:05	A BROAD-BEAM MICROSTRIP PATCHES ANTENNA USING CAVITY BACKED SLOT-COUPLED Thana Puklibmoung

Wednesday June 5, 2019

Time	Activities
08:00-09:00	Registration
09:00-16:30	Poster Session
16:30-17:00	Awards, Closing Celebration and Welcome to ICON Sci 2020

Session 1: Sustainability Science Room: KINGKAMOL Chairman: Assoc.Prof.Dr.Siriporn Rojananan Co-Chair: Asst.Prof.Dr.Tippaban Palathai	
09:00-09:20	ECO EFFICENCY COMPARISON OF GREEN HOUSE GAS REDUCTION IMPLEMENTATION PLAN, A CASE STUDY OF THAILAND'S SMALL AND MEDIUM HOTEL AND LARGE HOTEL Natworapol Rachsiriwatcharabul
09:25-09:45	EVALUATION OF SALT TOLERANT ABILITY ON SELECTED THAI RICE CULTIVARS Chanakarn Sangsiri
09:50-10:10	ELECTROCHROMISM OF G/ITO/NiO _x Hy AND G/ITO/WO ₃ PREPARED BY REACTIVE DC MAGNETRON SPUTTERING TECHNIQUE Jarinya Yosthisud
10:10-10:30	Coffee Break
10:30-10:50	PLASMA IRRADIATION INDUCING BIOCHEMICAL STRESS IN HAIRY ROOT OF ARTEMISIA ANNUAL Ittipat Punlerd
10:55-11:15	STUDY EFFECT OF ROLLER'S SURFACE COATING ON SHEET METAL SPINNING PROCESS Thanapat Sangkharat

Session 2: Innovative Technology and Sustainability Engineering Room: DUANGKAMOL Chairman: Dr.Noppakun Sanpo Co-Chair: Dr.Putinun Uawongsuwan	
09:00-09:20	CLASSIFICATION AND IDENTIFICATION OF DIABETIC RETINOPATHY SEVERITY STAGE IN THAI PATIENT USING DEEP LEARNING MODEL Weeragul Pratumgul
09:25-09:45	TWO-DIMENSIONAL NUMERICAL INVESTIGATION OF HYDROGEN CHARGING IN A METAL HYDRIDE STORAGE INTEGRATED WITH ULTRASONIC MIXING Thanasak Chumwisoot
09:50-10:10	THE APPLICATION OF LOW-COST SENSOR IN GAS MONITORING APPARATUS Kanawut Inkaew



The 10th RMUTP International Conference on Science

Economic Modelling Special Session

Day 1: 4th June 2019, Sukosol Hotel, Bangkok, Thailand

Session Opening and Keynote Speech | Chair: Dr Susan Sharma

1:00pm - 1:10pm	Session Opening by Alfred Deakin Professor, Paresh Narayan , Deakin University
1:10pm - 1:40pm	Keynote Speech by Professor Naoyuki Yoshino , Dean & Head of Asian Development Bank Institute (ADBI) <i>Local financial development, access to credit and SMEs' performance: Evidence from Bangladesh</i>
1:40pm - 2:00pm	Question & Answer

Presentation Session 1 | Chair: Dr Bernard lyke

2:00pm - 2:30pm	Chun-Ping Chang , Shih Chien University at Kaohsiung <i>Political institution and environmental quality: A perspective from Asia</i> Discussant: Dinh Phan
2:30pm - 3:00pm	Dinh Phan , Taylor's University <i>Political connections and corporate investment: Evidence from Malaysia</i> Discussant: Prabheesh KP
3:00pm - 3:30pm	Prabheesh KP , Indian Institute of Technology Hyderabad <i>Drivers of India's business cycle synchronization</i> Discussant: Chun-Ping Chang



Presentation Session 2 | Chair: Professor Chun-Ping Chang

3:45pm - 4:15pm	Anviksha Drall , Indian Institute of Technology Madras <i>Does entry barrier exist for non-farm employment in India? Evidence from the semi-arid tropics (SAT) and East Indian region</i> Discussant: Ko Ko Maung
4:15pm - 4:45pm	Ko Ko Maung , The Republic of the Union of Myanmar <i>Toward a model for sustainable microfinance institutions in Myanmar</i> Discussant: Bernard lyke
4:45pm - 5:15pm	Naoyuki Yoshino , Asian Development Bank Institute <i>Remittance Inflow, Financial Inclusion and Economic growth in Asian middle-income countries</i> Discussant: Anviksha Drall

Day 2: 5th June 2019, Sukosol Hotel, Bangkok, Thailand

Presentation Session 3 | Chair: Prof Prabheesh KP

10:00am - 10:30am	Ipsita Rakshit , Indian Institute of Technology Madras <i>Does non-linearity exist while determining the impact of energy efficiency on economic growth? - A global-level analysis</i> Discussant: Panqiang Niu
10:30am - 11:00am	Panqiang Niu , Shanghai University <i>Is communication of synthetic knowledge base bounded?</i> Discussant: Yuen Onn Choong
11:00am - 11:30am	Yuen Onn Choong , Universiti Tunku Abdul Rahman <i>Why don't Malaysians adopt solar photovoltaic technology? The role of social influence and facilitating conditions</i> Discussant: Ipsita Rakshit



Keynote speaker



THE ROLE OF MARKETING CAPABILITY IN CORPORATE INNOVATION

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Abstract

This paper quantifies the role of marketing capability (MC) in influencing corporate innovation (patents awarded, patent citations, and patent value). Using historical data for a sample of U.S. firms, we show that MC positively influences corporate innovation. This result is robust to multiple sensitivity tests, including the use of several estimators and control variables. Further, we quantify the economic relevance of the effect of MC on corporate innovation; a one standard deviation improvement in MC predicts an increase in patent value of US\$37.90 million, equivalent to 1.22% of total assets.

Keywords: Marketing capability; Corporate innovation; Firms; Assets



Oral presentation

Session 1: Sustainability Science



EFFECT OF MACHINE PARAMETERS ON THE PROPERTIES OF 3D PRINTED COTTON/PLA FABRICS

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Abstract

Textile substrates have been combined with polymers using 3D printing technology. The aim of this research was to study the effect of machine properties on the cotton/PLA structures printed using 3D printing technique. PLA was printed on a cotton fabric using a 3D printer, with PLA as the printing polymer. The effect of extrusion temperature, printing speed, fill density and model height on adhesion force before and after washing, and tensile strength were investigated. The experimental data was used to develop regression models to predict the properties of the cotton/PLA structures. The model for adhesion force before washing yielded a coefficient of determination (R^2) value of 0.75 and an optimum adhesion force of 50.06 N/cm. The model for adhesion force had an R^2 value of 0.84, an optimum adhesion force of 42.91 N/cm. Adhesion forces before and after washing, were both positively correlated to extrusion temperature. However, they reduced with an increase in printing speed and model height. Tensile strength yielded an R^2 value of 0.94 and an optimum tensile strength of 346.22 MPa. From the results it was concluded that 3D machine printing parameters have an effect on the properties of the cotton/PLA structures.

Keywords: Cotton, PLA, 3D Printing, Adhesion force



EFFECT OF DIFFERENT BINDERS ON THE ADHESION OF Ag/TiO₂ POWDER ON POLYESTER FIBER AND THEIR PHOTOCATALYTIC METHYLENE BLUE DEGRADATION UNDER VISIBLE LIGHT IRRADIATION

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Abstract

Ag/TiO₂ was prepared by doping 10% mol of silver (Ag) on via impregnation method. The crystallinity and wavelength absorption of Ag/TiO₂ powder were characterized by X-ray Diffraction (XRD) and UV-VIS NIR spectrophotometer, respectively. Then, the Ag/TiO₂ powder was mixed with two different binders such as Polyethylene glycols with molecular weight 6000 (PEG) and Polyacrylic acid (PAA) and coated on Polyester fiber (PET) by dip-coated the percentage of binder was varied from 0.3%, 1%, 3% and 5%wt. The photocatalytic reactivity of PET coated by Ag/TiO₂ was examined by decolorization of 10⁻⁵ M methylene blue (MB) solution under visible light irradiation. The decrease of MB concentration was measured by UV-VIS spectrophotometer at the λ_{\max} of 664 nm every 60 minutes. The XRD result indicated that Ag/TiO₂ had the combination of anatase phase, silver oxide (AgO) and metallic silver (Ag⁰). After doping, the band gap energy of TiO₂ was reduced from 3.14 eV to 2.92 eV (red-shift effect). Ag/TiO₂ powder was possessed an excellent photocatalyst for degrading MB (90.89%) which has higher MB degradation efficiency than TiO₂ (58.31%). The coated Polyester fiber with 5% PEG-Ag/TiO₂ and 3% PAA-Ag/TiO₂ showed the higher MB degradation efficiency with 87.68 % and 86.72 %, respectively.

Keywords: Photocatalysis, Ag/TiO₂, Polyester fiber, Polyacrylic acid, Polyethylene glycols, Methylene blue



THE EFFECT OF PLANT RESIDUES AND BIOCHARS ON ORGANIC MATTER AND NITROGEN IN SOIL

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Abstract

The aim of this research is to study the effect of plant residues and biochars on organic matter and nitrogen retention in the soil. This study used 1% (w/w) plant residues (mangosteen peel, mangrove bark, neem) and 1% (w/w) biochars (made from coconut shell, coconut husk, corncob) by mixing with sandy loam soil and 5% (w/w) nitrogen fertilizer and then they were kept at room temperature for 49 days. Soil samples were used for germination index (GI) at first day of soil amendment and were analyzed for pH, organic matter (OM), available ammonium and available nitrate every 7 days. The result showed that soil mixed with coconut shell biochar had the highest OM and available ammonia of 1.98% and 24.98 mg/kg, respectively. Thus, the available nitrate of soil mixed with coconut shell biochar had the lowest of 49.86 mg/kg. However, GI of soil mixed with mangrove bark had the highest of 116.57% and followed by soil mixed with coconut husk biochar (83.32%). The pH value of soil mixed with coconut shell biochar slightly acidic. It can be concluded that soil mixed with coconut shell biochar and soil mixed with mangrove bark have capacity for nutrient and organic retention.

Keywords: Biochar, Mangosteen peel, Mangrove bark, Neem, Nutrient retention, Organic matter, Soil amendment



EFFECT OF SEASON ON WATER QUALITY OF EXTENSIVE AND INTENSIVE SEABASS CULTURE POND AND ASSOCIATED CANALS.

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Abstract

This research aims to study the seasonal effect on water quality of seabass cultural ponds and associated canals by monitoring the water quality during dry season and wet season from extensive farm and intensive farm. Water samples were analysed for chemical, physical and biological parameters. Results showed that TCB and FCB in wet season were higher than dry season in both intensive and extensive associated canals because of water runoff from the land into the surface water. TCB of intensive and extensive pond in wet season were higher than TCB of intensive and extensive pond in dry season 7.80 and 1.73 times. FCB of intensive and extensive pond in wet season were higher than FCB of intensive and extensive pond in dry season 8.11 and 5.20 times. In dry season, associated canals had low DO and high COD. In addition, the seawater level affected quality water of ponds. When the seawater level was higher than the dyke, seawater from canals could over flow into the ponds. This affected the water quality in culture ponds. Thus, farmers should build high dyke and treat canal water before withdrawal to cultural ponds or preparing the influent water by using reclamation pond.

Keywords: Season, Water quality, Seabass, Aquaculture



SCREENING OF CANDIDATE MUTANTS OF KDML105 RICE USING SALINITY TOLERANCE SCORE AND PHYSIOLOGICAL INDICES

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Abstract

Salt tolerance abilities of KDML105 and its mutants were evaluated using “Salinity Tolerance Score” (SS) based on the standard evaluation system of IRRI. Seedlings of candidate mutants were treated with 150 mM NaCl for 5 days in hydroponic system screened for salt-tolerance using both scores of SS (SS = 3) and physiological indices. Three lines of mutants MT4, MT5 and MT 6 scoring 30.65%, 46.0% and 34.0% respectively at SS = 3 were selected. Selected lines were further evaluated for yield component under salt stress which proved better performance of MT5 over MT4 and MT6 lines. On the other hand, treatment of salt at 250 mM NaCl at booting stage showed different responses of all tested mutants in terms of physiological indices. Photosynthetic pigments (Chl_a, Chl_b and carotenoids) and net photosynthesis rate (NPR) invariably reduced in all mutants and KDML105 due to NaCl stress. Despite of relatively lower contents of pigments, mutant lines displayed higher NPR compared to KDML105 under salinity stress. Soluble sugars (glucose, fructose and sucrose) were examined in root, leaf blade and leaf sheath of KDML105 and mutant lines under salinity stress. Endogenous contents of glucose and fructose dropped significantly in roots and leaf sheath of KDML105 and mutants, whereas salt stress caused considerable increase in the contents of glucose and fructose in leaf blade of all lines. Further, candidate salt-tolerant mutants had more hexose contents in leaf blade than KDML105. Growth and morphological performances of salt-tolerant mutants were examined on the basis of shoot length, number of tillers, panicle length, number of spikelets, fertility percentage and grain weight. In conclusion, selected mutants displayed promising salt-tolerant abilities, growth and yield.

Keywords: Salinity stress, Rice, Mutants, KDML105, Soluble sugars, Photosynthesis

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MUTANT OF KDML105 RICE SHOW HIGHER POTENTIAL TO RETAIN TOTAL CHLOROPHYLL AND PHOTOSYNTHESIS CAPABILITY UNDER LOW NITROGEN CONDITION

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Abstract

Nitrogen (N) is an important nutrient for rice production. Growth and development of KDML105 rice and its mutant line MT2 were examined under low nitrogen condition. Both rice samples were grown in a soilless culture system supplemented with modified Yoshida solution at varied concentrations of ammonium nitrate (NH_4NO_3) as 0.18 mM (low N) or 1.43 mM (control N). Samples were cultivated continuously in this condition from seedling until the booting stage (approximately 100 days). Physiological parameters of photosynthetic pigments and photosynthesis rate revealed that low N caused reduced total chlorophyll in KDML105 but not in MT2. Similarly, the result of leaf greenness (SPAD value) also decreased and reflected different net photosynthetic rates (P_n). The MT2 mutant showed higher P_n than KDML105 under both low N and control conditions. Nitrogen is a major component of chlorophyll and amino acids under low N. The MT2 mutant displayed higher efficiency to utilize N sources for physiological mechanisms than its parental KDML105 rice under low N condition. It could be addressed that MT2 mutant displayed higher efficiency to utilize N sources for physiological mechanisms than its parental KDML105 under low N condition, which may reveal for its improved nitrogen use efficiency. This mutant will be useful to implement as pre-breeding material in rice breeding programs.

Keywords: KDML105, Nitrogen, Photosynthesis rate, Chlorophyll



ECO EFFICENCY COMPARISON OF GREEN HOUSE GAS REDUCTION IMPLEMENTATION PLAN, A CASE STUDY OF THAILAND'S SMALL AND MEDIUM HOTEL AND LARGE HOTEL

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Abstract

Due to rising of global warming awareness in many industrial sector, hotel industry in Thailand also contribute significant development in order to accommodate green or sustainable tourism. This paper illustrate eco efficiency of greenhouse gas (GHG) reduction plan of small and medium hotel in Thailand compare to large hotel. The study started from calculating Carbon Footprint for Organization (CFO) using Thailand Greenhouse Gas Management Organization (TGO) guideline of represented Thai's small and medium hotel. GHG reduction plan were formulated and implemented. Lastly, eco efficiency of this GHG reduction plan were calculated. The comparison of eco efficiency of GHG reduction plan of Thai's small and medium hotel and large hotel were also conducted. The result depicted that eco efficiency of GHG reduction plan of Thai's small and medium hotel is 8,264 KCO₂e/baht which is lower than large hotel in which have eco efficiency of 12,587 KCO₂e/baht.

Keywords: Eco efficiency, Carbon footprint for organization, Greenhouse gas reduction, hotel industry



EVALUATION OF SALT TOLERANT ABILITY ON SELECTED THAI RICE CULTIVARS

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Abstract

Salinity is a major abiotic stress affecting rice production. Registered and Traditional Thai rice cultivars obtained from Suphan Buri Rice Research Center were evaluated on salt tolerant ability. Twenty eight day old plants were cultured in 0 (control) or 50 mM NaCl solution until evaluation. Pokkali; salt-tolerant cultivar and IR29; salt-sensitive were compared with 9 studied cultivars. Growth parameters and photosynthetic pigment contents were measured at 21 days after stress exposure. The parameters such as shoot fresh and dry weight, and the contents of chlorophyll a, chlorophyll b, total chlorophyll and carotenoids were significantly different leading to grouping analysis. However, root performance did not show significant difference among cultivars and were not included in the grouping analysis. Studied cultivars were classified into two groups based on significant changes. Pokkali, Hawm Chonsalit, Ha Ruang, Suphan Buri60 and Suphan Buri90 classified into group I showed no significant changes in all studied parameters compared to mock-treated condition, while the group II composed of Mae Lahd, Khao Tah-mon, Sai Yud, Suphan Buri1, Khao Gaw Diaw and, IR29 presented decrease in photosynthetic pigments and shoot fresh weight.

Keywords: Salt stress, Thailand, Rice cultivar, Tolerant ability



ELECTROCHROMISM OF G/ITO/NiO_xH_y AND G/ITO/WO₃ PREPARED BY REACTIVE DC MAGNETRON SPUTTERING TECHNIQUE

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Abstract

This work aims to study the electrochromism of G/ITO/NiO_xH_y and G/ITO/WO₃ using cyclic voltammetry technique for electrochromic devices application. All samples were deposited on ITO coated glass(G) substrates by reactive DC magnetron sputtering with the same thickness of 150 nm. NiO_xH_y thin films were prepared at the constant power of 35 W under the mixed gas of Ar:O₂:H₂ at the flow rate ratio of 10:10:20 sccm and WO₃ thin films were prepared at the constant power of 150 W under Ar and O₂ mixed gas at the flow rate ratio of 30:27.5 sccm. The electrochromism properties of G/ITO/NiO_xH_y and G/ITO/WO₃ were studied in a 0.1 M of KOH and 0.1 M of H₂SO₄ solution respectively. The results showed that the both thin film systems showed a good electrochromism properties. The highest current density at 10th cycles repeating scan were 2.07 and 3.89 mA/cm² and the ΔOD at wavelength 550 nm of bleached and colored states of G/ITO/NiO_xH_y and G/ITO/WO₃ were 0.59 and 0.35 respectively.

