

Chulalongkorn University, Bangkok 10330, ^aNational Center for Genetic Engineering and Biotechnology (BIOTEC), National Science and Technology Development Agency (NSTDA), 113 Paholyothin Rd., Klong 1, Klong Luang, Pathumthani 12120, Thailand; e-mail: narong@biotec.or.th

Abstract: Chlorpyrifos, an organophosphorus insecticide commonly used as active ingredient in agricultural and urban pest control products, was reported to contain harmful effect on the health status of many aquatic invertebrates. Black Tiger Shrimp (*Penaeus monodon*), an important commercial species culturing extensively in agricultural areas, can be at risk by the chronic effect of this insecticide. To detect the exposure and early effect of sub-lethal concentration of chlorpyrifos to *P. monodon*, the molecular responses of the exposed shrimps were determined using mRNA DD-PCR. The experiment was conducted by exposing the shrimps with chlorpyrifos at the concentration of 0, 1, and, 10 µg/l. Then, RNA extraction and cDNA reverse transcription from the treated shrimps were carried out. DD-PCR was performed using 90 primer combinations (30 arbitrary primers and 3 oligo dT₁₁-N primers). A total of 36 differential displayed transcripts (24 up-regulated and 12 down-regulated) were obtained. Results from BLASTx analysis revealed that, of 13 transcripts, 5 transcripts were matched with genes reported in other animals which included phosphoglucomutase (1 transcript), nitrogen regulatory protein (1 transcript) and ubiquitin-like 7 (3 transcripts) while 8 transcripts were no match to any reported genes. The differential expression of these candidate genes following chlorpyrifos exposure indicates the possible use of these genes as biomarker of exposure to organophosphorus pesticide in *P. monodon*.

I_I0027 THEORETICAL STUDY OF ADSORPTION OF NITROSAMINE COMPOUNDS BY ZEOLITES

Anawat Pinisakul, Chinapong Kritayakornupong and Vithaya Ruangporvisuti

¹ Department of Chemistry, Faculty of Science, King Mongkut's University of Technology Thonburi, 126 Pracha-utis Rd., Thung-kru, Bangkok, 10140, Thailand.

E-mail : ianaakul@kmutt.ac.th, Fax : (662)470-8843

² Department of Chemistry, Faculty of Science, Chulalongkorn University, Bangkok, 10330, Thailand.

Abstract: The study of adsorption of nitrosamine compounds by zeolites was performed by computational chemistry. The nitrosamine compounds consisting of nitrosamine (NA) and their derivatives such as N-methyl-N-nitrososamine (NMA), N-ethyl-N-nitrososamine (NEA), N,N-dimethyl-N-nitrosoamine (NDMA), N-ethyl-N-methyl-N-nitrosoamine (NEMA) and N,N-diethyl-N-nitrosoamine (NDEA) were adsorbed on H-ZSM-5. The geometrical structures of nitrosamine compounds and H-ZSM-5 have been obtained by geometry optimization using DFT/B3LYP/6-31G(d) and ONIOM(B3LYP/6-31G(d):AM1) level of theory. From the calculation, the structure of nitrosamine compounds which adsorbed on H-ZSM-5 was conducted by O-H bond at the adsorption site. The adsorption energy was increased by increasing the steric effect of the substituted groups. The thermodynamics properties show the adsorption processes to be exothermic, spontaneous and higher order.

I_I0029 PREPARATION AND CHARACTERIZATION OF ACTIVATED CARBON FROM DENDROCALAMUS ASPER BACKER AND DENDROCALAMUS LATIFLORUS

Parinthon Temyarasip¹, Apisit Songsasen¹ and Veerasak Udomchoke²

¹ Department of Chemistry, Faculty of Science, Kasetsart University, Bangkok, Thailand

² Department of General Science, Faculty of Science, Kasetsart University, Bangkok, Thailand

Abstract: The objective of this work has conducted a research on the production of activated carbons from *Dendrocalamus Asper* Backer (DAB) and *Dendrocalamus Latiflorus* (DL) by chemical activation method. Activating parameters were carbonized temperature, breeds of bamboo (DAB and DL), ages of bamboos, activation reagents (H₃PO₄ and KOH), concentrations of activation reagents and activation times. The characterizations of activated carbon were studied by iodine number and scanning electron microscope (SEM). The 2-years DAB's activated carbon, obtained from the 85% H₃PO₄ activation for 4 hours, has the highest iodine number (615.84 mg/g).