Keywords: Electrochromic device, Nickel oxide, Tungsten oxide, Reactive DC Magnetron sputtering, Thin film



PLASMA IRRADIATION INDUCING BIOCHEMICAL STRESS IN HAIRY ROOT OF *Artemisia annua* L.

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Abstract

Biochemical constituent detected in *A. annua* is varied according to genotype and environmental conditions and generally poorly produced in root part. Elicitation can be applied to induce metabolic changes in plant parts using various elicitors. This present study is aimed to investigate the biochemical variations after stress-inducing physical force using argon plasma. Plasma irradiation is a novel electrically ionized radiation technology which was used to apply to hairy root cultures of *A. annua* at dose 0 (control) or 70 watts for 15 or 45 seconds, then the biochemical compounds in root tissue was examined at 3 and 6 hours after plasma irradiation using gas chromatography–mass spectrometry (GC-MS). The results revealed that treatment of 45 seconds showed appropriate time more than 15 seconds. Variation of biochemical compounds was analyzed by GC-MS and it was shown that plasma treatment could elevate or reduce quantitative compounds when compared to non-irradiated roots. Increasing amounts of 1,2-Benzenedicarboxylic acid, a compound against colorectal cancer was detected in hairy roots after 6 hours of plasma irradiation (for 45 seconds), which was 3 times higher than untreated hairy root. Moreover, plasma can induce nine compounds that normally disappear in the *A. annua* hairy root. On the other hand, there had seven numbers of biochemical compounds that were reduced after plasma irradiation.

Keywords: *Artemisia annua* L. Hairy root, Argon plasma irradiation, Biochemical compounds



THE EFFECT OF ROLLER'S SURFACE COATING ON SHEET METAL SPINNING PROCESS

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Abstract

The sheet metal spinning process is a conventional forming process. It is widely used in vary application. Many researches have studied the spinning process parameter, such as, roller design, roller path, feed ratio, spinning depth. The friction coefficient between roller and work piece was studied less than other parameter, because the spinning process is a single point incremental forming. However, in the thin wall spinning process, the friction cause of the failure in spinning process. This research proposes to study the effect of friction on thin wall spinning process. The vary coating was studied for find the minimum friction coefficient. The medium carbon steel (S45C) was used for base material and coating with vary method. TiN (Titanium Nitride), TiCN (Titanium Carbon Nitride), TiAlN (Titanium Aluminum Nitride) and DLC (Diamond Like Carbon) coating was studied. The result shown DLC is the less friction coefficient. After that, the spinning experiment was setup with DLC coating and non-coating roller. By vary spindle speed, feed rate, spinning depth coating and non-coating roller, the result of the experiment will show the effect of friction on spinning force and wear characteristic of the roller.

Keywords: Sheet metal spinning process, PVD coating.



Oral presentation

Session 2: Innovative Technology and Sustainability Engineering



ESTIMATING PRECIPITABLE WATER VAPOR USING DATA FROM THE GROUND MOTION OBSERVED SYSTEM

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Abstract

The Ground Motion Observed System (GMOS) station is used to measure the rate of tectonic plate movement. Thailand has installed 14 GMOSs located along the fault lines. In this study, the data from the GMOS station is applied to estimate Precipitable Water Vapor (PWV) by Zenith Wet Delay (ZWD) of Kanchanaburi station, Thailand during 2017-2018. The calculated PWV value is compared with the detected PWV from Aerosol Robotics Network (AERONET) by Sun photometer in the adjacent area for verification. The result reveals that the Correlation Coefficient value is between 0.7408 and 0.9794 whereof according to detected PWV by Sun photometer. Based on the result of this study, estimated PWV is able to apply for the precipitable water vapor monitoring system in further operation.

Keywords: Ground motion observed system, Precipitable water vapor, ZWD, GPS, AERONET



GENERATING ELECTRICAL ENERGY FORM PLANT FUEL SYSTEM UNDER HYDROPONIC CONDITION

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Abstract

A variety of living organisms have a potential to generate the electric currents which are the alternative resources of electric power. Plant organisms adsorb light and convert electromagnetic energy to chemical energy and also generate an electrical power by photosynthetic process. However, a few amounts of currents are generated in this system. In this experiment, plant under hydroponic system are used for studying generation of electric power. Different ratios of tap water and Hoagland's solution were performed. Zinc steel and polypropylene mixed with CNTs are used as the cathode and anode electrode, respectively, in the system. Bioelectric potentials and currents of treatments are detected and recorded. Plant system under solution containing high ratio of tap water generated higher voltage than those of system containing low ratio of tap water. However, plant system under solution containing high ratio of Hoagland's solution showed higher current density than those of system containing low ratio of Hoagland's solution. Metal oxide nanoparticles, known as photo-catalyst in fuel cell, were added in the solution of culture system and analyzed for electric power density. The result presented that these nanoparticles have a potent to increase power density at all ratios of tap water and Hoagland's solution.

Keywords: Electrical energy, Plant fuel, Hydroponic system



EFFECT OF MEMBRANE TREATMENT AND OPERATING TEMPERATURE ON PERFORMANCE OF ALKALINE-ACID DIRECT GLYCEROL FUEL CELL

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Abstract

Alkaline-acid direct glycerol fuel cell was fueled by glycerol to replace ethanol due to its interesting economic aspect when compared to ethanol. However, glycerol provides lower performance of fuel cells than ethanol. The effect of membrane treatment condition consisting of alkaline and acid on the cell's performance was investigated. Another observation was on the effect of operating temperature for the benefits of daily use as a portable device operating at low temperature. It was found that the membrane treated under acid condition by sulfuric acid solution yielded higher performance of fuel cell than did the alkaline condition treatment. The immersion of Nafion 115 membrane in the acid solution resulted in the addition of H⁺ ions to the inner structure of the membrane which assists in the transfer of H⁺ ion to the cathode side. The reduction of cell's performance as a result of decreasing operating temperature from 80°C to 70, 60, 50, 40 and 30°C is because the cell exhibited higher activation loss at low temperature according to the Butler-Volmer Equation.

Keywords: Alkaline-acid, Direct glycerol fuel cell, Nafion 115 membrane, Temperature, Membrane treatment, Kinetic of chemical reaction.



EFFECT OF SPUTTERING CURRENT ON THE STRUCTURE OF TiCrN THIN FILMS PREPARED FROM MOSAIC TARGET BY REACTIVE DC MAGNETRON SPUTTERING

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Abstract

TiCrN thin films have been prepared using a reactive DC magnetron sputtering system from a mosaic target. The effects of sputtering current on the structure of films, in the range of 300 to 700 mA, were investigated. The crystal structure, microstructure, thickness and composition were characterized by GIXRD, FE-SEM and EDS technique, respectively. The results revealed that, all the as-deposited thin films were formed as a (Ti,Cr)N solid solution. The as-deposited TiCrN films showed a nanostructure with a crystallite size less than 70 nm. The crystal sizes of all planes were in the range of 22.2 to 69.9 nm. The lattice constants were in the range of 4.149 Å to 4.175 Å. The thickness increases from 1630 nm to 4910 nm with increasing the sputtering current. The chemical composition (Ti Cr and N contents) of the as-deposited films were varied with the sputtering current. Lastly, all of the thin films in this work showed compact columnar and dense morphology as a result of increasing the sputtering current.

Keywords: TiCrN, Thin films, Mosaic target, Sputtering current



TRACKING WHEEL TEST OF COMPOSITE INSULATOR IN 22 KV DISTRIBUTION SYSTEM

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Abstract

The electrical insulator is an important part on the stability of the power system. The defects of electrical insulators are caused by the deterioration, which strongly affected on a power system. According to this problem, this research aimed to study a characteristic of the deterioration of composite insulators for the power transmission 22 kV by designing and creating a standard test set IEC Publ. 62730. This test is the tracking wheel test and determine the polluted condition that is setting the AC voltage 19.25 kV to electrodes by using sodium chloride as a polluted with conductivity 3.50 mS/cm. The results showed that the heat from 38.4 to 50.5 degrees Celsius was a main cause of leakage current and thus affected on changing the surface of electrical insulators. This degradation results in a decrease in the insulation of the surface, which leads to the corona discharge and or the Dry band up while testing. The result can be concluded that the deterioration of composite insulators can be used as a guideline for the maintenance of the electrical power system and the selection of the electrical insulators under the suitable conditions in order to reduce the causes of deterioration and the effects on the power system.

Keywords: Dry band, Polluted conditions, Deterioration, Composite insulators



A BROAD-BEAM MICROSTRIP PATCHES ANTENNA USING CAVITY BACKED SLOT-COUPLED

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Abstract

A broad beam microstrip antenna array using cavity back slot coupling is present in this paper. To achieve broad-beam antenna, phase of each element of the microstrip array has been designed to emulate the reflection of waves on the surface of parabolic backscatter by adjusting the parasitic patches size. In order to increase the efficiency of this array antenna, the back-slot cavity with an exciting probe will be used for coupling the electromagnetic waves to the back of this array. The proper sizes, locations of patches and the optimized position of cavity have been investigated by computer simulation technology (CST) software. An extensive analysis of return loss, radiation pattern and gain of the proposed antenna are shown in this paper. The fabricated antenna has been return loss -22.39 dB, the maximum directive gain of 5.6 dB at 5 GHz and it can produce wide beam-width (half-power beam-width around 130°). The antenna can be used for realizing earth coverage beam in LEO satellite or could be used for the application in wireless communication system.

Keywords: Broad beam, microstrip, Slot-coupled



CLASSIFICATION AND IDENTIFICATION OF DIABETIC RETINOPATHY SEVERITY STAGE IN THAI PATIENT USING DEEP LEARNING MODEL

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Abstract

Diabetic retinopathy (DR) is one of the complications caused by long-term diabetes, have an effect on vision quality of the patient until the level of permanent vision loss. This research has developed an automation method for screening and identifying the severity of diabetic retinopathy in Thai patients by using image processing principle together with deep learning technique. By this way, we examining the basic features which common wildly used in hospital for screening patient such as blood vessels, exudates, microaneurysms and some properties of color fundus retinal images (entropy and homogeneity). Then, developed a prototype software of purposed method with friendly graphic user interface for easily use. After that, prototype software of purposed method has been learned with 9,900 color fundus retinal images and taken to testing with 3,300 set of DR images. The result showed 99.36% of accuracy level and 99.48% of sensitivity level when compared with diagnosis of an ophthalmologist.

Keywords: Diabetic retinopathy, Artificial neural network, Deep learning



TWO-DIMENSIONAL NUMERICAL INVESTIGATION OF HYDROGEN CHARGING IN A METAL HYDRIDE STORAGE INTEGRATED WITH ULTRASONIC MIXING

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Abstract

Hydrogen is one of promising energy carriers for the near future because it is a renewable energy source and highest energy-to-weight ratio fuel. Hydrogen, however, is not easy to keep and used in its natural form. Metal hydride is one of potential candidates for storing hydrogen as it can be done in close-to-ambient environment. In this work, the two-dimensional numerical model of metal hydride system was developed and employed to investigate the effect of ultrasonic wave on an absorption rate of hydrogen in metal hydride powder (LaNi₅). Simulations are then performed to study the impact of external conditions i.e., hydrogen gas pressure and temperature on hydrogen refilling time. A parametric study is, then, performed based on a heat and mass transfer analysis to explore how metal hydride powder (LaNi₅) mixing hydrogen gas under ultrasonic condition can be improved. The suitable rate to charge hydrogen gas into the metal hydride tank is also investigated and discussed.

Keywords: numerical model, hydrogen storage; absorption; metal hydride; ultrasonic



THE APPLICATION OF LOW-COST SENSOR IN GAS MONITORING APPARATUS

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Abstract

The Low-cost sensor for air quality monitoring has been widely used during the past decades. In this research, the low-cost gas sensors were applied to monitor carbon dioxide and methane, two main greenhouse gases. There were two designing apparatus that had been developed, including the stand- and the portable-apparatus. The testing results showed that the stand-apparatus provided precisely the result of two gas monitoring, comparing to the reference both in the laboratory test and the field test. In contrary, the portable apparatus showed the precisely result only in the case of carbon dioxide monitoring. In short, the low-cost sensor can be used objectively for gas monitoring, however, the system design and sensitivity of the sensor need to be further developed under a range of specific condition.

Keywords: Air monitoring, Sensor, Gas detection



Poster Presentation

Session 1: Sustainability Science



MONITORING OF ABOVE GROUND OIL STORAGE TANKS WITH NONDESTRUCTIVE TESTING USING ACOUSTIC EMISSION TECHNIQUE

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Abstract

Non-destructive test with acoustic emission technique was used for monitoring of the corrosion in the above ground oil storage tank. This technique has to be prior used for the location detection of corrosion especially indication of the severity of corrosion. In this research, the relationship between the corrosion rate and the sound wave energy was studied. It was found that the corrosion rate was increased with enhancing the acoustic emission energy. Therefore, in order to achieve the corrosion rate and the position of the defects on the inner surface of the tank, non-destructive testing with acoustic emission technique can be factually chosen for this specific application.

Keywords: Acoustic emission energy, above ground storage tank, NDT,
Acoustic emission testing, Corrosion rates.



ANTIOXIDANT ACTIVITY OF FRUIT AND VEGETABLE POWDERS IN THAILAND

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Abstract

Fruits and vegetables are the richest sources of minerals and dietary fiber. They also pack with various antioxidant compounds which is known as a key ingredient for maintaining health. Unfortunately, the shelf life of fresh produces is short after harvesting. As a result, the dehydration process by converting fresh parts into powder can be one alternative to extend the storage time. The powder delivers not only nutrients, flavor, color, and texture but the dehydrated form is also easy for storage, transportation, and being used in healthy products. On the other hand, the loss of important nutrients can also occur. In order to develop a superfood product, selecting type of fruits and vegetables is the most important consideration in order to gain the highest phytonutrients. Nowadays, there are a number of superfood powders have been imported to Thailand with expensive price. This study was designed to explore and evaluate the power of tropical Thai's fruit and vegetable powders on antioxidant activity compared with the commercial superfood products outside the country. A total phenolic compound was evaluated based on the Folin–Ciocalteu reagent (FCR), correlating with redox and antioxidant capacities. The total phenolic content was expressed as gallic acid equivalents (GAE) in milligrams per gram dry of sample. The highest GAE of the imported product (from a total of 9 samples) was found to be 11.32 ± 0.09 mg. The highest level of the total polyphenols was found in Thai's veggies (Teaw) and fruit (Emblica) at 152.16 ± 11.10 and 134.82 ± 2.27 , respectively. These GAE values are higher than GAE values of imported fruits and veggies which are well known as superfoods such as Acai, Cranberry and Kale. The results of this study indicate that Thai's fruit and vegetable powders have the potential to be developed as a superfood antioxidant powders for an exported product.

Keywords: Antioxidant, Powders, Fruits, Vegetables, Polyphenolic compounds



BIOLOGICAL ACTIVITY OF PARTIAL PURIFIED POLYSACCHARIDES FROM SOME MACROALGAE IN THAILAND

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Abstract

Macroalgae are a rich source of natural polysaccharides with several important biological activities. This research is the first report on biological activities of partially purified polysaccharides and rare sugar in polysaccharides of some macroalgae in Thailand. Polysaccharides were extracted from the local macroalgae such as *Ulva* spp., *Sargassum* spp., *Spirogyra* spp., *Cladophora* spp. and *Rhizoclonium* spp. which locally known as Sarai Sai Kai, Sarai Toon, Sarai Tao, and Sarai Kai. Total sugar of partially purified polysaccharides extracts was higher than crude polysaccharides extracts 13.60 ± 0.69 , 4.03 ± 0.06 , 8.20 ± 0.91 and $5.67 \pm 0.58\%$, respectively. In addition, the sugar composition of polysaccharides differed slightly in each macroalgae. Sarai Sai Kai comprised of rhamnose, xylose and tagatose whereas rhamnose and glucose was found in Sarai Toon. Sarai Tao composed of rhamnose, psicose, xylose and tagatose. Sarai Kai contained psicose, xylose, tagatose, allose and galactose. Furthermore, polysaccharides of Sarai Toon have the highest biological activity. It had antioxidant activity by scavenging DPPH and ABTS which IC₅₀ equals 3.59 ± 1.00 and 0.86 ± 0.32 mg/ml, indicating that polysaccharide from Sarai Toon was more effective than vitamin C. Moreover, IC₅₀ of anticancer activity against of Caco-2 cells was 0.63 ± 1.75 mg/ml. Subsequently, polysaccharides from macroalgae product will be developed.

Keywords: Algae, Bioactive, Purification, Colon cancer, Monosaccharide



IMPROVEMENT OF MECHANICAL PROPERTIES OF POLYLACTIC ACID/OIL PALM FIBER COMPOSITES BY ALKALI TREATMENT

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Abstract

The aim of this work is the improvement of mechanical properties of oil palm fiber (OPF) reinforced polylactic acid (PLA) composites by using NaOH treatment. NaOH concentrations (0 to 15 wt%) and treatment times (and 0 to 30 min) were varied to determine the suitable condition for surface treatment of OPF. Aspect ratio (L/D) and surface of OPF were investigated by using optical microscope and scanning electron microscope (SEM), respectively. The result suggested that the most suitable condition for surface treatment of OPF was NaOH concentration of 10 wt% at immersion time of 20 min. Treated OPF with alkali solution formed microporous at fiber surface and had more roughness. For the effect of alkali treatment on the mechanical properties of composite, it was evaluated by tensile and impact testings and SEM technique. The results showed that surface treatment with NaOH led to enhancement of mechanical properties of composite due to improve interfacial adhesion and fiber dispersion.