I_I0030 PREPARATION OF ACTIVATED CARBONS FROM BAMBUA ARUNDINACEA (RETZ) WILD AND GIGANTOCHLOA VERTICILLATA BY PHOSPHORIC ACID AND POTASSIUM HYDROXIDE ACTIVATION FOR ADSORPTION OF IODINE

Pitsanu Khorboot, Apisit Songsasen, Ranee Suwanpruk

Department of Chemistry, Faculty of Science, Kasetsart University, Bangkok, Thailand

Abstract: Activated carbons from *Bambusa arundinacea* (Retz) Wild (BAW) and *Gigantochloa verticillata* (GV) were prepared through chemical processes using phosphoric acid and potassium hydroxide. Characteristics of activated carbons were studied by iodine number and scanning electron microscopy (SEM). Efficiency for activating BAW's charcoal with potassium hydroxide was higher than in case of phosphoric acid and the age of bamboos has an effect on the iodine number. Activation time and concentration of chemical reagents have minor effects on activated carbon's activities. Scanning electron micrographs showed that the external surface characteristics of the bamboos charcoal between before and after activation were not significant difference. In addition, the iodine number of one-year GV's activated carbon activated by 20% potassium hydroxide for 8 hours, commercial activated carbon and three-year BAW's activated carbon activated by 80% potassium hydroxide for 4 hours was 1,202.4, 708.08 and 199.31 mg/g, respectively.

I_I0031 ENVIRONMENTAL EFFECTS OF NANOPARTICLES: GENOTOXIC EFFECTS OF TITANIUM DIOXIDE ON INDUCTION OF MICRONUCLEUS FORMATION IN THE SNAKE HEAD FISH CELL LINE

Harit Pitakjakkipop¹, Wannapong Triampo¹, Lakana Hilmakoun²

¹ Department of Physics, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok, Thailand.

E-mail: harit_chay@yahoo.com

² Department of Pathobiology, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok,

Abstract: With the rising of nanomaterials or nanoparticles (NP) in commercial, to date few studies have investigated the toxicological and environmental effects of NP. Exposure to nanoparticle substances can be an important risk factor for human health. Mutagenicity tests represent a good method for genotoxic effect evaluation of environmental pollutants. Several studies have shown that fish micronuclei(MN) tests are sensitive enough to detect genotoxic agents in industrial water. In this work, we have measured MN and monitored nuclear abnormalities in the snake fish cells, with the aim to contribute to the comparative investigation of effects of TiO_2 nanoparticles(TiO_2 -NP) and TiO_2 microparticles(TiO_2 -MP). The differential sensitivity of fish cells to TiO_2 -MP and TiO_2 -NP was evaluated by exposing individuals of both species to different doses 1, 5, 10 and 50 for TiO_2 -MP and 0.1, 0.5, 1, 5 and 10 for TiO_2 -NP. The treatments are monitored over the period of 24, 48 and 72hr. We concluded that TiO_2 -NP is more toxic to nuclear material, as it induced higher numbers of micronuclei. The data on increasing of genotoxicity in fish cells indicates a hazard of NP to environments and humans. The doses and the exposure period are important parameters. However, further studies with TiO_2 must be carried out using such as different dose and/or exposure period if we are to reach a better understanding.

I_I0032 Antibacterial effects of TiO_2 nanoparticles combine with UVA on *Leptospira interrogans* serovar Canicola

Sudarat Chadisuthi¹, Wannapong Triampo^{1,2}, Galayanee Doungchawee³, Jirasak Wong-ekkabut¹

¹ Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand

² Capability Building Unit in Nanoscience and Nanotechnology, Faculty of Science, Mahidol University, Bangkok 10400, Thailand

³ Department of Pathobiology, Faculty of Science, Mahidol University, Bangkok 10400, Thailand