Keywords: Bioplastic, Composite, Natural fiber, Mechanical properties,
Surface treatment



IMPROVED ETHANOL TOLERANCE IN *SPATHASPORA PASSALIDARUM* CMUWF1-2 THROUGH ADAPTIVE EVOLUTION

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Abstract

Spathaspora passalidarum CMUWF1-2 is a yeast that has highly efficient produce ethanol from xylose, which is the major sugar present in lignocellulosic biomass at high temperature. However, this yeast is sensitive to the inhibitors such as furfural present in the pretreated lignocellulosic biomass. Previous study, CMUWF1-2 was improved the furfural tolerance through evolutionary adaptation. During ~17 generations of adaptive evolution, a furfural tolerant mutant AF2.5 was obtained. After characterizing this strain in this study, it was found that AF2.5 not only had furfural tolerance but also had ethanol tolerance, higher than wild type. To focus on its ethanol tolerance, AF2.5 was examined growth and cell morphology in YPD broth medium containing with and without 4% (v/v) ethanol comparing with wild type. In the presence of 4% (v/v) ethanol, AF2.5 showed better growth than wild type, while cell morphology of AF2.5 was not different with wild type. Their cell walls were thin, when grown in the presence of ethanol. Moreover, the surviving capacity of AF2.5 that was exposed to 4% (v/v) ethanol was evaluated comparing with wild type. The result showed that a percent of viability in AF2.5 had two times higher than wild type.

Keywords: *Spathaspora passalidarum*, Bioethanol, Adaptive evolution,
Ethanol tolerance, Yeast



A SIMPLE HOME-BUILT SPECTROPHOTOMETER FOR ENVIRONMENTAL TESTING

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Abstract

A simplified design and implementation of a home built, low-cost, portable spectrometer using an Arduino as a Light-Emitting Diode (LED) photodetector has been established. The developed technique based on the well-known absorption principle commonly used in analytical chemistry for quantitative of the substances of interest. The spectrophotometer measures the intensity of light passing through a sample solution in a cuvette and compares with the intensity of the original light power. The intensity of color passing through a sample solution is proportional to the concentration of the sample solution. In other words, the higher the concentration of the analyte the more absorbed light. The main components of the proposed spectrophotometer are a LED light source, a LED light detector, a digital multimeter, and a sample holder. The proposed spectrophotometer is suitable for the spectrum approximately in the visible range. Herein, the blue, white and orange LED, as a photodetector, linked to a digital multimeter were used to detect the yellow sample at different concentrations. The absorbed light using blue, white and orange LED detector demonstrated excellent linearity with R^2 values of 0.9779, 0.9985 and 0.9988 respectively.

Keywords: Home-built spectrophotometer, Low-cost, Field test



REMOVAL OF LEAD (II) ION FROM AQUEOUS SOLUTION USING FRESH BANANA PEEL

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Abstract

The ability of fresh banana peel without surface modification in removal of lead (II) ion from aqueous solution was evaluated based on batch adsorption at room temperature. The experimental conditions, including dose, contact time, initial concentration of lead (II) ion were studied. The characterization of fresh banana peel was carried out with respect to several techniques, such as FTIR and ED-XRF. The isotherm models of Langmuir and Freundlich were used to describe the adsorption mechanism involving the relationship between adsorbent surface capacity and adsorbed degree of lead (II) ion in the equilibrium conditions. The experimental data fitted well to the Langmuir isotherm with a correlation coefficient of r^2 greater than 0.86. The Maximum adsorption capacity (q_m) was found to be 0.9151 mg/g. The results of ED-XRF of fresh banana peels before and after treatment with lead (II) ion confirmed that lead (II) ion was occupied onto the surface of fresh banana peel. Moreover, the inside of fresh banana peels was found the lead (II) ion larger than the outside peels. It was concluded that waste of banana can be used as a low-cost adsorbent for removal of lead (II) ion from aqueous solution based on a simple adsorption method.

Keywords: Banana peel, Lead removal, Isotherm

ACTIVITY EVALUATION OF BIOACTIVE COMPOUNDS FROM EDIBLE FRESHWATER GREEN MACROALGAE EXTRACTED BY ULTRASOUND ASSISTED EXTRACTION

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Abstract

Freshwater macroalgae are important sources of natural bioactive substances. They are considered high value products that have been applied in food, cosmetic and pharmaceutical industries. This research aimed to evaluate ultrasound-assisted extraction (UAE) method on bioactive compounds (antimicrobial, antioxidant and anti-tyrosinase activities) derived from *Spirogyra* spp. (namely “Tao”) and *Cladophora* spp./*Rhizoclonium* spp. (namely “Kai”). Ultrasonic device with an input frequency of 45 kHz and sonication time of 30 and 60 min were employed in this process. The results revealed that Tao showed higher antibacterial activity and antioxidant activity than Kai. The minimum bactericidal concentrations (MBC) against *Staphylococcus aureus* and *Propionibacterium acnes* were 15.6 mg/ml and 62.5 mg/ml, respectively. In addition, Tao extracted by UAE for 30 min presented the highest yield of total phenolic compounds (TPC) followed by 2, 2-Diphenyl-1-picrylhydrazyl (DPPH), with 15.5±0.6 and 10.4±1.6 mg gallic/g extract, respectively. On the other hand, the highest yield of anti-tyrosinase was 20.1±1.1 mg kojic/g extract when sonicated for 60 min. In summary, the appropriate method and extraction time depended on purpose, bioactive compound and kind of algae. These results could potentially be useful for macroalgal natural compound extraction in cosmetic and pharmaceutical production in the future.

Keywords: Ultrasound-assisted extraction (UAE), Algae, Bioactive compounds, Antimicrobial activity, Antioxidant activity



PHYTOCHEMICAL INVESTIGATION AND ANTIOXIDANT ACTIVITY OF *XYLOCARPUS GRANATUM* EXTRACTS

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Abstract

This study aimed to investigate the phytochemicals and antioxidant activities of the *X. granatum* extract. The fruits of *X. granatum* was separation by maceration and sequential extraction method with hexane, ethyl acetate, and methanol to crude extracts. Crude extracts were assessed for their total phenolic contents tested using the Folin–Ciocalteu method and antioxidant activities tested using DPPH radical scavenging assay. The results showed that phytochemical examination of the extracts of *X. granatum* included alkaloids, condensed tannins, phenolic compounds, triterpenes, steroids, cardiac glycosides, and anthraquinones. The crude methanol extract had the highest phenolic content was 96.55 mg GAE /g dw. The crude methanol extract could reduce DPPH; The EC₅₀ was 34 µg/ ml.

Keywords: Phytochemical investigation, Antioxidant activity, *X. granatum*



BIOLOGICAL ACTIVITY AND OPTIMAL CONDITIONS FOR MAKING KHLU TEA

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Abstract

This research aims to study the biological activity of Khlu (*Pluchea indica* L.) for the development of herbal tea. The leaves of Khlu were tested antioxidant by 1,1-diphenyl-2-picrylhydrazyl (DPPH), and there were tested the amount of phenol by Folin-Ciocalteu's reagent. Fresh leaves, dried leaves, and 30 days dried leaves could reduce the amount of DPPH values at 131.23 ± 1.42 , 127.55 ± 1.03 and 125.90 ± 1.28 $\mu\text{g} / \text{ml}$, respectively. Moreover, the phenolic content of fresh leaves, dried leaves, and 30 days dried leaves were 84.91 ± 0.54 , 82.44 ± 1.09 and 81.01 ± 1.25 mg GAE / g dw respectively. The optimal condition for the process of making Khlu tea was the temperature at 70 °C for 7 hours. The scores of sensory evaluations in terms of appearance, color, aroma, flavor (astringent) and overall were 7.37 ± 1.22 , 7.23 ± 1.16 , 6.97 ± 1.30 , 7.00 ± 1.14 and 7.63 ± 1.10 , respectively.

Keywords: Herbal drink, Khlu



DETERMINATION OF RESIDUAL HEAVY METALS IN BOTTOM ASH FROM WASTE DISPOSAL PLANT

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Abstract

This work was focused the residual heavy metal in bottom ash from the waste disposal plant at Nongkham, Bangkok. Heavy metals in solid waste material occur in different forms and phases that differ in terms of the toxicity, mobility and bioavailability. The total residual toxic metals such as lead, copper, zinc and cadmium were determined with flame atomic absorption spectrophotometer with deuterium background correction. The collected bottom ash samples were prepared to clear solution with the microwave digestion technique using nitric and hydrochloric acid under optimum program. The total concentration of lead, copper, zinc and cadmium was found in the range of 129.3 – 245.2 mg/kg, 67.43– 142.2 mg/kg, 28.91– 45.22 mg/kg, and 5.64 – 29.61 mg/kg, respectively. The recovery of all metals was found in the range of 89.4–101.2% and the relative standard deviation (RSD) was to be 2.34–3.55 % (n=7).

Keywords: Bottom ash, Lead, Copper, Zinc, Cadmium, Waste disposal plant



ADSORPTION OF CADMIUM FROM WASTEWATERS USING INCINERATOR BOTTOM ASH FROM MUNICIPAL SOLID WASTE

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Abstract

In this work, the adsorptive ability of a by-product waste from incineration of municipal solid waste was used as adsorbent for removal of Cd²⁺ from aqueous solution. The removal schematics of Cd²⁺ was carried out based on batch adsorption method. The equilibrium parameters were also studied, such as pH, contact time, adsorbent dosage and an initial concentration of Cd²⁺. The adsorption parameters of pH, contact time, adsorbent dosage and an initial concentration of Cd²⁺ were 7, 60 min, 5 g/L, and 20 mg/L, respectively. The Langmuir model was more applicable than the Freundlich with correlation coefficient 0.99. The maximum monolayer adsorption (qm) of Cd²⁺ on an incinerator bottom ash was 8.69 mg/g. The incinerator bottom ash without surface modification was used to apply with wastewater obtained from textile manufacturer. The spiked sample was also carried out under the same adsorption conditions. It was found that the maximum removal efficiency of an incinerator bottom ash was 86.4%.

Keywords: Incinerator bottom ash, Cadmium, Adsorption isotherm



A STUDY ON SLAG COMPOSITION INSIDE BIOMASS BOILER SYSTEM

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Abstract

It was found that slagging in high temperature zone is one of the major problems in the refinery, petrochemical, pulp and paper, and steel industries; especially in biomass and coal pulverized power plant. Slagging conditions are critical factors influencing reliability and availability on a biomass utility boiler. In this study, several types of slagging were collected for chemical analysis. It was revealed that the chemical composition and other properties of received slagging showed unique results based on the type of feedstock fuel materials.

Keywords: Slagging, Biomass, Boiler, Chemical composition



ANTIFOULING EVALUATION STUDY OF POLYMERIC COATING

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Abstract

Antifouling coatings are special coatings that prevent the accumulation of marine organisms on a surface. Typical antifouling coatings are not biomimetic but are based on synthetic chemical compounds that can have deleterious effects on the environment. In this study, the selective polymeric coating was used in antifouling evaluation test. It was revealed that the received polymeric antifouling coating showed the better results when compared with controlled sample.

Keywords: Antifouling, Coating, Polymer



THE STUDY ON THERMAL AND MECHANICAL PROPERTIES OF COLD SPRAY COATING

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Abstract

Recently cold spray coating technology was used for many applications in petrochemical business especially for high temperature required section. For this reason, the applied coating must be able to withstand at least 700 °C. The developed cold spray coating was studied on thermal and mechanical properties. It was found that cold spray coatings reveal good performance after completed both thermal and mechanical property testings.

Keywords: Cold spray, Coating, Thermal property, Mechanical property



EVALUATION OF YIELD AND ANTIOXIDANT ACTIVITY ON OPEN POLLINATED LINE OF FRUIT MULBERRY

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Abstract

Thirty-three of open polinated mulberry lines from Queen Sirikit Sericulture Center Sakon Nakhon Province were evaluated from January 2017 to July 2018. The results showed that most of them had cordate leaf shape. Most leaf arrangement were alternately and spirally arranged: dextrorse (right). They are 2 types of flowers sexes: female and hermaphrodite flower. The average plant height was 2.10-4.80 m. The fruit width was ranged in 7.93-13.63 mm. The fruit length was in the range 16.76-33.86 mm. The fruit weight ranged from 0.54-2.82 g. The fruit yield ranged from 157.92-2,668.09 g./plant. The analysis on chemical compositions revealed that the concentration of Titration Acid (TA) was ranged from 3.31-6.19 mg/g DW, total soluble solids (TSS) in ranged from 8.33-21.33 °brix. TSS/TA was ranged from 8.23-33.13 and Diphenyl-1-picrylhydrazyl (DPPH) was in ranged from 14.63-95.42%.

Keywords: Evaluation, Yield, antioxidant activity, Chinese open pollinated line, *Morus* spp.



EFFICIENCY OF WASTEWATER TREATMENT FROM ENVIRONMENTAL LABORATORY OF SCIENCE AND TECHNOLOGY, RMUTP USING OZONATION PROCESS

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Abstract

Wastewater from the laboratory in Division of Environmental Science and Technology, Faculty of Science and Technology, Rajamangala University of Technology Phra Nakhon is a source of pollution without any treatment. Researchers realized that it will become environmental problem in the future. For this reason, wastewater treatment from water laboratory would be studied using ozonation process. This aims to treat the wastewater until pass the water standard. From the study, the suitable condition for ozonation process was pH6 and optimal time was 30 minutes. Filling ozone in rate 0.25 gram/hour/liter wastewater, it can remove COD, BOD and SS 52.60, 50 and 79.56 percent respectively. After that, the biological treatment using 8 hour of aeration via SBR process was applied. The result found that COD and BOD removal efficiencies were 47.36 and 40.90 percent, respectively when microorganisms in reactor wasn't oxidized by ozone. However, the treated water was still not pass the water standard.

Keywords: COD, Ozonation, Wastewater treatment, RMUTP



MODIFIED EGGSHELL MEMBRANE HYDROLYSIS BY ENZYMATIC METHOD FOR EXTRACTING BIOACTIVE SUBSTANCES

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Abstract

An poultry eggshell membrane covering an egg yolk presently has protein up to 90% composed of keratin protein, collagen-like protein, chondroitin sulfate and hyaluronic acid and both keratin and collagen protein contain much cysteine (about 10%). This study was to develop the eggshell hydrolysis method for keratin and collagen extraction using protease compared with common physical and chemical hydrolysis methods. The enzymatic reaction which is advantageous in that the reaction temperature and mild pH usage, easy process control, stable hydrolysates, retains more nutritional value and functional properties. The results revealed that the hydrolysis of eggshell membrane by using enzymatic was a better choice since it enhanced the polypeptide chain extracted out especially in the presence of reducing agent of DTT or mercapto substance to reduce disulfide bonds. The hydrolysis processes were accelerated since the eggshell membrane dissolution was shortened. Comparing to the chemical hydrolysis with hydrochloric acid adjusted to the pH at the isoelectric point of keratin, 4.6-4.7 for 2-5 hr. The soluble keratin was then collected by centrifugation and dried at 60-65°C in vacuum oven. The keratin was increased 40%, 32g, after drying eggshell membrane powder.

Keywords: Eggshell membrane, Protein, Physical hydrolysis, Enzymatic hydrolysis



AN ENVIRONMENTAL PACKAGING MADE BY COMPOSITE MATERIALS USING WATER HYACINTH AS A MAIN CONSTITUENT WITHOUT FUNGUS CONTAMINATION

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Abstract

In the development of environmental packaging for temperature preservation, the composite materials composed of hyacinth fiber, rice husk and coconut fibers were made to substitute for the foam packaging, naturally difficult degradable box. From the experiment, water hyacinth, rice husk and coconut fiber at the ratios of 7: 1: 2, 1: 1: 2 and 1: 1: 1 by using isocyanate as a solder. With their physical and biological features, the composite material at a ratio of 7: 1: 2 with a density of 0.7 g/ cm³ had the strength of 26.76 MPa, humidity of 3.8 percent, swelling of 26.63 percent showed heat transfer close to the foam box. The silver nanoparticles incorporated in the composite sheets before forming into packaging showed strong inhibition activity on the common contaminated fungi since no growth of fungus was observed at least one month incubation. The biomaterials of composite package showed fair effectiveness in maintaining the temperature at least 6 hr for hot water and quite low of at least 1 hr for ice. Therefore, from this research, it can be proposed that a new alternative method of using natural composite materials for temperature preservation can be made in order to reduce the use of foam boxes and add value to natural waste materials, although the other biomaterials may be required to fulfill the effectiveness of temperature preservation.

Keywords: Composite materials, Temperature preservation, Packaging



STABILIZATION METHOD FOR MICROBES ISOLATED FROM KEFIR IN FERMENTED DAIRY

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Abstract

Kefir which is one of fermented dairy product with a unique combination of milk and fermented bacteria and yeasts is composed of more than 30 strains of microorganisms especially certain species of Bacilli and Bifidobacteria. Many isolate mixtures such as lactobacilli, yeasts, and fungi from kefir had been recently studied and applied in healthy food products as well as cosmetics. Various drying methods in order to retention/stability of these probiotic have to adjust and they are dependent on microorganism strains and the protective agents to ensure their survival throughout shelf-life and provide adequate numbers of viable kefir microbe. In the study, the mixtures of microbial isolates obtained from kefir were prepared into powdered formula after mixing with skim milk solution. It showed to be good protective agent for the freeze-drying process. The results showed that the preservation factors of time and temperature affected the bacterial potency. Under the shelf life temperature kept at 4 and 10°C, total viable CFU counts and high survivability were found to be better than those at 25°C. Moreover, their shelf life at 10°C for 10, 20, and 30 days were not significantly different. These studies can indicate the tentative responsiveness factors affecting the risks of lower potency and stability in manufacturing of formulated probiotics in large scale production, the transportation, storage and sales.

Keywords: Kefir, Stability, Skim milk



BIOINDICATOR FOR THE KIMCHI QUALITY FROM LACTOBACILLI SPECIES

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Abstract

Kimchi, traditional Korean fermented vegetables, is long known for its organoleptic, beneficial and world widely popular. Many researches have been revealed the possible microbial communities during spontaneous kimchi fermentation process are mainly composed of *Lactobacillus*, *Weissella*, *Pediococcus* and *Leuconostoc* spp. In this study, the cultivation-dependent method together molecular techniques, could be applied for indicating Kimchi microbial diversity. It could indicate there were significant lower activities and numbers of heterofermentative lactic acid bacteria in the kimchi samples during the sale having long shelf storage closing to expired sale periods and especially the samples with poor storage in the freezer. The results showed the optimum pH at 4.2-4.6 were maintained while the acidity, which is optimum at 0.6-0.8% of lactic acid, were dropped. At least 60% of the bacteria and 40-50 % of total organic acid were reduced according to lower kimchi quality since lower beneficial and nutrition in kimchi products during the sale on market. Besides, other common bacteria were also increasingly detected during longer kept. Therefore, survival of dominant LAB genera can be a good criterion for indicating the quality of fermented kimchi.

Keywords: Organic acid, LAB, Kimchi



BIONATURAL SILICA MADE BY BAMBOO LEAVES

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Abstract

Silica is a crucial trace mineral found in bones and fast growing tissues and it is also a major building block of collagen, which helps keep skin supple and blood vessels strong. Bionatural silica could be obtained from dietary sources such as grains, vegetables, beer, coffee and water. In this study, the environmentally friendly dehumidification products made by bamboo silica were developed for dried food product preservation with safety. The optimized extracting methods for silica from bamboo leaves were optimized by boiling bamboo leaves with various concentrations of hydrochloric acid from 1- 4 M. The purity of the silica determined by XRF technique was in the range of 90-96 percent. The dehumidifying efficiency for hydrochloric acid at the concentration of 2 and 4 M was the water loss at 29 and 21% and that of 3 M had water adsorption capacity at 95%. From the experiment, the silica sample treated with 2 molar acid concentrations were structurally good at capturing moisture in the air whereas the silica extracted at 4 molar had the ability to retain water well due to its high porosity. Therefore, the natural dehumidifying material from bamboo leaves treated with 4 molar acid concentration was most suitable for being dehumidifying products to reduce moisture and retain water. We are confident that the biodehumidifying sheets made by biosilica is environmentally friendly and can be further developed to meet the need of the customer.

Keywords: Bamboo, Dehumidifying, XRF



LANTHANUM DOPED BISMUTH FERRITE AS PHOTSENSITIZER FOR PEROVSKITE SOLAR CELL

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Abstract

Perovskite structure bismuth ferrite was successfully used as photosensitizer in perovskite solar cells. Bismuth ferrite doping lanthanum which weighed percentage variation of 5, 10, 15, and 20 were synthesized by sol-gel technique for improving energy gap and photo absorption. The morphology and chemical component of lanthanum doped bismuth ferrite were characterized by SEM, TEM, and XRD. The first principle calculation was also performed to obtain an exact atomic stricter and to investigate further the underlying physics of its optical properties. The structure of solar cells was FTO/TiO₂/BiFeO₃/electrolyte/Pt/FTO. The current and voltage of solar cells were measured under solar illumination indicating solar cell behavior. It was found that the highest power conversion efficiency of solar cell was observed at 1.8 % for 15% doping with annealing of bismuth ferrite film. These results suggest that lanthanum doped bismuth ferrite could be used as a perovskite photosensitizer material for solar cells.

Keywords: Bismuth ferrite, Perovskite solar cells, Photosensitizer



THE SYNTHESIS OF ZN-DOPED TITANATE NANOWIRES FOR ELECTROCHEMICAL ENERGY STORAGE

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Abstract

Zn-doped titanate nanowires (TNWs) with the chemical formula of $\text{Zn}_x\text{Ti}_{3-x}\text{O}_7 (\text{Na}_{0.96} \text{H}_{1.04} \times 3.42\text{H}_2\text{O})$ where $x = 0, 0.05, 0.1, 0.2$, and 0.3 were synthesized by a hydrothermal method at temperature of 130°C for 24 h. The synthesized samples were characterized by scanning electron microscope (SEM), X-ray diffraction (XRD), and Brunauer-Emmett-Teller (BET) techniques. It was found that, the diameter and length of the nanotubes are in scale of nanometer. Electrochemical properties of prepared samples were investigated by cyclic voltammetry (CV), galvanostatic charge - discharge (GCD) and electrochemical impedance spectra (EIS) methods. The specific capacitance of 23 F g^{-1} (at 1 mV s^{-1}) was observed for Zn-doped TNWs.

Keywords: energy storage, Zn-doped TNWs, electrochemical properties



DETERMINATION OF HUMIC ACIDS AS A PRECURSOR OF THMs IN RAW WATER FROM THE CHAO PHRAYA RIVER, THAILAND USING FEEM TECHNIQUE

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Abstract

The concentration of humic acids in raw water canal (The Prapa canal) of Metropolitan Waterworks Authority (MWA) Bangkok, Thailand were measured by fluorescence excitation-emission matrix (FEEM) spectroscopy. This technique is capable to evaluate insights and classify the types of organic matters. Water samples were collected from Chaopraya river and raw water from water treatment plant (WTP) for 4 months period. The analytical technique was selected to examine the humic acids. Results displayed that humic acid-like organic group occurring at the excitation/emission wavelengths of Ex / Em 250-250 nm /410-450 nm and Ex / Em 300-320 nm / 410 nm. The dissolve organic carbon (DOC) in the Prapa canal was less than 2.00 mg/l. In addition, there was a correlation between the seasonal changes and the concentration of DOC. Moreover, the humic acids are very important because it had ability to react with disinfectant an increasing the THMs concentration in tap water. Therefore, the concentration of THMs should be considered for the control of the humic acids at the raw water canal before operating to the water treatment plant.

Keywords: FEEM, Humic acids, WTP, Disinfection, THMs, DOC, Water supply



THE APPLICATION OF BAGASSE AS ENVIRONMENTAL FRIENDLY BIOPACKAGE WITH ANTIFUNGUS PROPERTY FOR CULTIVATION OF GREEN COS SEEDLING

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Abstract

Bagasse, the stem of sugar cane that has been crushed for sugar cane juice, is classified as agricultural byproducts. Its fibers have been mostly used at present due to its main components composed of 47% moisture content, 47.5% fiber. To promote the application of environmental friendly biomaterials from the plant fibers, a biodegradable packing for seeding from bagasse with turmeric extract was established and tested for cultivation of Green Cos seedling. The turmeric extracts at the concentrations of 5,000, to 20,000 ppm were chosen to substitute for chemical substances to prevent the fungi contamination to meet the needs of consumers who love health. The results showed that it enhanced the height of the seedling as well as accelerated 92-97% germination of the seeds comparing the controls cultivated by bagasse package alone and no packaging in the soil. Its concentrations at least 15,000 ppm decelerated the growth of inoculated *Penicillium* sp. and even inhibit the growth of *Rhizopus* sp. and *Colletotrichum musae* which are common contaminant fungi in salad vegetables. It also helped slow the changing of the package and increase water absorption. Therefore, this bagasse package harboring turmeric extracts can be one example of environmentally friendly cultivated biomaterials for seedling.

Keywords: Bagasse, Seedling, Turmeric extract, Fungi



**INHIBITION EFFICIENCY OF EXTRACTS FROM LEAVES OF
PIPER BETLE LINN, PIPER SARMENTOSUM ROXB AND
ANDROGRAPHIS PANICULATA (*BURM.F.*) NEES ON
THE GROWTH OF COLLETOTRICHUM GLOEOSPORIOIDES IN
NAM DOK MAI MANGO (*MONGIFERA INDICA LINN.*)**

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Abstract

The efficiency of betal leaf, wildbetal leafbush and kariyat extract for fungus inhibition of *Colletotrichum gloeosporioides* on Nam Dok Mai Mango was studied. The objectives were to find the herbs that are suitable for inhibiting *Colletotrichum gloeosporioides* that cause anthracnose disease on Nam Dok Mai Mango and the appropriate concentration to extend the shelf life of Nam Dok Mai Mango. Three concentrations of three herb extracts were used at 10, 15 and 20 ppm. The lowest concentration was tested for anthracnose disease inhibition and shelf life of Nam Dok Mai Mango by using Dilution Susceptibility Test using concentration at 10, 15 and 20 ppm. The growth of hyphae was measured day 7 in PDA. Anti fungus efficacy showed that betal leaf extract was 0.00 ± 0.00 mm in all 3 concentrations. The wildbetal leafbush and kariyat extract were 3.23 ± 0.25 , 0.67 ± 0.29 , 0.40 ± 0.17 , 6.17 ± 0.29 , 6.00 ± 0.50 and 5.00 ± 0.50 mm respectively. Betal leaf can inhibit fungus 100 percent at all concentration specify which value corresponds to what. The lowest concentration of 10 ppm. can inhibit fungus on Nam Dok Mai Mango and one soaked with distilled water and the other not soaked 100 and 96 percent respectively.

Keywords: Betal leaf, Wildbetal leafbush, Kariyat, Extraction, Nam Dok Mai Mango



THE STUDY ON ABRASIVE AND EROSIVE RESISTANCES OF THERMAL SPRAY COATING

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Abstract

Thermal spraying is a technology which improves and restores the surface of a solid material. The process can be used to apply coatings to a wide range of materials and components, in order to provide resistance to wear, erosion, cavitation, corrosion, abrasion or heat. In this paper, the study of abrasive and erosive properties of several types of thermal spray coating samples were focused. It was revealed that both thermal spray coating technology and formulation played the important role on characterizing abrasive and erosive resistance properties.

Keywords: Abrasive resistance, Erosive resistance, Thermal spray, Coating



ANTI-OXIDATION PROPERTIES OF REPAIR GRASS EXTRACTS IN THE COSMETICS

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Abstract

Repair grass or barbed grass (*Centotheca lappacea*), one Thai indigenous herbal medicine which is used to enhance postpartum recovery by topical fumigation and oral administration. Various researches on its main chemical constituents including fatty acids, phenolic and flavonoid contents, silica, silicon and minerals were reported especially from the aerial part. In the study, the whole plant including its roots were extracted after decocted in hot distilled water at 95°C or macerated in 95% (v/v) ethanol to release its phytochemical complex compounds. To indicate the effectiveness of its function in postpartum rejuvenation, the extracts were tested for in-vitro anti-aging activities for the anti-oxidation properties that were DPPH radical scavenging and metal ion chelating. The results demonstrated that the ethanolic extract exhibited better activities than the aqueous extract on DPPH scavenging and metal chelating. Moreover, comparing to ascorbic acid, this ethanolic extract provided strong collagenase inhibition with the IC₅₀ value of 1.75±0.08 mg/ml comparable to ascorbic acid (IC₅₀ value of 1.30±0.04 mg/ml). Further the plant extracts in cosmetics, facial cream, it showed rather lower anti-oxidation activity than that same concentration presented in liquid soap. This study indicated the significance of recognized anti-oxidation property in barbed grass extract existing in each cosmetic products

Keywords: Repair grass, Anti-oxidation, DPPH, Cosmetics



EFFECT OF PHOTOSYNTHETIC MICROORGANISM ON LIME PLANT GROWING AND FRUITING

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Abstract

Lime plant has an absolute requirement of nutrients for growing. The microbial application can facilitate in addressing limited access to chemical fertilizer concern. Moreover, the photosynthetic microorganism community can contribute together in nutrient availability for plant growing and fruiting. The objectives of this research were analyzed the growth rate of photosynthetic microorganism in a fermented juice within 3 months. A fermented juice was analyzed in terms of MLSS, COD, and nutrients. The efficiencies of fermented juice for lime plant growing, and fruiting were also investigated. Lime plant growth rate was collected in terms of plant height, and fruiting. The experimental results showed that the concentration of microbial in a fermented juice was maintained approximately $1,063 \pm 158$ mg/L on average ($n=5$). The photosynthetic microorganism concentration and nutrients concentration in fermented juice was a significant promotion of productivity of lime plant growing and fruiting.

Keywords: Lime plant, Fermented juice, Photosynthetic microorganism



ANTIMICROBIAL EFFECTS OF AQUEOUS PHASE OF MEDICINAL MUSHROOM *GANODERMA LUCIDUM* EXTRACTS

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Abstract

Reishi or *Ganoderma lucidum*, a medicinal mushroom producing a group of bioactive compounds including triterpenoid and steroid compounds has various pharmacological and biological activities especially antibacterial and antifungal effects. In this study, the mushroom extracts by maceration one part (v/v) of it into three parts of ethanol, water and polyethylene glycol (PEG) were assayed for inhibition effects on Gram-positive and Gram-negative bacteria and yeast. The results showed the crude PEG extracts had antimicrobial activities on 5 Gram-positive bacteria with the minimum inhibitory concentration (IC₅₀) at 7.0-13.50 mg/mL but not on Gram-negative bacteria while the water extracts inhibited only the yeast *Candida* sp., with IC₅₀ at 100-200 mg/mL. Ethanolic extracts of the mushroom showed high potent of the antimicrobial activity and even more synergistic effects of antimicrobial activity were displayed from the aqueous phases of all three fractions mixing. These results indicated that antimicrobial activity of mushroom extracts depended upon the nature of the solvent. In addition, the study is one example of a decisive antimicrobial activity of each aqueous fraction of *Ganoderma* extracts.

Keywords: Mushroom, Maceration, Polyethylene glycol, Antimicrobial activity



INFLUENCE OF MATERIAL TYPES ON SPECIFIC WEAR RATE OF ALUMINUM ALLOY COATINGS

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Abstract

Aluminum alloy (Aluminum, Nickel and Molybdenum) are excellent wear resistance materials that have been widely used for thermal spraying onto the surface of various substrates. The effects of material types on microstructure, hardness and specific wear rate of the coatings were studied. It was found that the type of substrate materials do not play the important role on specific wear rate at the optimal conditions of thermal spray coating.

Keywords: Aluminum alloy, Thermal spray coating, Substrate materials,
Specific wear rate



COMPARISON OF SCINTILLATION LIGHT YIELD OF CWO AND BGO SINGLE CRYSTALS FOR GAMMA RAY DETECTION

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Abstract

Nowadays, radioactive materials are being applied in medical imaging. Because humans cannot see the radiation, therefore radiation detection materials are very important to humans. Scintillator is a material which can change a gamma photon to many visible photons. Good scintillators should have the following properties: high scintillation light yield, good energy resolution, and high density. In this work, we choose to study scintillation light yield property of the CWO crystal due to its interesting properties such as high stopping power and non-hygroscopic. It will be compared with the BGO crystal. From the results, it was found that at 662 keV energy from ¹³⁷Cs radioactive source, the CWO crystal show more scintillation light yield value than the BGO crystal about 2 times therefore resulting in better energy resolution value. The stopping power property of both crystals is also presented in this work.

Keywords: BGO, CWO, Energy resolution, Scintillation light yield



HYDROTHERMAL SYNTHESIS OF W-DOPED TiO₂ NANOSTRUCTURE PHOTOCATALYST

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Abstract

In this study, W-doped TiO₂ photocatalysts were synthesized using hydrothermal method. The as-synthesized photocatalysts were characterized by field emission scanning electron microscope (FESEM), UV-visible spectrophotometer and Fourier transform infrared spectroscopy (FTIR). From the results of the study, it was found that the as-synthesized photocatalysts were nanofibers and absorbed light in the UV range. The photocatalytic activity was evaluated by the degradation of MB solution with the concentration of 25 mg/L under a UV and visible light.

Keywords: W-doped TiO₂ , Photocatalysts , Hydrothermal, Nanofibers



THE EFFECT OF ANNEALING TEMPERATURE ON STRUCTURE OF TiCrN THIN FILM DEPOSITED BY DC MAGNETRON SPUTTERING METHOD

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Abstract

The DC reactive magnetron sputtering method was employed to deposit Titanium Chromium Nitride (TiCrN) thin film on silicon (100) substrates. The coatings were annealed at different temperature from 700°C to 1000°C with increase step of 100 °C in air for 2 h. The crystal structure, surface morphologies, microstructure and chemical compositions were investigated by X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM) and energy dispersive X-ray spectroscopy (EDX). The x-ray patterns confirmed that the TiO₂ rutile structure with strong prefer orientation of (101) plane was appeared from 700°C. The crystallinity of film increased with the annealing temperatures. The lattice constant (a and c) were in the rage of 4.565 – 4.607 Å and 2.946 – 2.956 Å. The void between grain boundary was confirmed by FE-SEM micrograph. The cross sectional analysis reveal that the porous structure with enhancement of thickness from 1.64 – 1.95 µm were obtained as increase annealing temperatures. The EDX results indicated that the O content increase from 0 – 60.67 At% whereas the Ti, Cr, and N contents were decreased from 43.26 – 22.40 At%, 20.65 – 2.57 At% and 51.19 – 14.36 At% through the annealing temperatures.

Keywords: Annealing temperature, TiCrN, DC magnetron sputtering



DETERMINATION OF RADIATION SHIELDING PROPERTIES OF TUNGSTEN/PVC COMPOSITES AGAINST GAMMA-RAYS

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Abstract

The radiation shielding properties of polyvinyl chloride (PVC) containing tungsten at different concentration were investigated using a beam transmission method for various gamma-ray energy. The mass attenuation coefficients of gamma-ray for these materials have been calculated and values of the half-value layer have been studied to evaluate their shielding effectiveness. It was found that the mass attenuation coefficients increase with increasing of tungsten content up to a value of 70% by weight. The mass attenuation coefficients were 1.708, 1.605, 1.115 cm²/g and the half-value layer were 0.147, 0.156, 0.225 cm for the gamma ray energy of 59.5, 80.9, 122 keV, respectively. The result shows that polyvinyl chloride containing tungsten showed good gamma-ray shielding performances.