Abstract: TiO_2 nanoparticles (TiO_2 -NP) combine with Ultraviolet-A (UVA) radiation were recently reported as the photocatalytic disinfection process. Our study is to investigate the antimicrobial effects of TiO_2 -NP on *L. interrogans* serovar Canicola represented as pathogenic leptospires that cause leptospirosis. The bacteria were cultured and treated by TiO_2 -NP, UVA radiation at variable time duration of 2, 6 and 24 hr with and without TiO_2 -NP at 50 μ g/-10⁶cells-ml. The results show that samples with higher dose UVA (112.3 W·sec/cm²) both with and without TiO_2 -NP have higher antimicrobial effects resulting in the decrease in the growth and viability of bacteria when compared with those without UVA exposure. By immunoblotting method, Leptospiral antigen components about 21 and 48 kDa disappear when compared with non-exposed control. Only TiO_2 treatment alone does not significantly give any difference from the control (no treatment) samples. From our preliminary works, it may be concluded that the UVA play a major role on antimicrobial effects while the TiO_2 -NP affect bacteria only when photocatalysis is occurred. Further studies with TiO_2 -NP must be carried out using such as different doses and/or exposure periods if we want to reach a better understanding.

I_I0033 Recycle of Screen Printing Ink for Ceramic

Mr. Pongyut Junthong, Mr. Tanatorn Tongsumrith and Mr. Nitus Tipsothaiyana

Department of Printing and Packaging Technology, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi 126 Pracha-utid Rd., Bangmod, Toong-kru, Bangkok 10140.

Abstract: The purposes of recycle of ceramic ink in screen printing are to study the process of screen ink recycle and to determine the effect of temperature and duration of pigments burning to the recycle ink qualities. The useable blue ink was dried by evaporation of solvent and burned at 300 °C 325 °C 350 °C 375 °C and 400 °C for 5 and 30 minutes. The burned pigment was observed, grinded and screen passing through 120 T mesh. Medium oil was then mixed with pigments for quality testing such as particle size, ink viscosity. Recycle ink was printed on transfer paper and transferred on ceramic using 760 °C. The ink film was measured of color (CIE L*a*b*) with spectrophotometer.

The results show that pigments was black burned when increasing temperature viscosity was around 11 poise and fineness of pigment particle after grinding was 7 microns which can be adjusted to be suitable for printing. After printing, L*a*b* color value on transfer paper was changed. With increasing burning temperature and duration, blue color was changed to green color and darker. However, color on ceramic was similarly blue. In addition, temperature 325 °C and duration 5 minutes was a suitable status for pigments burning, in order to mixed with medium for application for screen printing ink ceramic by using transfer paper.

I_I0034 QUANTITATIVES OF PHENOLIC COMPOUNDS IN TREATED PULP AND PAPER MILL WASTEWATER AFTER ADSORPTION BY ACTIVATED CARBON.

Kasetsart University¹ and Faculty of Science²

¹ College of Environment, Kasetsart University, Thailand.

² Department of Chemistry Faculty of Science, Kasetsart University, Thailand,

e-mail address: fscivit@ku.ac.th.

Abstract: The water effluent after treatment with activated sludge of pulp and paper factory still has brown color because

of dissolution of lignin molecule. Lignin molecule contain the main component call phenolic compounds. These compounds are hard to degrade by biological treatment, so they make the color in the water effluent. This research study the adsorption of activated carbon made from rubber wood in reducing color, COD and the content of phenolic compounds. The experiment use the concentration of activated carbon in wastewater equal 0.02, 0.05, 0.10 and 0.20 % (W/V). The result show that the optimum condition is at 24 hour of adsorption time and 0.20 % of concentration. This condition can adsorb 80.6680% of color, 76.4583% of COD. GC-MS and GC are use to identify and quantitative the amount of phenolic compound before and after adsorption. The information from GC-MS and GC can explain the relationship between color adsorption and COD adsorption with each type of phenolic compounds in the molecular level.

I_I0035 Activated carbon from sawdust char by physical activation and chemical activation

Kanokwan Rungsirivitoot^a, Paitip Thiravetyan^a, Woranan Nakbanpote^b

^a Division of Biotechnology, School of Bioresource and Technology at King Mongkut's University of Technology Thonburi, 83 Moo 8 Thakham, Bangkhuntien, Bangkok 10150, Thailand. Email address : paitip.thi@kmutt.ac.th

^b Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, 83 Moo 8 Thakham, Bangkhuntien, Bangkok 10150, Thailand

Abstract: The research studied about the production of activated carbon from agriculture waste. Sawdust char was used as the precursor for activation preparation. Activated carbon was prepared by physical and chemical activation. This process used CO_2 and KOH for activation. The result of this study found that the chemical activation was better than physical activation because KOH used in this process could go into the sawdust, so it developed the pores and help efficiency in adsorption. Activated carbon was activation by KOH, the BET surface area and micropore volume increased by temperature and impregnation ratio. Activated carbon was activated by KOH at impregnation ratio of KOH: sawdust (4:1) at 800 °C for 1 hour gave the respectively BET surface area and micropore volume equal at 1168.10 m^2/g and 0.5200 cm^3/g when compared with sawdust char before activation process value was 169.57 m^2/g and 0.1733 cm^3/g

I_I0036 UTILISATION OF LATEX SERUM FOR THE PRODUCTION OF CHLORELLA

ดร. ชัยพร บุญเรือง¹

¹ Department of Technology and Industry, Faculty of Science and Technology, Prince of Songkla University, Pattani Campus, Pattani, Thailand.

E-mail: cchonlal@bunga.pn.psu.ac.th, Fax: (6673)335-130

Abstract: The comparison of growth and biomass of *Chlorella* were carried out in 10 L flask using latex serum from latex processing factory effluent as fertilizer. Different ratios of latex serum between 1, 2, 3, 4, and 5 per cent by volume with 1.04×10^6 cell/ml. initial cell density of *Chlorella* were applied to the experiment. Results showed that *Chlorella* reached to the maximum density within 5 days, and the final cell densities of the microalgae among treatments were $17.3 \pm 1.30 \times 10^6$, $5.0 \pm 2.56 \times 10^6$, $0.83 \pm 0.36 \times 10^6$, $0.00 \pm 0.00 \times 10^6$, and $0.63 \pm 0.63 \times 10^6$ cell/ml respectively. Biomass and growth rate of *Chlorella* when apply 1 percent of latex serum found to be significantly greater in all treatment ($p < 0.05$). This result was further applied to mass cultivation of *Chlorella* at 1,000 L comparing with a group using chemical fertilizer. Growth rate and biomass of a batch used latex serum were still significantly higher than another ($p < 0.05$), and the cultivation periods also delayed when using latex serum.

I_I0037 ELECTROCOAGULATION OF PALM OIL MILL'S EFFLUENT IN THE PRODUCTION OF NATURAL RUBBER ANTIOXIDANT

Melissa B. Agustin¹, Weerachai Phutdhawong

Department of Chemistry, Faculty of Science, Maejo University, Sansai, Chiang Mai, Thailand, 50290

Abstract: A new approach in the management of palm oil mill's effluent (POME) with an emphasis on giving added value to wastes was demonstrated in this study. Electrocoagulation (EC), an electrochemical technique used in water purification technology was employed to remove dissolved organic substances from the POME at the same time utilized the recovered substance as antioxidant for natural rubber. The presence of phenolic groups, a characteristic functional group of most antioxidants, was confirmed by the formation of black precipitate upon mixing POME with FeCl_3 . Removal of these phenolic compounds was done by electrocoagulating (2.0 A, 4.6-8.1 V) a liter of POME using aluminum as electrodes for 6 hours. The process afforded a clear solution ($\text{pH}=7.86$) and a coagulum. Recovery of the phenolic compounds from the coagulum was done by dissolution with 7%HCl followed by solvent extraction with butanol. The dried residue from the butanol extract was further extracted with hexane using a Soxhlet to remove oils and waxes. The overall process afforded a yield of 17.1g/L POME. The antioxidant property of the isolate was confirmed by the decolorization of DPPH on the TLC plate using a spray method. The isolate was incorporated into a rubber mixture and its effects on the physico-mechanical properties of the rubber were evaluated and compared with the commercial antioxidant.