Keywords: Radiation shielding, Polyvinyl chloride, Tungsten



PRODUCTION OF ROOF TILE FROM COIR FIBER

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Abstract

Roof tiles from coir fiber were made in this research. The length of coir fiber was varied from 3, 5, 7 and 9 mm. Isocyanate resin was used as a binder at the content from 5-20 wt%. The coir fiber was compacted with the binder in the roof tile-mold using a compression molding. The density of the roof tile was about 900 kg/m³ and 15 mm-thick with according to TIS 876-2547 and TIS 535-2556. The effect of isocyanate resin contents on mechanical and thermal properties of the roof tile was investigated. From the results, moisture content, water absorption and swelling of the roof tile decreased with increasing the binder content. On the other hand, the higher content of the binder increased modulus of rupture (MOR) and internal bonding of the roof tile while modulus of elasticity (MOE) was almost unchanged. Additionally, thermal conductivity of the roof tile increased with increasing the binder content. The optimum content of isocyanate binder for the roof tile from coir fiber was 20 wt% with moisture content about 3.5%, MOR at 25 MPa, MOE at 1.6 GPa and thermal conductivity around 0.18 W/m-k.

Keywords: Binder, Coir fiber, Density, Roof tile, Swelling



DEVELOPMENT OF AGRICULTURAL WASTE FROM SUGAR CANE AS SUSTAINABLE MATERIAL

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Abstract

Sugar cane as a renewable resource from agricultural waste was modified for fiber boards. The sugar cane fiber was ground and washed before pressing. Urea formaldehyde and isocyanate resin were used as binders at the content of 5-10 wt%. The fiber, binder, paraffin emulsion and hardener were combined and pressed in a sheet mold with 400 mm long, 400 mm wide and 3 mm thick using compression molding machine. The pressing temperature was set at 120 °C with pressure of 150 kg/cm² for 5 min. Physical, mechanical and thermal properties of the sugar cane fiber board were carried according to TIS standard No. 966-2547. Density of the fiber board was fallen as medium density fiber board at about 800 kg/m³. Moisture content, modulus of rupture (MOR), modulus of elasticity (MOE) and thermal conductivity of the sugar cane fiber board were fallen through TIS standard.

Keywords: Agricultural waste, Binder, Fiber board, Sugar cane



MANUFACTURING BIODEGRADABLE CONTAINER FROM FIBER OF NOH KALA IN KOH KRET NONTABURI PROVINCE

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Abstract

Noh Kala is an ancient herbal plant of Mon, especially in Koh Kred Nonthaburi Province, which has been utilized its pseudostem as ingredient of traditional food since Ayutthaya period. In production process for Noh Kala's pseudostem, the leaf sheath will be left 80 percent of whole mass. The abandon residues have an advantage in enrich of fiber about 40 percent of dried weight after eched by NaOH reagent that corresponding to proximate analysis for any part of Noh Kala pseudostem. The abandon residue was cut into a 2.54 centimeter length then spinning fiber to remove hard leaf sheat. The fine fiber was applied to mix with binder which composed of various white egg and starch flour percentage. The plant fiber mixture was pressed into 20×20 centimeter square then separated to test thermal conductivity with differential scanning calorimetry (DSC), cross link between fiber and binder via fourier transform infared spectrometry (FTIR) and mechanical strength via tensile test.

Keywords: Biodegradable container, Noh Kala, Plant fiber



ETHANOL PRODUCTION FROM WATERMELON SHELL BY FERMENTATION PROCESS

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Abstract

In this work, we investigated ethanol production from the common aquatic watermelon shell by fermentation process. This was achieved using a fermentation medium mixed with aqueous solutions of H₂SO₄ (0.5%) and NaOH (1%). Firstly, fermentation medium was obtained from washing rice. Samples were left to ferment in the acidic and basic solutions for different time scales and tested for alcohol concentration. The resulting of producing ethyl alcohol were at 6.0% for H₂SO₄ cont. 0.8% , 4.5% for NaOH cont. 2% and 8.0% for H₂O solution at measuring of time ~5 hours.

Keywords: Watermelon shell, Alternative energy, Fresh water



EFFECT OF COCONUT OIL WITH EXTRACTED *CURCUMA ZEDOARIA* SUPPLEMENT IN DIET ON GROWTH OF PACIFIC WHITE SHRIMP

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Abstract

Coconut oil with extracts of *Curcuma zedoaria* Roscoe (COZ) can be used in feed supplement for aquatic animals. COZ was high total phenolic compound as antioxidant and medium chain triglyceride which is easy to absorb. The objectives of this work were to study effect of COZ on growth and survival rate of Pacific white shrimp. COZ was produced by using 4 different ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* Roscoe (w/w)–5:0, 5:0.50, 5:0.75 and 5:1.0. It was found that increasing the fresh rhizome of *Curcuma zedoaria* Roscoe content resulted in increasing total phenolic content and antioxidant activity. Pacific white shrimp was reared for 28 days (4 weeks). The experiment was done using Completely Randomized Design (CRD), 5 treatments, three replication, T1 used virgin coconut oil (VCO), T2 used COZ (ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* (w/w) as 5:0.5), T3 used COZ (ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* (w/w) as 5:0.75) and T4 used COZ (ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* (w/w) as 5:1). It found that growth and survival rate of pacific white shrimp and from T4 was highest. This result indicated T4 used with high antioxidant and antioxidant activity resulting to high growth and high survival rate of pacific white shrimp.

Keywords : Coconut oil, *Curcuma zedoaria* R., Pacific white shrimp



ANALYSIS OF STRESS DISTRIBUTION FOR RUN-FLAT BY FINITE ELEMENT METHOD

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Abstract

Since a run-flat wheel for an armored small truck is made of AISI 1045 metal with a density of $7,870 \text{ kg/m}^3$, each wheel assembly is composed of 2 pieces and each piece has a semi-circular shape tighten with metal bolts that have total weight approximately of 11 kg per wheel. The results of experiment design and finite element analysis were compared. Considering the consistency between these two methods, the stresses were generated by deformation when compressive mass of a force a 7 kN is subjected. The difference between the experiment and the FEA analysis can be a good representative of the output experiment. The ran-flat consists of two semi-circular pieces, so the analysis of the stress intensity must be determined at the angle of rotation of the wheel. The outcome stress intensity showed to be the highest at the tightening point of both semi-circular.

Keywords: Stress distribution, Run-flat, Finite element method



DESIGN AND WEIGHT OPTIMIZATION OF RUN - FLAT WHEEL FOR THE ARMORED SMALL TRUCK BY FINITE ELEMENT METHOD

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Abstract

Run-flat for an armored small truck newly designed shapes and materials are different from the conventional. CAD used in the design and finite element method was used for strength analysis. Based on the stress important variables affecting the design are width of run-flat, height of cross section and locking of the ring, especially at the joints. The new material is UHMWPE composite. The research process hardness testing, toughness, tensile strength, compressive and shear force. As a result, the weight of conventional run-flat of 11 kg decreased to 70% under the same conditions.

Keywords: Run-flat, Armored small truck, UHMWPE composite, Finite element method



THE PHYSICAL PROPERTIES CHARACTERIZATION OF PADDY IN DRYING PROCESS OF PNEUMATIC DRYER

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Abstract

Drying process of rough rice is important for postharvest pest and disease management during the rice processing. Many drying process such as spouted bed technique and fluidized bed technique are extremely studied in terms of instrument design and energy consumption. However, the research about the quality characterization during the drying process is slightly studied. In this work, we proposed the rice quality parameters and relative kernel properties for characterize rice kernel after drying process of pneumatic dryer with smooth-pipe drying column. We found that velocity of drying air is crucial for given rough rice quality after the drying process which reflected via both the rice quality parameter and milling quality. We also found that the mechanical response have the potential for developing into suggestion parameter for characterization of rice quality in drying process.

Keywords: Paddy quality, Pneumatic dryer, Power law



THE PARAMETER ANALYSIS FOR BULLETPROOF PLATE RESISTING THE PERFORATION AND THE REFLECTION OF 7.62 MM BULLET WITH FINITE ELEMENT METHOD

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Abstract

Development and design of bulletproof plate with material that can be destroyed the 7.62 mm bullet with bullet speed at 878 ± 9.1 m/s according to the National Institute of Justice Level 4 (NIJ 4) using 2 flat sheets stacking of SKD11 and SUS304. The front plate is the first sheet from SKD11 material, hardening at 65 HRC with a thickness of 6 mm. The second sheet is the back plate from SUS 304 material with a thickness of 5 mm. The finite element method was used to simulate and analyze the result which the bullet can be resisted the perforation by perpendicular to the bullet. Therefore, simulating the firing by the angle of 15, 30, 45 and 60 degrees using SKD11 sheet with a thickness of 6,8,10 mm and SUS304 sheet with a thickness of 5, 6, 8, 10 mm and stacking into 2 layers then the finite element method was simulated one at a time by the first sheet of SKD11 with 6 mm of thickness can resist the perforation of the bullet at 60 degrees and a thickness of 8 and 10 mm can be started resisting the perforation at 45 degrees. The second sheet is SUS304 with a thickness of 5,6,8 and 10 mm could not able to resist the perforation and the refraction of the bullet direction as good as SKD11. Therefore, analyzing 2 sheets stacking into 2 layers can resist the bullet perforation and change the direction of the bullet.

Keywords: 7.62 mm bullet, NIJ 4, bulletproof plate, finite element method



THE PARAMETER ANALYSIS OF THE TUNGSTEN CARBIDE AND SUS304 ARMOR PLATE WITH A FINITE ELEMENT METHOD

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Abstract

Analysis and simulation of bulletproof plates with materials that can destroy the bullet head size 7.62 mm, bullet speed 878 ± 9.1 m/s according to the National Institute of Justice, Level 4 (NIJ 4). Finite element method is used to analyze and simulate the damage of armor plates and bullet head with explicit analysis. Tungsten carbide (WC) material was used in this study with thickness 6, 8 and 10 mm base on Johnson-Holmquist failure model (JH-2) and SUS304 materials, thickness of 5, 6, 8 and 10 mm with Steinberg-Cochran-Guinan-Lund-model. By having 2 sheets of material stacked up into 2 layers when the bullet hits the first plate and breaks through, then the second plate to hold the scrap metal bullets. The first plate material is WC with a thickness of 6, 8 and 10 mm, which is still unable to resist the penetration of the bullet, but can damage the steel armor plate. The second plate is made from SUS304 material at a thickness of 5, 6, 8 and 10 mm, it cannot resist the penetration of the bullet. The result of show that the steel armor plate is damaged. There is a scrap of metal breaking out. Therefore, in the form of 2 layers of stacked plates that all thickness parameters, the armor plate is still not able to withstand the penetration of the 7.62 mm bullet. Due to the increased thickness of first plate, WC has caused the bullet head to break, but the scrap metal bullets that penetrated the armor plate together with shrapnel and second plate SUS304, when the thickness increases, the softening of the sheet decreases. Therefore, increasing the thickness of the first plate is WC and the second plate is SUS304 to have the same thickness increase to 12, 14 and 16 mm. The resulting simulation with thickness of the 16 mm armor plate will begin to be able to withstand the penetration of the 7.62 mm bullet.

Keywords: 7.62 mm bullet, NIJ 4, Bulletproof plates, Finite element method



WEAR RESISTANCE OF ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE COMPOSITE FOR APPLICATION IN ENGINEERING

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Abstract

This research aims to study the properties of tribology UHMWPE composite by adopting UHMWPE mixed with aluminum oxide (Al_2O_3) fillers with different particle sizes with the specified mixing ratio for applications in engineering. To compare the properties of tribology of pure UHMWPE material and UHMWPE composite with Al_2O_3 particle size of 0.05 μm (50 nm), 0.3 μm (300 nm), 1 μm (1000 nm) and 5 μm by extrusion process. The Blok on ring method is used to test the wear of the material and the friction coefficient. The results of the tribology UHMWPE composite is determined by the amount of aluminum oxide, each particle size and the ratio of various ingredients. The amount of filler mix to improve the properties of the UHMWPE depends on the type, particle size and surface area of the filler. In which the filler containing nano-sized particles to improve the wear resistance properties must be mixed in small quantities no more than 0.5 wt.%. Due to the greater amount of filler mixing, the filler has a tendency to have uneven distribution and results in reduced wear resistance.

Keywords: tribology, UHMWPE composite, Al_2O_3



THE GENERATE OF INITIAL CONDITIONS FOR WEATHER PREDICTIONS

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Abstract

Weather forecasts are very necessary to predict the future weather conditions. The important thing in forecasting is the model and variables. The model used in the forecasting must be accurate and effective. In addition, the variables used in forecasting must be comprehensive and appropriate to be able to represent the forecast. The initial conditions for forecasting must be appropriate and reliable. There are many method to generate the initial conditions in forecasting. To generate the initial conditions for winter monsoon prediction with Kalman Filtering method, which is a method used to predict the status of various systems and able to create values of variables used in forecasting to have a variety of similarities, can be used as a starting variable in forecasting very well. In this research the winter monsoon prediction by the Shallow Water Model and validating the initial conditions by Root Mean Square Error (RMSE). The result of weather prediction in the winter monsoon can be used the Kalman Filtering method for generate the initial conditions.

Keywords: Initial condition, Predictions



THE DECREASING OF FRICTION PROPERTIES OF ALUMINIUM FROM ANODIZING PROCESS AND SILICON DIOXIDE SUPPLEMENT

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Abstract

Aluminum is a lightweight material which are popularly used in various parts of the industry. However, there are some limitations on the tribological properties such as abrasive wear and friction when it was compared to other metals. Tribological properties of aluminium was improved with anodizing process and silicon dioxide supplement. the effect of time on surface structure and friction coefficient were studied with with scanning electron microscope and sliding wear tester. It was found that friction coefficient of aluminium was decreased after improvement process was applied.

Keywords: Aluminium, Silicon dioxide, Anodizing, Friction coefficient.



IMPROVEMENT OF TRIBOLOGICAL PROPERTIES OF ALUMINIUM SURFACE WITH ANODIZING PROCESS AND TITANIUM DIOXIDE SUPPLEMENT

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Abstract

Aluminium was used in many industrial applications due to good properties such as ductile, high corrosion resistant and high electrical conductivity. Since wear resistance of aluminium was very poor so that it was a limitation of using this material in several conditions. In this research, aluminium was improved the wear resistance properties by using anodizing process and adding some titanium dioxide particles on the surface. The effect of anodizing process duration on the wear resistance property was studied. It was found that the process duration and amount of titanium dioxide play the important role on improvement of tribological properties of aluminium.

Keywords: Aluminium, Titanium dioxide, Anodizing, Wear resistance, Friction coefficient.



THE IMPROVEMENT OF SELF-LUBRICATING PROPERTIES OF ALUMINIUM BRONZE SURFACE WITH FILLING OIL INTO POROUS

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Abstract

Aluminium bronze was excellent lubricant and corrosion resistance and it was used in the severe wear environment such as forming rolls or deep drawing dies. The friction coefficient was one of important properties for this application. The study of decreasing on friction coefficient of aluminium bronze was focused. Aluminium bronze was thermal sprayed on the aluminium substrate and the as-sprayed sample was processed with vacuum pressure impregnation technique. Finally, the porous of as-sprayed sample was filled with oil. Microstructure, specific wear rate and friction coefficient were studied with optical microscope and sliding wear test. It was found that the specific wear rate and friction coefficient were decreased when the porous was filled with the oil.

Keywords: Aluminum bronze, Thermal spray coating, friction coefficient, Specific wear rate, Impregnation



EFFECT OF COCONUT OIL WITH EXTRACTED *CURCUMA ZEDOARIA* SUPPLEMENT IN DIET ON GROWTH OF PACIFIC WHITE SHRIMP

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Abstract

Coconut oil with extracts of *Curcuma zedoaria* Roscoe (COZ) can be used in feed supplement for aquatic animals. COZ was high total phenolic compound as antioxidant and medium chain triglyceride which is easy to absorb. The objectives of this work were to study effect of COZ on growth and survival rate of Pacific white shrimp. COZ was produced by using 4 different ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* Roscoe (w/w)–5:0, 5:0.50, 5:0.75 and 5:1.0. It was found that increasing the fresh rhizome of *Curcuma zedoaria* Roscoe content resulted in increasing total phenolic content and antioxidant activity. Pacific white shrimp was reared for 28 days (4 weeks). The experiment was done using Completely Randomized Design (CRD), 5 treatments, three replication, T1 used virgin coconut oil (VCO), T2 used COZ (ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* (w/w) as 5:0.5), T3 used COZ (ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* (w/w) as 5:0.75) and T4 used COZ (ratios of coconut meat to fresh rhizome of *Curcuma zedoaria* (w/w) as 5:1). It found that growth and survival rate of pacific white shrimp and from T4 was highest. This result indicated T4 used with high antioxidant and antioxidant activity resulting to high growth and high survival rate of pacific white shrimp.

Keywords : coconut oil, *Curcuma zedoaria* R., and Pacific white shrimp

ANTIOXIDANT ACTIVITY, TOTAL PHENOLIC CONTENT AND CURCUMIN OF COCONUT OIL WITH EXTRACTED *C. LONGA* L. AND COCONUT OIL WITH EXTRACTED *C. AROMATICA*

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Abstract

C. longa L. and *C. Aromatica* contained phenolic compounds were powerful antioxidant for preventing deleterious effect. Coconut oil enriched with phenolic compounds from *C. longa* L. and *C. Aromatica* can be used for material in cosmetics product and food supplement. The objective of this work was to determine antioxidant activity, total phenolic content and curcumin of coconut oil with extracted *C. longa* L. (COL). In addition coconut oil with extracted *C. Aromatica* (COA). COL and COA were produced by using the different ratio of coconut meat to fresh rhizome of *C. longa* L. or *C. Aromatica* into 5kg : 0.5 kg, 5kg : 1.0 kg, 5kg : 1.5 kg, 5kg : 2.0 kg. Total phenolic content was determined according to the Folin-ciocaltau method. It found that total phenolic content, curcumin and antioxidant activity (IC₅₀) in COL were more than in COA in the same the ratio of coconut meat to fresh rhizome of *C. longa* L. Moreover, it found that that increase the content of rhizome of *C. longa* L. or *C. zedoaria* to produce COA and COL resulting in COA and COL with high total phenolic content, curcumin and antioxidant activity (IC₅₀). From these results, antioxidant activities in COL and COA were correlated with total phenolic content and curcumin. This can be concluded that COL enriched phenolic compounds was more potent antioxidant than COA. It can be useful to be healthy food and product of cosmetic.

Key words. Antioxidant activity, Total phenolic content, Curcumin, Coconut oil, *C. longa* L., *C. Aromatica*



Poster Presentation

Session 2: Innovative Technology and Sustainability Engineering



DESIGN AND DEVELOPMENT OF PEN VENDING MACHINE USING ARDUINO UNO R3 MICROCONTROLLER

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Abstract

The objective of the research were to design and development of pen vending machine which has 120 c.m. x 60 c.m. x 45 c.m. as width x length x height, respectively. Our designed machine has arduino UNO R3 micro controller as the sensor and compressor to control the motor in the pen release set and the pen detect set. The experimental results show that the controlling of the pen release set according to the situation. Furthermore, the controlling of the pen detects set according to the number of coins and can withdraw coins correctly when the coin is withdrawn.

Keywords: Vending machine, Arduino UNO R3, Microcontroller



IMPACT STUDY OF THE ELECTRIC VEHICLE CHARGER ON POWER SYSTEMS

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Abstract

This article presents impact study of power quality while using electric vehicle charger (EV Charger). Today, electric vehicle (EV) is used as a vehicle for driving more than in the past. As the number of EV increases, the number of EV charger will increase. In the present, there is not much information about the impact of EV charger on power systems. Therefore, this paper focuses on the study of such effects. The data affecting the power systems quality are voltage, current, power and harmonics. Such data during the time of use and not use the EV charger were collected. Using the EV charger with the testing EV was experimented. The data from the experiment were taken to create graphs and that graphs were used to analyze the effects that occur. Then, ways to reduce the impact could be found, which were good for the overall power systems.

Keywords: electric vehicle charger, power systems, harmonics



IMPACTS OF FACTOR LIGHTNING AND SURGE PROTECTION FOR PHOTOVOLTAIC POWER GENERATOR ON DISTRIBUTION SYSTEM

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Abstract

This research paper presents the Analysis of Factor lightning protection for photovoltaic power generation. The question of the safety of lightning protection systems in photovoltaic power generation, especially under severe weather conditions such as thunderstorms. Therefore, a simple model of a photovoltaic power generation was developed, which included the arrangement of a conventional photovoltaic panel. The effect of lightning is also simulated by the pattern of lightning currents. It is also found that the size of the panel mounting structure and the point of lightning conduction induce the induced voltage at the junctions of the photovoltaic panel. Based on the results of the impulse current analysis, the intensity of the lightning current is increasing rapidly. All these factors will be taken into consideration in order to design a protective system.

Keywords: over voltage, lightning protection, photovoltaic power generators



VOLTAGE AND CURRENT ANALYSIS MODEL FOR 3-PHASE AC MOTOR

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Abstract

This paper presents current and voltage analysis model for 3-phase AC motor. There are two types of stator winding circuits of 3-phase AC motor: the star circuit and the delta circuit. Both circuits are have different voltage and voltage supplied to the three-phase AC motor. This research measures the voltage and current of the stator windings when connecting both circuits in order to use those data to create a analysis model. The model structure to analyze the voltage and current of the AC motor consists of many devices data, such as magnetic contactors, volt-meter, amp-meter, timer device to record the starting time and running time of the motor. The model created was used to evaluate the efficiency of 3-phase AC motor in this research.

Keywords: 3-phase ac motor, Star circuit, Delta circuit, Analysis model



APPLICATION OF HYBRID SYSTEM FOR AGRICULTURE WATER PUMPS

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Abstract

This article presents the application of hybrid systems for use with agricultural water pumps. Agricultural areas are necessary in agricultural water pumps. Since agricultural area is open, it is suitable to use solar energy to generate electricity to supply agricultural water pumps. The production of electricity by solar energy alone may cause poor power quality due to weather issues. If the power quality is not sufficient, the pump will not be able to work efficiently. This research proposes the idea of maintaining the quality of the power supplied to a water pump by utilizing hybrid system. Hybrid system is the power supply from 2 sources. The main power is derived from solar energy and backup power is obtained from the electricity provider in that area. When the test area has insufficient sunlight, it will reduce the power supplied to the water pump. The processor instructs the selector switch to a backup power supply from the electricity provider to supply the water pump instead of electricity from solar energy. Tested samples from agricultural areas show that the proposed hybrid system can maintain good performance of the agricultural water pump.

Keywords: hybrid system, agricultural water pump, solar energy



DEVELOPMENT OF DEMONSTRATION FOR HYDRO POWER GENERATION

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Abstract

The objective of the research were to development of demonstration for hydro power generation and study of the inverter circuit. The experiment found that development of demonstration for hydro power 220V_{AC} by using 12V_{DC} electric motor to the current and voltage to the inverter, convert current and voltage to 12V_{DC} to current and voltage 220V_{AC}, by using 24 V_{DC} water pump to suck water in a 20 liter tank. And create pressure to water in the PVC pipe, sending power to the motor rotor to rotate, generate electricity and send to the battery charger circuit, charge current and voltage from the motor to generate electricity to store in the battery. After that send current and voltage to the inverter circuit, convert 12V_{DC} battery voltage to 220V_{AC}.

The results showed that the development of demonstration for hydro power generation able to produce 220 volts AC power for 25 minutes, static electricity without electricity increasing or decreasing all the time working, but the working period will be stable or decrease according to the percentage of usage.

Keywords: Demonstration, Hydro power generation, Inverter circuit



SYNTHESIS THE LiO_2 AND SiO_2 GLASS SYSTEM FOR DENTAL APPLICATION

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Abstract

In this study was to examine possibility in the manufacture of Lithium disilicate glass–ceramics for dental. The application with mechanical properties and physical properties of suitable for put to practical use in the present. The color synthetic glass similar to the nature teeth for reduce imports of dental materials which the relatively high price synthesizing glass-ceramic by melting $\text{SiO}_2\text{--Li}_2\text{O--Al}_2\text{O}_3\text{--K}_2\text{O--P}_2\text{O}_5$ and growth of crystal by providing the appropriate heat for causing the crystals and crystallization within the texture work pieces then test properties such as to determine the phase composition technique (XRD), Thermal analysis techniques (DTA), The test of physical properties is the percentage density (Density), and the mechanical testing is the hardness.

Keywords: Lithium disilicate, glass–ceramics



THE INJURY GRAPE LEAF SURFACE DETECTION USING HYBRID MEAN SHIFT AND THRESHOLD OPTIMIZATION ALGORITHM

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Abstract

Grape is a popular economic plant in Thailand. They can be used for food industrial product i.e. wine, jam, juice, raisins and vinegar. However, the most important problem of grape planting is leaf plague such as Downy Mildew, Anthracnose Scab Bird's Eye Spot, Leaf Spot and Rust, which is a causes of immensity damage for farmers. Recently, the image processing is applied for the leaf plague where the region of injury grape leaf surface detection is undesirable. In order to get the achieve robustness for invariant of light condition, high identification accuracy efficiency and no restriction of color distribution, firstly, Histogram Equalization, Global Contrast Enhancement, and Gaussian Filter are applied to preprocessing process. Secondly, the coarse segmentation Mean-shift Algorithm is applied to feature extraction. Finally, the optimal threshold is separated the injury and non-injury region on grape leaf surface. The experimental achieved cover region about 98.18 % accuracy of grape leaf disease identification. Moreover, this research can be apply to monitor the other economic plant diseases such as rice, sugarcane, cassava, corn etc.

Keywords: grape leaf disease, mean-shift optimization, threshold optimization



ADVANCE WATER TREATMENT USING POLYMERIC MICROFILTRATION MEMBRANE

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Abstract

Nowadays, increasing water pollution has put much pressure on water resources. A number of natural organic matter and organic micropollutants have been found in potentially harmful concentrations in numerous water sources. The maximum permissible levels of these compounds in drinking water and wastewaters discharged to the environment was set at low concentration. Several common treatment technologies that are currently used to remove inorganic and organic contaminants from natural water supplies address serious problems. Properly selected, microfiltration membrane processes in systems are effective for water purification. Polymeric membranes are of primary interest in the membrane separation markets because it is practical and beneficial. However, pretreatment requirements before using a microfiltration membrane are necessary for suspended solids reduction. This research used two types of the polymeric membrane and covers the most applicable achievements regarding the pretreatment of water inlet and the performance of polymeric membranes for water treatment were also investigated.

Keywords: water treatment, microfiltration, polymeric membranes



SCREENING OF CHRONIC KIDNEY DISEASE PATIENTS USING GRADIENT BOOSTED TREES WITH GRID OPTIMIZATION

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Abstract

This paper presents the development of an assisting system for chronic kidney disease screening. A gradient boosting algorithm with decision tree model is applied to generate a reliable diagnosis prediction technique. The hyper parameters in model generation process are optimally adjusted with grid search methods. Synthetic Minority Over-sampling Technique (SMOTE) is applied to solve an imbalanced issue of the used data set. The screening model is used as a core prediction engine in a web-based application to facilitate a screening task on chronic kidney disease patients in Thailand. In experiments, the proposed system performs perfectly for full score in all measurements including accuracy, precision and f-measure. The testing with an actual patient data obtains from all correct results approved by medical experts.

Keywords: gradient boosted trees, grid search, chronic kidney disease



PHOTO-SEQUENCING BATCH REACTOR FOR WASTEWATER TREATMENT WITH SHOE SOLE

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Abstract

Sequencing batch reactor process (SBR) is a conventional technology for high organic load wastewater treatment. In comparison to the traditional wastewater treatment technologies, photosynthetic bacteria (PSB) wastewater treatment processes have some unique advantages for degrading various organic compounds in wastewater. In addition, PSB biomass is a good source of other value-added products, which further enhances economic returns. Photosequencing batch reactor (SBR), which introduces photosynthetic bacteria into a suspended conventional SBR that effectively and to further purify the effluent. This research has studied the operation optimization of photo-sequencing batch reactor treating municipal wastewater with rubber shoe sole as a supporting media. F/M Ratio was adjusted at 0.13 and hydraulic retention time (HRT) was at 5 days. Moreover, the removal efficiencies of the photo-sequencing batch reactor with rubber shoe sole was investigated in terms of BOD, COD, SS, phosphorus, and ammonia-nitrogen, respectively.

Keywords: photo-sequencing batch reactor, wastewater treatment, shoe sole



PADDY DRYING USING A COMBINED FLUIDIZATION TECHNIQUES AND FAR-INFRARED RADIATION

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Abstract

The objectives, to a paddy drying using a combined fluidization techniques and far-infrared radiation were applied, and Khao Dawk Mali 105 were chosen as a test sample. In different operational conditions of the fluidization, Infrared fluidization drying (IF) and Hot air fluidization drying (HF). A fluidization dryer machine has three main components: (1) high pressure blower with the dimensions of ½HP 0.5kW with the air entry in to the DC 240-400V inverter controlling the rotation speed of a high pressure blower, (2) Finned heater from three heaters, 1,300 W/heater, that is to increase the heat to medium used for drying, the thermostat controller or PID, (3) temperature controller, which the rectangular drying chamber, infrared light from three lamps was used to irradiate the drying sample and the bed. In this study, hot air was returning to system remaining 90%.

Keywords: Fluidization, Far-Infrared Radiation, Quality of rice, Specific Energy Consumption



VOLTAGE LEAK IN WATER DETECTOR BOAT

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Abstract

Nowadays, the dangers caused by electric leakage in water that make many residents at over there dies and some of the staff who went to help also died. The electric leak in water cause to which has a severe impact and causes injury And died very much In addition to electrical leakage while flooding has occurred, it can also occur with the water source of the establishment, factory, and general water sources also. Therefore, We found the problem of dangers caused by electric leakage in water has a huge impact on human and animal life Therefore thinking of ways to check the electrical current leaking in the water with a boat that detects the leakage current that is convenient, fast and secure By which the vessel will move by using the motor drive and inside the vessel will install a circuit that detects electrical leakage and the GPS module When the electrical current is leaked, the data will be sent to the smartphone via LINE Application. From the above mentioned. The Smart Boat can check the leakage current, and send the notification. And accurately tell the coordinates of the leakage current.

Keywords: Voltage Leak, Detector, Water



OPTIMAL ECONOMIC DISPATCH WITH CONSIDERING THE DAILY LOAD PATTERNS IN POWER SYSTEM

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Abstract

This work presented an optimization technique to economic load dispatch (ELD) problems with considering the daily load patterns and generator constraints using a particle swarm optimization (PSO). The objective was to minimize fuel cost. The optimization problem was subjected to the system constraints consisting of power balance and the generation output of each units. The application of a constriction factor into PSO had a useful strategy to ensure convergence of the particle swarm algorithm. This proposed method is able to determine, the output power generation for all of the power generation units, The result showed that the total constraint cost function was minimized. The performance of the developed methodology was also investigated using the test system of fifteen-generation units. The results showed that the proposed algorithms could give the minimum total cost of generation with satisfaction of all the constraints, resulting in saving in the power loss.

Keywords: economic dispatch, particle swarm optimization, power system



ACCURACY TESTER FOR KILOWATT-HOUR METER

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Abstract

Thailand has been using electricity in various places homes, Shopping Malls, Hospital, Factories and important government offices. There are the government agencies that are responsible for distributing electricity consumers. From the past to the present, the Metropolitan Electricity Authority (MEA) and The Provincial Electricity Authority (PEA) have invented a prototype for measuring the accuracy of electrical units. The measurement of electrical unit fault design and construction of electrical measuring device 15(45) and 30(100) 1-Phase 2 wire system with load measurement. The sensor is attached to the external rotary plate. This is use to control the operation of the programmable logic controller (PLC). To reduce the cost of the expensive electricity. The Problem is that the meter is unusually efficient. Actual performance reduce the error of the meter. And can be developed to progress to the world of innovation 4.0

Keywords: Validity Checker, PLC, kilowatt-Hour Meter

INFLUENCE OF THERMAL OXIDATION TEMPERATURES ON THE MORPHOLOGICAL AND SENSING FILM PROPERTIES OF MoO₃ NANOPARTICLES

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Abstract

In this study, molybdenum (Mo) nanoparticles have been synthesized by hydrothermal method with difference annealing temperature. Then the preparation of MoO₃ nanoparticles the thermal oxidation of Mo nanoparticles under an atmosphere was employed in the electrical furnace. For the sensing film of MoO₃ nanoparticles, the spin coating method was employed to prepared. The influence of thermal oxidation temperatures at 200°C on the structure, morphological properties, cross section and elemental compositions of MoO₃ nanoparticles and sensing film were characterized by X-ray direction, field emission scanning electron microscope (FE-SEM), high-resolution transmission electron microscope (HR-TEM) and energy dispersive spectroscopy (EDS) respectively. The results show that the morphology of the nanoparticles and sensing film are strongly dependent on the thermal oxidation temperatures.

Keywords: Molybdenum trioxide; Nanoparticles, Hydrothermal method



HYSTERESIS EFFECT OF SENSOR MATERIALS FOR MEASURING OF BRINELL HARDNESS TRUNCATED USING HIGH-FREQUENCY OF CYCLIC MEASUREMENT

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Abstract

The effect of mechanical hysteresis that caused by the modulus relaxation of force-resistive sensor materials that can be truncated using the highfrequency of cyclic measurement is the point of view of this presentation. This report presented the characteristic linking between the Active Weight Loading (AWL) and the Weight Loading (WL) and the real-time of cyclic measuring of AWL were exhibited using the Graphical User Interface (GUI). The effect of adiabatic hysteresis was investigated by varying of the periods of cyclic loading as following: 1500, 1250, 1000, and 500 counts per period, while, the time interval between the periods of cyclic loading was used as 1 hour. After modifying procedures, it was found that both of the characteristic curves and the real-time of the AWL-WL relation with using of 500 counts per period presented in linearly direction. Finally, the calibrated value of AWL that used for calculating of Brinell Hardness Number (BHN) were exhibited in the ranging: 7.0 to 110.0 N, respectively.

Keywords: Brinell hardness, Mechanical hysteresis, Modulus relaxation



STUDY OF ABSORBENT COOLING SYSTEMS BY USING ACTIVATED CARBON AND METHANOL

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Abstract

Recently, the global warming tends to increase especially in the equator zone and tropical wet. This issue led to increase using the air conditioning system that based on famous of vapor compression refrigeration system. For industry, they have using the air conditioning system and released waste heat. However, the study of this waste heat in terms of refrigeration is not well understood. In this research, we propose the study and model design of low quality waste heat into energy source in the vapor compression refrigeration system. Our system was combination between activated carbon and methanol. The major parts of this system were included absorber condenser and evaporator. The experimental condition was including absorption temperature about 90°C with condensation temperature at 5°C and 10°C respectively. In each condensation temperature, we changed temperature by manual valve at 60°C, 70°C and 80°C for calculate the height coefficient of performance (COP). The results shown that the condensation temperature at 5°C and temperature of valve control at 60°C had the minimum cooling temperature about 24.9°C with COP of system approximately 0.2703. We also found that the condensation temperature at 10°C performed the cooling temperature about 25.2°C with COP of system approximately 0.2402 under temperature of valve control at 80°C. According to these results, the water follows that from evaporator, which has the potential for develop to air conditioning system of industry and alternative way for reducing energy costs.