I_I0038 INFLUENCE OF HUMIC ACIDS ON SOLUBILISATION OF HEAVY METALS FROM CEMENT-BASED STABILISED CONTAMINATED SOIL

Aniwat Passako¹ and Apichat Imyim²

¹ Naval Science Department, Royal Thai Navy, Budhamonthol 3 Rd., Taweeawathana, Bangkok 10170, Thailand

² Environmental Analysis Research Group, Department of Chemistry, Faculty of Science, Chulalongkorn University, Bangkok, 10330 Thailand,

E-mail: iapichat@chula.ac.th

Abstract: Humic acids (5% w/w) was added to heavy metals contaminated soil containing Cd, Cu, Cr, Ni, Pb, and Zn. The stabilization/solidification by Portland cement was done for humic acid added soil (S-HS) and original contaminated soil (S-OS). The solubilisation of the metals from both concretes was investigated at different pH of leachant ranging from 1-12. Regarding the dissolution of the metals in leachates from both materials, the results showed that the dissolution was mainly controlled by the pH at equilibrium. Leaching behaviors of the same metal from both materials were different. Cadmium, copper, nickel, and zinc were better dissolved from S-OS than S-HS. In acidic medium, chromium and lead had the similar leaching behavior as other metals, but in basic region their release from S-HS was greater than that from S-OS. Humic acids can reduce the dissolution of the metals.

I_I0039 VERMICOMPOSTING OF SYNTHETIC ORGANIC WASTE BY *Perionyx excavatus*

Khwanthipha Pandech¹, Dondej Tungtrakanpong¹ and Pajaree Thongsanit¹

¹ Department of Environmental Engineering Faculty of Engineering, Naresuan University, Phitsanulok 65000

Abstract: This research was to study the vermicomposting of organic waste by using *P. excavatus*. The experiment was divided into 3 parts, 1) study of effect of bulking agent in vermicomposting, 2) study of optimum ratio of organic waste/worm in vermicomposting, 3) study of optimum depth of organic waste for vermicomposting. The organic waste was added once at beginning of the experiment. The vermicomposting was maintained moisture contents at least 50%. The experiments period were 28 days. The result of the vermicomposting showed that worms were able to digest waste materials and volatile solids more rapidly than the composting. The result of the effect of worm quantity can be suggested that 200 grams of earthworm was able to digest rapidly the most of organic waste and volatile solids. The result of organic waste depth found that the suitable depth was 1 cm. The digestion rate was decreased with increasing the depth of organic waste.

I_I0040 THE ENVIRONMENTAL FACTORS AFFECTING HYDROGEN PRODUCTION FROM CASSAVA STARCH MANUFACTURING WASTEWATER BY CO-CULTURE OF ANAEROBIC SLUDGE AND

Suksaman Sangyoka¹ and Alissara Reungsang^{2,3}

¹ Faculty of Science and Technology, Phibulsongkarm Rajabhat University

² Department of Biotechnology, Faculty of Technology, Khon Kaen University, Khon Kaen, 40002 Thailand

³ Fermentation Research Centre for Value Added Agricultural Products, Khon Kaen University, Khon Kaen, 40002 Thailand

Abstract: Bio-hydrogen production by fermentation is very promising method based on the low free energy and ability to consume organic substrate from wastewater. This research was conducted to investigate the effect of initial pH, light conditions, stirring condition, reducing agents, nitrogen and phosphorus levels on hydrogen production from cassava starch manufacturing wastewater by co-culture of anaerobic sludge and *Rhodospirillum rubrum*. Initial pH was effected on both hydrogen yield and specific hydrogen production. The illumination did not strongly affect on both of hydrogen yield and specific hydrogen production due to the beneficial effects of the light-dark cycle on nitrogenase. The mechanical stirring condition was enhanced the production of hydrogen. Both of *Enterobacter aerogenes* and L-cysteine was an effective to remove oxygen and generate anaerobic condition in the system. At nitrogen concentration rang 0.1-0.2 M showed the ability for capitalize on hydrogen production in the shorter lag time. An optimum rang of phosphorus level for hydrogen production from cassava manufacturing wastewater by co-culture of anaerobic sludge and *R. rubrum* was rang 0.02-0.04 M.