Keywords: refrigeration, activated carbon, methanol



FATIGUE TESTING MACHINE BY ROTATING BENDING

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Abstract

Fatigue failures are found that more than 90% of reported materials failures in the industrials. This research aims to design and build the fatigue testing machine by rotating bending. The power source of this machine is driven by an AC motor 1 horsepower with a speed of approximately 2,750 rpm. The fatigue testing machine this has been made can attach the largest specimen diameter 12 mm were subjected to loads between 50-300 Newton and has a counter for counting revolution speed of specimen. The counter is 8 digits in order to count the maximum number of the specimen before it fractures from the fatigue of the specimen. This research could reduce the cost of the procurement of the fatigue testing machine that uses to study the fatigue behavior of materials.

Keywords: bending, fatigue failure, fatigue testing machine



THE REAL-TIME ANALYSIS FOR THE MECHANICAL PROPERTIES OF RED BEAN GRAINS

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Abstract

Data on the physical and mechanical properties of seeds have significantly importance for most machinery and process equipment design. These properties include breaking force, deformation and stress-strain as well. This study was conducted to investigate the real-time mechanical properties of red bean grains via our design of the pneumatic mechanical tools (PnMT). The significant data revealed that the red bean grains mostly contained with moisture content of 20% w.b.. The average length, width and thickness were 6.2, 5.4 and 5.1 mm respectively. The results showed that breaking force, deformation and stress-strain were different in both features and values in most different applied force directions. In addition, we observed there were the relationship between strain and time. This followed the significant power law in all different force directions.

Keywords: real-time mechanical properties, red bean grains, pneumatic mechanical tools, breaking force



DESIGNED ENVIRONMENT FOR PEOPLE WITH BABY APHASIA. CASE STUDY: BABIES APHASIA AND INTELLIGENCE. "NONTAWITH HOME LANDSCAPE," PAK KRET DISTRICT SOME MAKETS. NONTABURI

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Abstract

This research is Designed environment for people with baby aphasia Case Studie : Babies aphasia and intelligence. "Nontawith home landscape," Pak Kret district some markets. Nonthaburi. This study is designed to improve the environment for children and young aphasia. The objectives of the study are as follows: 1. The physical characteristics of the building affects the behavior of toddlers in the baby home for the mentally disabled. 2. Try to find sizes and spatial patterns of response to living habits and satisfaction with the environment simulated by 3. Summary and guidelines to improve the physical environment in response to the use of infant mental retardation. This study has defined the scope of the variable from the infant aphasia variable was formed to operate the facility safe for the use and existence of infant aphasia indicators are good. satisfied that affect applications babies aphasia.

Keywords: Environments, applications, people with Baby aphasia.



DESIGNED ENVIRONMENT FOR PEOPLE WITH DISABILITIES AND DISABILITY. CASE STUDYS: IMPROVING THE ENVIRONMENT OF THE CENTER FOR SOCIAL WELFARE DEVELOPMENT ELDERLY HOME KHAE. BANGKOK

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Abstract

This research is Designed environment for people with disabilities and disability. Case studies : Improving the environment of the center for social welfare development elderly home khae. Bangkok. This study is designed to improve the environment and for people with disabilities and disability. The objectives of the study are as follows: 1. The physical characteristics of the building affects the behavior of the elderly, the disabled and the house sitter. 2. Try to find sizes and spatial patterns of response to living habits and satisfaction with the environment simulation. 3. Summary and guidelines to improve the physical environment in response to the use of the handicapped and disabled. This study has defined the scope of the variables is disabled and disability Phrapradaeng variable was formed to operate the facility safe for the user and the lives of disabled people and disability indicators. is satisfied that affect the welfare of people with disabilities and disability.

Keywords: Environments, Applications, People with disabilities and disability.



THE DESIGN SPACE FOR RECREATIONAL ACTIVITIES FOR CHILDREN WITH DISABILITIES. CASE STUDYS: THE ENVIRONMENT OF THE ORPHANAGE FOR DISABLED CHILDREN IN PAK KRET. NONTABURI.

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Abstract

This research is The design space for recreational activities for children with disabilities. Case studie : The environment of the orphanage for disabled children in Pak Kret. Nonthaburi is continuing to design and improve the environment for people with disabilities and disability. The objectives of the study are as follows: 1. The physical characteristics of the building affects the behavior of children with disabilities. 2. Try to find sizes and spatial patterns of response to living habits and satisfaction with the environment simulation. 3. Summary and guidelines for improving the physical environment to meet the child's disability. This study has defined the scope of the variable from a disabled dependent variable was formed to operate the facility safe for the user and the lives of disabled children a measure of satisfaction that effect. for children with disabilities.

Keywords: Environments, Applications, Disabled children.



THE DESIGN SPACE FOR RECREATIONAL ACTIVITIES FOR DISABILITY. CASE STUDYS: IMPROVE THE PHYSICAL ENVIRONMENT OF THE CENTER FOR SOCIAL WELFARE DEVELOPMENT ELDERLY. PATHUM THANI

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Abstract

This research is The design space for recreational activities for disability. Case studies: Improve the physical of the center for social welfare development. Pathum Thani. This study is designed to improve the environment for the elderly and the objectives of the study are as follows: 1. The physical characteristics of the building affects the behavior of the elderly. 2. Try to find sizes and spatial patterns of response to living habits and satisfaction with the environment simulation. 3. Summary and guidelines to improve the physical environment in response to the deployment of the elderly, research has defined the scope of the variables is the elderly, the dependent variable is the type of user convenience, safety benefits. and the livelihood of the elderly is a measure of satisfaction that affects the welfare of the elderly.

Keywords: Environments, Applications, Elderly.



PHASE FORMATION AND MECHANICAL RESPONSE OF COBALT OXIDE DOPED BNKT LEAD-FREE CERAMICS

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Abstract

The effects of CoO additive on phase behavior, densification, microstructure and mechanical properties of $\text{Bi}_{0.5}(\text{Na}_{0.81}\text{K}_{0.19})_{0.5}\text{TiO}_3$ lead-free ceramics were investigated. The samples were synthesized by solid state reaction technique, where powders were calcined at 850 °C for 4 h and ceramics were sintered at 1,050 °C for 4 h. The results show that the X-ray diffraction analysis of the ceramic reveals all samples exhibited a single phase perovskite. The physical and mechanical properties behaviors have significantly changed link with the additive contents.

Keywords: Phase formation, Mechanical properties, BNKT



A COMPARISON OF PARTIAL DISCHARGE VALUES IN XLPE INSULATION OF UNDERGROUND HIGH VOLTAGE CABLES FOR 24 KV IN THE CASE OF DIFFERENT INSTALLATION PERIODS

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Abstract

This research studies and demonstrates the comparison of partial discharges (PD) in the XLPE underground high voltage cable between cables that are used with the new cables and used as results of the electric field analysis in the underground high voltage cables. The simulation of the underground cable has been applied using the compact software of Comsol Multiphysics 5.3

The underground high voltage cables for 24 kV rated voltage is prepared for analysis between simulation and PD measurement test in both the used cable and the new cable.

The results showed that partial discharge (PD) in the underground cable type XLPE occur in the new cable which can be analyzed electric fields within the insulation cable by using Comsol Multiphysics 5.3 program. It is assumed that some discharging might be the internal charging type in somewhere of the dielectric cable. This point might lead to a significantly higher discharge rate than the XLPE cable of the new cable. Therefore, the used underground cable should be tested for information leading to the recovery of the power system.

Keywords: Comsol multiphysics 5.3, Partial discharge



THE STUDY OF THE METHOD OF WASTEWATER TREATMENT SOURCE COMBUSTION OF PALM OIL WITH OZONE FILLING SYSTEM OF BIOGAS POWER PLANT

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Abstract

This research studies analyzes the problems of wastewater from the burning of palm rhizomes that are used as fuel to produce electricity that results in the ash of palm trees. That has been used to ferment biogas as a fuel for electricity generation, which has a lot of waste water from the gas digester In the range of gas production is completed Those wastewater will be pumped out of the biogas digester in large quantities. Therefore study waste water analysis to find a way to design the wastewater treatment system from high voltage electrical system from the corona discharge principle. When adding ozone it is necessary to analyze the chemical effects of wastewater to be in accordance with the standard values of the department of industrial works.

Keywords: Electricity, Wastewater treatment



EFFECT OF ZnO NANOPARTICLES ON THE PHYSICAL PROPERTIES OF PLA/PBS BIOCOMPOSITE FILMS

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Abstract

Petroleum-based polymers have significantly problems in the environment due to it is cannot degrade in nature. Biopolymer becomes to interesting materials for replacing these materials to overcome these disadvantages. Here, we intend to study the biocomposite films of polylactic acid (PLA) blend polybutylene succinate (PBS) composited with ZnO nanoparticles. The chemical reaction and the water absorbency of biocomposite films were investigated by FT-IR spectroscopy and swelling ratio, respectively. The FT-IR results showed that the biocomposite films did not have any chemical reactions between polymers chains with ZnO nanoparticles. The swelling ratio of biocomposite films have proportionally with the contact time. Additionally, the rheology behavior of biocomposite films was also investigated and the results showed that the storage modulus loss moduli dependence on the concentration of ZnO nanoparticles. The photocatalytic activity of biocomposite film was investigated by the methylene blue degradation in the aqueous solution. We found that the efficacy of photocatalytic activity increased with increases in the contact time.

Keywords: Innovative materials, Biocomposite, Polylactic acid, Polybutylene succinate, ZnO nanoparticles



Poster Presentation

Session 3: Textiles and Design Sustainability



FLAME RETARDANCY OF COTTON FABRICS AFTER IN SITU SYNTHESIS OF SILICON OXIDE NANO PARTICLES

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Abstract

In this research work SiO₂ nano particles were in situ synthesized on cotton fabric using sol-gel method. Tetra ethyl orto silicate (TEOS) were used as precursor. Both acidic and basic conditions for producing the SiO₂ nano particles were studied. The concentration of TEOS were chosen as a variable in this work. X-Ray Diffraction and Scanning Electron Microscopy were used as characterization methods for studding the size, crystallinity and morphology of nano particles. The water drop test was used for measuring the hydrophilic and hydrophobic properties of treated fabrics. Flame retardancy properties of untreated and treated cotton fabrics were investigated using char yield method. The results show that, the prepared Nano SiO₂ has hydrophilic properties. Also the flame retardancy of treated cotton is improved as compared with untreated cotton. The durability of samples after 5 times of washing was checked using inductively coupled plasma (ICP) method.

Keywords: Cotton fabric, Flame retardant, Silicon Oxide, Nano particles



IN SITU SYNTHESIS OF IRON OXIDE NANO PARTICLES ON COTTON FABRICS-PHOTOCATALYTIC ACTIVITY AND MAGNETIC PROPERTIES

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Abstract

In this research work, Iron oxide nano particles were in situ synthesized on cotton fabrics using co-precipitation method. Sodium hydroxide as precipitating agent were used. FeCl_3 and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ were added to distilled water with different concentration. The concentration of used Iron (II) and Iron (III) was chosen as variable in this study. The ratio of used Iron salts was fixed constant. The crystallinity of prepared nano particles were investigated using X Ray-Diffraction method. The morphology and size of nano particles were studied using Scanning Electron Microscopy. The results showed that, the prepared nano-oxide is Fe_3O_4 . Magnetic measurements were carried out with a vibrating sample magnetometer. The photocatalytic properties of prepared samples were investigated. For this purpose, the decolorization of methylene Blue in presence of prepared magnetic fabrics under UV light were considered.

Keywords: Nano particles, magnetic, cotton, photocatalytic activity



WICKING PROPERTIES OF MEN'S QUICK-DRY SPORTSWEAR

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Abstract

Nowadays, people concern more about the healthy lifestyle. They participate more in sports and fitness activities. As a result, there is a significant growth in the sportswear market for the textile industry. It was reported that the global market of sports and fitness clothing was proposed to reach US\$ 126.30 million by the year 2015 and was expected to reach US\$231.7 billion in 2024. With the growing awareness of healthy lifestyle and sport activity, the function of clothing is demanded by consumers, including the property of quick-dry function.

Quick-drying has become one of increasingly demanded property of functional sportswear now. A lot of quick-dry sportswears have been produced by different brands in the market. Various brands' quick-dry technology brings the difference of quick-dry performance and this needs to be investigated. In the meanwhile, the common criteria to determine the performance of quick dry sportswear is lacking because different types and technologies of fast dry fabrics are used. Put simply, quick-dry function indicates the drying rate of the wetting fabrics which is an ease of care for clothing. The factors such as fiber structure, fabric composition and post-finishing may greatly affect the rapid drying performance. In this study, the objective is to focus on two major interpretations of quick-drying function and targets on different sports brands of the quick-dry existing summer men's running tops in the market.

Keywords: Wicking property; Sportswear; Quick dry property, Fabric structure



WATER VAPOR TRANSMISSION PROPERTIES OF SUMMER COOLING TOWELS

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Abstract

In recent years, functional fabrics have developed rapidly in the market. Because of global warming, extreme hot days in Hong Kong frequently occur in summer, resulting in a large demand for textile products with cooling effects. Cooling towels of different brands are popular in Hong Kong since the products are claimed to provide excellent cooling effect helping people to reduce body temperature. Thermal comfort was defined as “that condition of mind which expresses satisfaction with the thermal environment” by American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.. Reversely, thermal discomfort for human is that the dissatisfaction with the ambient surrounding. Human thermal comfort is significantly influenced by heat and humidity. During summer, high temperature can lead to an increase in human’s body temperature. When human’s body temperature rises, heat is released and dissipated through sweating which increases skin wetness particularly in high humidity condition.

Since skin wetness leads to thermal discomfort, the perspiration is the main factor causing thermal discomfort. This can be evaluated by measuring the water vapor transmission property of fabrics, which refers to ‘the rate of water vapor flow through unit area of the surface of fabric in an environment under specific humidity and temperature. In this study, four types of cooling towels were selected to analyze the cooling effects by evaluating the water vapor transmission. All the samples were found to provide a cooling effect at first contact after being wetted.

Keywords: Water vapor transmission; Cooling towel; Yarn count, Fabric structure

AIR PERMEABILITY PROPERTIES OF SUMMER COOLING TOWELS

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Abstract

Air permeability refers to the rate of air flow via a test material under a different air pressure between two surfaces of that material. Air permeability of fabric is one of thermal comfort properties and related to other thermal comfort properties of moisture transmission. The fabric with high air permeability property is able to allow quick transition of moisture, facilitating the heat transfer process, which is influenced by the fabric structure, thickness and porosity.

Concerning the fabric structure, knitted fabrics is considered to have higher air permeability than woven fabric since they are made of interlocking loops with high extensibility. Also, the fabric with a fine mesh structure would have high air permeability, allowing air to circulate constantly over skin, drawing moisture away from the skin and keeping it cool. Generally speaking, the high thickness of fabric would decrease the air permeability due to the deep and small pores, causing more distance for air travelling through the surface of the fabric. Porosity is one of the significant factors affecting the air permeability of fabric, which was defined by the 'ratio of void space to fiber in a given volume of the fabric. Fabrics with high porosity have more number of pores which allow more air passing through the pores from the surface of the fabric. It was reported that increase in yarn count and mass would decrease the air permeability of the fabric. It was noted that the fluid friction of the fabric would increase if the size of pores decrease, leading to a lower air permeability.

Air permeability is of high importance for the functional towels with cooling effect, which helps body stay cool for hours by quick moisture absorption and evaporation of the heat out of the towel by water. A variety of companies have developed the cooling towels by different innovated textile technologies. This study aims to comparatively evaluate the cooling properties of four types of cooling towel products by analyzing the air permeability behavior.

Keywords: Air permeability; Cooling towel; Yarn count, Fabric thickness



DRYING RATE EVALUATION OF MEN'S QUICK-DRY SPORTSWEAR

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Abstract

Drying process means the removal of moisture remained in the fabric after squeezing or hydro-extraction. The amount of moisture in a fabric depends on the thickness, structure such as size and shape of pores of the fabric, and also the chemical interaction between the water molecules and the surface of that fabric. The rate of drying is determined by the moisture content of the particular fiber, the drying temperature, the relative humidity (RH), and the velocity of the air in contact with the fiber.

The quick dry clothes refer to the fabric or garment will dry faster when compared with the wool or cotton materials under the same conditions of temperature and humidity. It does not mean that it will absorb the sweat but transferred the sweat to the surface of the clothes and make people feel dry on the side touch with human skin. Most of quick dry fabric are made of synthetic fiber, which has lower water absorbing performance, higher air permeability and water proof performance. Quick dry fabric is designed for the requirements of outdoor environment. It is easy to sweat when people are in outdoor activities. The quick dry clothes will make the sweat to evaporate into the air to keep your skin dry. Some of them use the principle of similar characteristics of shape memory polymer, or microporous membrane principle, or the principle of difference between water molecules diameter and the diameter of air molecules. It will accelerate the evaporation of sweat and avoid the getting cold by heat loss.

Quick dry is an important property of sportswear and contributes to the prevention of heat loss, wearing comfort and light weight. This has made quick dry a common performance requirement for garments. Moisture from the fiber inside the infiltration of water can be quickly release, discharge and maintain in an excellent dry effect, which enables the fabric in an often dry and comfortable state. In this study, we aims to comparatively evaluate the quick dry properties of sportswear available in Hong Kong market by analyzing the drying rate behavior.

Keywords: Drying rate; Sportswear; Quick dry property, Fabric structure



THERMAL CONDUCTIVITY PROPERTIES OF SUMMER COOLING TOWELS

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Abstract

Thermal conductivity refers to the ability of the fabric to transfer and conduct heat, and it is inversely proportional to thermal resistance which is related to the insulation of the fabric. The term thermal absorptivity measures the warm-cool feeling of the fabric at first sensation with the skin which depends on thermal conductivity. Thermal conductivity can be influenced by the thickness, fabric areal density and wetting, and high thermal conductivity allows rapid heat transfer. An increase in thickness of fabric could enhance the thermal conductivity.

Fabric areal density is also critical to determine fabric's thermal conductivity value. Higher fabric areal density would have stronger effect of interaction between heat transfer in the fiber and the air, hence increasing the thermal conductivity. It was found that an increase in the density of fabric would increase the contact area, thus the thermal conductivity becomes higher in overall structure. The functional fabric cooling towel has gained increasing attention in past few years, which is achieved by moisture evaporation. The cooling effect of cooling towel is activated simply by soaking the towel in the water, wringing the excess water, snapping it and then just placing it around the neck when doing sports or just using during hot days. The cooling effect helps body stay cool for hours by quick moisture absorption and evaporation of the heat out of the towel.

Nowadays, a variety of cooling towels have been developed using different textile technologies. This study evaluated the cooling properties of summer cooling towels of different brands by studying the liquid moisture management behavior.

Keywords: Thermal conductivity; Cooling towel; Fabric structure, Fabric thickness

Q-MAX TEST ANALYSIS OF MEN'S QUICK-DRY SPORTSWEAR

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Abstract

Quick-dry clothing was developed only a few decades ago, which is usually made of natural fiber materials such as wool fiber and silk fiber, synthetic fiber materials (e.g., polyester, polyamide, polypropylene), and/or blends or combinations thereof. The main purpose of quick dry clothing is to keep wearer warm and dry by moving moisture (sweat) away from the skin. The quick-drying fabric is made by applying, treating, or coating a fabric with a chemical to modify its absorption properties. Microcapsule technology has also been applied to develop the quick dry fabric by a finish process at the fiber level.

Quick-drying has become one of popular demanded properties of functional sportswear nowadays. A lot of quick-dry sportswear are produced by different brands in the market. However, there is likely lack of common criteria to determine the performance of quick dry sportswear because different types and technologies of fast dry fabrics are used. Quick-dry function is indicated the drying rate of the wetting fabrics which is an ease of care for clothing. The factors such as fiber structure, fabric composition and after-finishing may also affect the rapid drying performance. Besides, different gender has different level of perspiration. This study focuses on two major interpretations of quick-drying function and targets on different sports brands of the quick-dry existing summer men's running tops in the market.

Keywords: Q-max test; Quick dry property; Fabric structure, Sportswear



COMPARATIVE STUDY ON THE WATER VAPOR TRANSMISSION PROPERTIES OF THE MAINSTREAM SPORTSWEAR BRANDS

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Abstract

In the history of sportswear, the most commonly used materials for sportswear was cotton due to the properties of comfortable soft hand, good strength and good absorbency. However, the poor wicking properties limit the application of cotton fiber in the development of sportswear products. Hence, the synthetic fibers such as polyester and spandex have been attracting tremendous attention due to the excellent wicking properties, which can move the moisture away from the skin to the outer surface of garment and keep the body of athletes at a lower temperature.

To enhance the quality of the sportswear, a wide range of international brands are designing and investigating numerous innovative products. For example, Nike is one of the leading brands which can produce the polyester microfibers to provide a comfortable feeling for the athletes and keep their temperature at an appropriate range. At the same time, some brands also provide some similar products which are introduced as good wicking properties to bring the perspiration away from the human body. The property of water vapor transmission of fabrics is closely related with the characteristics of fabric, such as fabric weight and thickness. The term water vapor transmission is defined as “the steady water vapor flow in unit time through unit area of a body, normal to specific parallel surfaces” in standard testing atmosphere. The invisible moisture in the form of vapor passes through the air gap between yarns in a fabric from inner layer to outer layer. With high moisture transmission, the perspiration will not be accumulated on the skin, and the skin can become dry and feel comfortable.

This study aims to compare and evaluate the properties of moisture transmission of some mainstream sportswear products on the market. Three popular brands of sportswear with different composition and prices on the Hong Kong market were obtained from online shops and boutique. It was found that the samples bought from boutique showed the best water vapor transmission properties.

Keywords: Water vapor transmission; Sportswear; Fabric weight, Fabric thickness



EVALUATION ON THE AIR PERMEABILITY PROPERTIES OF THE MAINSTREAM SPORTSWEAR BRANDS

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Abstract

The air permeability of a fabric is an expression of how well it permits the passage of air through the fabric's interstices. The air permeability of fabrics is of high importance for active wear which can directly influence the thermal properties and moisture management, especially for a number of fabric end uses such as industrial filters, tents, parachutes, raincoat materials, airbags and sportswear.

An enormous market growth for sportswear has been occurring over last few decades. Sportswear can be divided into four groups as per the market demand, i.e., performance sportswear, basic sportswear, sports leisurewear and sports-fashion clothing. The wear comfort of sportswear is an important quality criterion which affects performance, efficiency and well-being. The air permeability and thermal properties of a fabric should be tailored in order to meet the requirements of sportswear. Several factors such as porosity and pore size, fabric thickness, yarn linear density and twist, yarn crimp, and fabric construction have been found to be the major parameters which affects the air permeability of a fabric.

Nowadays, with the development of textile technology, a number of clothing and garment companies such as NIKE and Under Armour have launched a series of new sportswear. The present study investigated the air permeability of three representative sportswear brands products in Hong Kong marketplace. It was found that the fiber content and fabric structure may be the reason that affects the air permeability.

Keywords: Air permeability; Fabric weight; Fabric thickness; Sportswear



HAND VALUE PROPERTIES OF THE MAINSTREAM SPORTSWEAR BRANDS IN HONG KONG MARKET

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Abstract

Relative hand value is often commonly used to predict consumer's overall response when handling a fabric. This term was introduced as early as 1930 by Peirce. It is a comprehensive physical, psychological and social response to touching a fabric. In standard evaluation, hand value is defined as a tactile evaluation associated with fabrics which markedly influences consumer preferences for textile products. According to the previous work, fabric hand can be stimulated by the physical tactile sensation to the mechanical properties of a fabric. Several studies reviewed that the fabric hand could be expressed in sensory feeling of physical properties of a fabric and analyzed through measurement parameters, for examples, the stiffness, softness and roughness.

PhabrOmeter is an essential instrument commonly used to evaluate the hand value of a fabric, which was invented in 1990s. The principle of PhabrOmeter system is extraction of a piece of circular fabric through a nozzle. All the information related to fabric hand is reflected by the resulting load-displacement extraction curve. Eight handle features, which represents different aspects of fabric hand value, are calculated based on a corresponding feature transform matrix which has been derived from a series of extraction curved using a pattern recognition technique, such as resilience, softness and smoothness, etc. The present study aims to investigate the relative hand value property of sportswear products of some popular brands in Hong Kong market.

Keywords: Hand value, Drape index, Resilience, Sportswear



STUDY ON THE COLORFASTNESS PROPERTIES OF THE MAINSTREAM SPORTSWEAR PRODUCTS IN HONG KONG MARKET

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Abstract

Colorfastness is a term used for the dyeing of textile materials to describe the resistance of a fabric against color fading or color transfer. Colorfastness properties of textiles are an important measure of quality of a fabric product, which allows it to retain its different characteristics despite degradation conditions such as exposure to light and dry cleaning. There are various types of colorfastness test for fabric, including colorfastness to rubbing and perspiration. Colorfastness to rubbing is a basic test used by customers to determine the quality of a colored fabric. This test was designed to determine the degree of color that may transfer from the colored textiles to other surfaces by rubbing. Crocking means the transfer of color from one fabric onto another by rubbing. A fabric with poor colorfastness would transfer its color easily onto other fabrics, especially to white color fabrics. Colorfastness to perspiration is to determine the fastness of colored textiles to the effects of acid perspiration. The colorfastness properties is an important concern for sportswear products, especially the colorfastness to rubbing and perspiration. Hence, in this study, the aims are to investigate the colorfastness properties of rubbing and perspiration of sportswear products according to the standard method.

Keywords: Hand value; Drape index; Resilience; Sportswear;



Q-MAX TEST ANALYSIS OF SUMMER COOLING TOWELS

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Abstract

Cooling towels' function is achieved by the evaporation of water. It is simple to activate the cooling towel. The step is to soak the towel with the water, wring the excess water, snap it and then just place it around the neck when doing sports or just using during hot days. Repeat the above steps when the cooling effect is no longer obvious. Evaporative cooling towels are said to offer cooling effect helping body stay cool for hours by quick moisture absorption and evaporation of the heat out of the towel by water. In the market, many brands have used different functional fabrics to develop the cooling towels and all the cooling effect is activated with water. This study evaluated the cooling properties of summer cooling towels of different brands by Q-max analysis. It was found all the samples could provide a cooling effect at first contact after being wetted. The reason may be explained by the yarn density, fabric structure and thickness.

Keywords: Q-max test; Cooling towel; Fabric weight, Fabric thickness



MOISTURE MANAGEMENT BEHAVIOR OF SUMMER COOLING TOWELS

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Abstract

Moisture management was defined as the controlled movement of water vapor and liquid water (perspiration) from the surface of the skin to the atmosphere through the fabric, thus preventing perspiration remaining next to the skin. Trapped moisture may heat up and cause fatigue or diminished performance in hot conditions, and in cold conditions, it will result in dropping in temperature and cause chilling and hypothermia. Excess moisture may also cause the garment to become heavy, as well as cause damage to the skin from chafing. Hence, moisture management is one of the key performance criteria in today's apparel industry, which decides the comfort level of that fabric. The objective of moisture management fabric is to make the skin feel dry and comfort. In order to achieve this, humidity should be evaporated and transferred to the atmosphere as soon as possible. This is achieved by a number of factors, such as diffusion, capillary transfer and convection.

The cooling function of towels is achieved by the evaporation of water, which is activated simply by soaking the towel with the water, wringing the excess water, snapping it and then just placing it around the neck when doing sports or just using during hot days. Repeat the above steps when the cooling effect is no longer obvious. Evaporative cooling towels are expected to offer cooling effect helping body stay cool for hours by quick moisture absorption and evaporation of the heat out of the towel by water. In the market, many brands have used different functional fabrics to develop the cooling towels and all the cooling effect is activated with water. This study evaluated the cooling properties of summer cooling towels of different brands by analyzing the moisture management behavior. It was found that all the samples could provide a cooling effect at first contact after being wetted. The reason may be explained by the yarn density, fabric structure and thickness.

Keywords: Moisture management; Cooling towel; Fabric structure, Fabric thickness

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THERMAL CONDUCTIVITY PROPERTIES OF SUMMER COOLING TOWELS

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Abstract

Thermal conductivity refers to the ability of the fabric to transfer and conduct heat, and it is inversely proportional to thermal resistance which is related to the insulation of the fabric. The term thermal absorptivity measures the warm-cool feeling of the fabric at first sensation with the skin which depends on thermal conductivity. Thermal conductivity can be influenced by the thickness, fabric areal density and wetting, and high thermal conductivity allows rapid heat transfer. An increase in thickness of fabric could enhance the thermal conductivity.

Fabric areal density is also critical to determine fabric's thermal conductivity value. Higher fabric areal density would have stronger effect of interaction between heat transfer in the fiber and the air, hence increasing the thermal conductivity. It was found that an increase in the density of fabric would increase the contact area, thus the thermal conductivity becomes higher in overall structure. The functional fabric cooling towel has gained increasing attention in past few years, which is achieved by moisture evaporation. The cooling effect of cooling towel is activated simply by soaking the towel in the water, wringing the excess water, snapping it and then just placing it around the neck when doing sports or just using during hot days. The cooling effect helps body stay cool for hours by quick moisture absorption and evaporation of the heat out of the towel.

Nowadays, a variety of cooling towels have been developed using different textile technologies. This study evaluated the cooling properties of summer cooling towels of different brands by studying the liquid moisture management behavior.

Keywords: Thermal conductivity; Cooling towel; Fabric structure, Fabric thickness



AIR PERMEABILITY PROPERTIES OF SUMMER COOLING TOWELS

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Abstract

Air permeability refers to the rate of air flow via a test material under a different air pressure between two surfaces of that material. Air permeability of fabric is one of thermal comfort properties and related to other thermal comfort properties of moisture transmission. The fabric with high air permeability property is able to allow quick transition of moisture, facilitating the heat transfer process, which is influenced by the fabric structure, thickness and porosity.

Concerning the fabric structure, knitted fabrics is considered to have higher air permeability than woven fabric since they are made of interlocking loops with high extensibility. Also, the fabric with a fine mesh structure would have high air permeability, allowing air to circulate constantly over skin, drawing moisture away from the skin and keeping it cool. Generally speaking, the high thickness of fabric would decrease the air permeability due to the deep and small pores, causing more distance for air travelling through the surface of the fabric. Porosity is one of the significant factors affecting the air permeability of fabric, which was defined by the 'ratio of void space to fiber in a given volume of the fabric. Fabrics with high porosity have more number of pores which allow more air passing through the pores from the surface of the fabric. It was reported that increase in yarn count and mass would decrease the air permeability of the fabric. It was noted that the fluid friction of the fabric would increase if the size of pores decrease, leading to a lower air permeability.

Air permeability is of high importance for the functional towels with cooling effect, which helps body stay cool for hours by quick moisture absorption and evaporation of the heat out of the towel by water. A variety of companies have developed the cooling towels by different innovated textile technologies. This study aims to comparatively evaluate the cooling properties of four types of cooling towel products by analyzing the air permeability behavior.

Keywords: Air permeability; Cooling towel; Yarn count, Fabric thickness



WATER VAPOR TRANSMISSION PROPERTIES OF SUMMER COOLING TOWELS

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Abstract

In recent years, functional fabrics have developed rapidly in the market. Because of global warming, extreme hot days in Hong Kong frequently occur in summer, resulting in a large demand for textile products with cooling effects. Cooling towels of different brands are popular in Hong Kong since the products are claimed to provide excellent cooling effect helping people to reduce body temperature. Thermal comfort was defined as “that condition of mind which expresses satisfaction with the thermal environment” by American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.. Reversely, thermal discomfort for human is that the dissatisfaction with the ambient surrounding. Human thermal comfort is significantly influenced by heat and humidity. During summer, high temperature can lead to an increase in human’s body temperature. When human’s body temperature rises, heat is released and dissipated through sweating which increases skin wetness particularly in high humidity condition.

Since skin wetness leads to thermal discomfort, the perspiration is the main factor causing thermal discomfort. This can be evaluated by measuring the water vapor transmission property of fabrics, which refers to ‘the rate of water vapor flow through unit area of the surface of fabric in an environment under specific humidity and temperature. In this study, four types of cooling towels were selected to analyze the cooling effects by evaluating the water vapor transmission. All the samples were found to provide a cooling effect at first contact after being wetted.

Keywords: Water vapor transmission; Cooling towel; Yarn count, Fabric structure

NEW ADVANCES IN TEXTILE INDUSTRY USING CARBON NANO TUBES- FOCUSING ON CHEMICAL VAPOR DEPOSITION METHOD

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Abstract

Carbon nanotubes (CNT) are highly conductive, lightweight and owing distinct physical and chemical properties and have created a new interesting field in textile industry for the continuous investigations. For fabricating conductive textile composites, carbon nanotubes are a promising candidate cause of their unique properties. CNT coated textiles have various applications in wearable electronics and smart textiles. They can be used in smart textiles and electronic textiles, scaffolds, structural health monitoring and flexible sensors, fire retardant and UV protection textiles, composite reinforcements, nano-reactors and etc. In this work, recent researches on application of carbon nanotube in textile industry are reviewed. Also it is shown that how chemical vapor deposition method can be used for deposition of CNT on textile substrates. It is recommended to use CVD technique as an in situ method for growth CNT on the surface of textile materials. The practical results related to conductivity of textile materials after CNT deposition will be compared and effect of CVD parameters on electrical conductivity is studied. The morphology of deposited CNT on the surface of textile fabrics is investigated using Scanning Electron Microscope (SEM) also the Raman spectroscopy is used for study the purity of Carbon Nanotubes. It is shown that the electrical conductivity is related to type of used fabrics. Also the gas type, temperature and geometry of the samples inside the reactor play important role.

Keywords: Carbon nano tube, Chemical vapor deposition, Textile industry, Conductivity



Poster Presentation

Session 4: financial markets and economic growth



RELATIONSHIP BETWEEN MEDIA OF INTEGRATED MARKETING COMMUNICATIONS AND PURCHASING DECISIONS FOR FOOD & BEVERAGE PRODUCTS OF DURIAN BY GENDER

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Abstract

With the goal of making the most efficient use of advertising for food and beverage products of durian, the focus of this study is to examine the relationship between media of Integrated Marketing Communications (IMC) and purchasing decisions for food and beverage products of durian by gender. The population for this study comprises consumers of durian products, who lived in Thailand in 2019. Quota sampling is used to select for a sample size of 138 subjects. The results show that most in the sample group agree on preference of purchase of durian products, in order, from all media, social media and television and radio, with newspapers and magazines appearing last. In addition, the Chi-square test indicates there is no relationship between media of IMC and purchasing decisions for food and beverage (F&B) products of durian by gender, hence there is no need for different advertising policy for this factor.

Keywords: Integrated marketing communications (IMC), Purchasing decisions, Food & beverage products, Durian



THE FUTURE OF THAILAND INCOME DISTRIBUTION

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Abstract

The Thai government has an important role in improving distribution of income and wealth, as the relationship between income disparity and economic growth has been a critical issue in economics over several decades. The purpose of this paper involves explaining and forecasting the value of the Thailand Gini index, which is a measure of statistical dispersion intended to represent distribution of national income, and is the most commonly used measurement of inequality. This study employs mixed methods research that includes documentary research and time series analysis on Thailand's Gini index. The result indicates that the Gini index will slightly decrease from 2017 to 2020. However, policy makers should still redistribute income from those with more income to those with less to improve income distribution, which could challenge Thailand's public policies.

Keywords: Income distribution, Unequal, Forecast, Thailand

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