I_I0041 Treatment of COD from offset printing wastewater by agricultural wastes

Ratanaporn Chaiyapongpapit^a, Paitip Theravetyan^a, Woranan Nakbanpote^b

^a Division of Biotechnology, School of Bioresource and Technology at King Mongkut's University of Technology Thonburi, 83 Moo 8 Thakham, Bangkuntnien, Bangkok 10150, Thailand,

Email address : paitip.thi@kmutt.ac.th

^b Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, 83 Moo 8 Thakham, Bangkuntnien, Bangkok 10150, Thailand

Abstract: The research was to study the efficiency of COD reduction from offset printing by agricultural wastes from comcochar, bagasse bottom ash and sawdust bottom ash. These adsorbents were compare with commercial activated carbon can reduce initial COD from 1,277 mg/l to 687 mg/l, 909 mg/l, 689 mg/l and 650 mg/l, respectively. The adsorption properties of carbon products studied was COD adsorption capacity. From the results were 10.11, 7.43, 15.72 and 26.59 mg/g, respectively. The sawdust bottom ash was the highest adsorption capacity. Consequently, the efficiency of sawdust bottom ash increased by activation sawdust bottom ash with potassium hydroxide at impregnate ratio(1:1), 800 °C for 1 hour. The BET surface area increased from 169.57 m²/g to 850 m²/g could enhance COD reduction in wastewater.

I_I0042 NITRATE REMOVAL EFFICIENCY AND BACTERIAL DIVERSITY IN THE TUBULAR DENITRIFICATION REACTOR FOR THE INDOOR AQUACULTURE POND

Bungrapha Sutisri¹, Maliwan Kutako¹, Ekawan Luepromchai², Prasert Pavasant³, Sorawit Powtongsook⁴ and Piamsak Menasveta^{1,5}

¹ Inter-Department of Environmental Science, Graduate School, Chulalongkorn University

² Department of Microbiology, Faculty of Science, Chulalongkorn University

³ Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University

¹ Center of Excellence for Marine Biotechnology (at Chulalongkorn University), National Center for Genetic Engineering and Biotechnology, National Science and Technology Development Agency, Phatum Thani 12120

² Department of Marine Science, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand

* Corresponding author: sorawit@biotec.or.th

Abstract: Nitrate accumulated in an indoor shrimp pond containing 7,500 L of seawater was treated by denitrification process using the tubular denitrification reactor (TDNR). The prototype reactor was made of 48 m length PCV pipe with 2.5 cm in diameter and packed with plastic substrate (bioballs) for bacterial attachment. Methanol was supplied as a carbon source for denitrifying bacteria in the reactor. It was found that TDNR could reduce nitrate concentration from 33 mg-N/L to 9 mg-N/L in 55 days. The maximum nitrate removal rate was 4006.8 mg NO₃-N/day. Investigation of bacteria in TDNR using Gram's staining showed that the dominant bacteria were rod-shape and gram-negative. With PCR-DGGE analysis, DNA sequence of 16S rDNA suggested that three of dominant bacteria in TDNR were uncultured bacteria.

I_I0043 Potential of Organic Residues from Concentrated Latex, Fish Processing and Palm Oil Industries in the Preparation of Planting Materials for Garden Grass

Wiphaphan Ubon¹, Wilairat Cheewasedtham¹, and Somporn Prasertsongsuk²

¹ Chemistry Division and ² Biological Division, Department of Science, Faculty of Science and Technology, Prince of Songkla University, Pattani Campus, Pattani 94000, Thailand

E-mail: g4747103@mor-or.pn.psu.ac.th, cwilai@bunga.pn.psu.ac.th and psomporn@bunga.pn.psu.ac.th

Abstract: Main nutrients, total nitrogen, total phosphorus and total potassium in organic residues or sludge in three different types of industries i.e. concentrated latex, fish processing and palm oil industries were investigated. The total nitrogen, total phosphorus and total potassium content in concentrated latex sludge were found at 1.02-2.53, 22.15-48.19 and 0.39-0.60, while those of fish processing factory sludge were found at 4.57, 2.57- 3.20 and 0.03-0.22 and those of palm decanter were found at 1.52, 0.26 - 0.74 and 0.35-0.52 %wt. by dry wt., respectively. Planting materials were prepared from mixing three types of those organic residues at different ratios and tested for their efficiency in garden grass, Nuan noi (in thai) or *Agrostis matrella* L., growing in order to replace using of ploughing soil. It was found that mixing of organic residues; concentrated latex sludge, fish processing sludge and palm oil factory decanter at 20:20:20 % wt. by wet wt. together with palm fiber and waste office paper at 20% each, could be used as planting material for growing garden grass with survival rate at more than 50% which better than control ploughing soil. The nutrients; total nitrogen, total phosphorus and total potassium content in that mixture were at 0.5, 1.7 and 1.1 %wt. by dry wt.

I_I0044 CUTTING FLUID WASTEWATER ADSORPTION BY MODIFIED CHITOSAN BEADS

Kowit Piyamongkala, Lursuang Mekasut, Sangobtip Pongstabodee¹

Department of Chemical Technology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand.

E-mail: kwt@kmitb.ac.th, psangob@sc.chula.ac.th*

Abstract: Adsorption of cutting fluid wastewater was investigated in this work. Chitosan and chemical modified chitosan consist of benzoyl chitosan and quateramminated chitosan beads were chosen as adsorbents. Batch adsorption experiments were carried out as a function of type of adsorbents. The adsorption capacity of cutting fluid wastewater on benzoyl chitosan, chitosan and quateramminated chitosan were 62, 55 and 50 mg/g, respectively. The protonation of amine groups in chitosan, interaction between chitosan through hydrophobic chain was play a role in cutting fluid wastewater adsorption onto chitosan. While benzoyl chitosan and quateramminated chitosan based on binding affinity and electrostatic interaction. Fourier transform infrared spectroscopy and heat of combustion from bomb calorimeter confirmed that cutting fluid wastewater could adsorbed onto all adsorbents.

I_I0045 Degradation of heavy oil in seawater by mixed bacterial cultures

Ekawan Luepromchai¹, Keiko Kitamura², and Akihiko Maruyama²

¹ Department of Microbiology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand.

* e-mail: ekawan.l@chula.ac.th Fax: (662) 2527576

² Research Institute for Biological Resources and Functions, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan.

Abstract: Heavy oil is a dense and viscous crude oil with high concentration of PAHs, asphaltenes, and resins. This study used mixed bacterial cultures consisting of *Sphingomonas* sp. AN17a and *Thalassospira* sp. MA18 for degradation of heavy oil. These bacteria were isolated from oil contaminated seawater collected in Japan and found that they can effectively degrade phenanthrene, a type of PAHs. Changes in oil components and number of bacteria populations during treatment were determined by TLC-FID and direct count techniques, respectively. Around 30% of total oil (initial 0.5% W/V) was degraded in seawater containing mixed bacteria and nutrients after 12 days. The amounts of saturates, aromatics, and resins fractions in this treatment were significantly lower than in seawater without mixed bacteria. Meanwhile, the mixed cultures could utilize only small fractions of heavy oil since bacterial number was slightly increased. The results suggested that more nutrients should be applied along with the mixed bacterial cultures for clean-up oil contaminated seawater.

I_I0046 Water Quality Management from Seafood Restaurant within Bangkhuntent Chaythalee District

Sorasake Kulamai¹, Suchada Chaisawadi¹, Patcharin juntawong¹, La-Ead Pengsopa² and Ounsa Nontpala²

¹ Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand;
e-mail address : suchada@pdti.kmutt.ac.th.

² Department of Chemical Engineering, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand;
e-mail address:

Abstract: Water quality monitoring seems essential to evaluate the pollution and to control the water quality. Surface water is the one that needs to control the water quality and evaluate the organic pollution. The qualitative indicator that uses for evaluate organic pollution is chemical oxygen demand (COD). To develop the simple, rapid and sufficiently precise method to use as the organic pollution indicator, many studied focused on absorbance measurement at 254 nm by using Ultraviolet Spectrophotometer. To choose the appropriated method as the organic pollution indicator, the correlation between COD and absorbance measurement at 254 nm (OD_{254}) had been studied on 107 surface water and 50 organic wastewater samples. In this study, the results showed COD of surface water and organic wastewater range 14 – 159 mg/L and 22 - 220 mg/L, when absorbance measurement at 254 nm (OD_{254}) range 0.14 - 0.99 and 0.13 - 1.40, respectively. The correlation coefficient (r^2) of the two methods were 0.83 and 0.92. When using the turbidity compensation by subtracting with OD_{546} , the correlation coefficient (r^2) showed 0.84 and 0.94. Using Ultraviolet Spectrophotometer at OD_{254} as the organic pollution indicators for surface water quality and organic wastewater monitoring have been concluded. To use the Ultraviolet Spectrophotometer at OD_{254} in the water quality monitoring for industrial pollution and wastewater treatment plant have been suggested for further studied.

I_10048 The applications of natural zeolites for cadmium removal from sample water:

Models on laboratory scale

Pornpan Pungpol¹, Matana Kacha¹, Teamchai Buatoi¹, Wichai Lat¹, Kamoltip Boriboon¹, Chan Inntam¹ and Usa Onthong²

¹ Department of Chemistry, Faculty of Science, Ubonratchathani University, Ubonratchathani, 34190

² Department of Chemistry, Faculty of Science, Taksin University, Songkhla, 90000

E-mail address: pornpan_ubuntu@yahoo.com

Abstract: Five natural zeolites found in the regions of Songkhla and Surathani provinces, Clinoptiolite, Mordenite, Willhensonite, Offretite and Ferrierite, have been applied to remove cadmium ions from sample water, on the basis of experimental models on laboratory scale. Clinoptiolite was used for preliminary study of the adsorption parameters. An hour adsorption time and 40 g/L of the ratio of zeolite per water sample are optimum adsorption parameters with an average cadmium removal efficiency of 91.68 %. The optimum adsorption conditions were then used for other four natural zeolites. The results show that the effective removal sequence can be listed as Offretite = Clinoptiolite > Willhensonite > Mordenite > Ferrierite. Clinoptiolite, Offretite and Willhensonite are successfully used to reduce significantly cadmium from sample water with removal efficiency ranging from of 87-92%, respectively. Accordingly, the natural zeolites are recommendable adsorbents for highly cadmium removal of industrial wastewater with low cost of wastewater treatments and environmentally friendly chemical processes.

I_10051 EVALUATING THE ENVIRONMENTAL QUALITY OF SALT DISTRIBUTION ON THE LOCAL SALT INDUSTRY

Sarunya Promkota¹ and Nuttapong Thancharoen²

¹ Groundwater Research Center, Faculty of Technology, Khon Kaen University, Khon Kaen 40002 Thailand

² Department of Geotechnology, Faculty of Technology, Khon Kaen University, Khon Kaen 40002 Thailand

E-mail: 'sarunya@kku.ac.th

Abstract: Saline water and soils were used to evaluate the environmental quality of salt distributions on the local salt industry in the Northeast, Thailand. The studied areas were covering Nong Khai, Udon Thani, Sakon Nakhon, Mahasarakham and Nakhon Ratchasima province. Chemical parameters, such as EC (electrical conductivity), TDS (total dissolved solid), pH and salinity surroundings the local salt industries of the evaporated salt and solar salt process were studied. The tests were done on site. According to waste brines and bitters discarding to the local reservoirs, salt production sometimes affects the land contaminated with salinity. The EC of surface water in the creek, which located closed to the local salt productivity process was greater than 15,000 μ S/cm. The TDS was more than 1,000 mg/L. The pH and salinity in the same areas presented in the range of 6.5-8.5 and 10-85 g/L, respectively. Some studied areas in Udon Thani and Nakhon Ratchasima which had a good care of the waste leakage to the surroundings can maintain their production and no infectivity of the salinity.

I_10052 REMOVAL OF LEAD FROM WATER BY USING NATURAL ZEOLITES

Usa Onthong¹, Orasa Anan¹, Wiparat Khunghar¹, Ranoo Khamhorm¹, Isara Rakham¹ and Pornpan Pungpol²

¹ Department of Chemistry, Faculty of Science, Taksin University, Songkhla, 90000

² Department of Chemistry, Faculty of Science, Ubonratchathani University, Ubonratchathani, 34190

E-mail address: usa@tsu.ac.th

Abstract: The removal of lead ion from diluted solutions by sorption on natural zeolites has been studied at laboratory scale. Four natural zeolites, mordenite, willhensonite, offretite and ferrierite, found in the regions of Songkhla and Surathani provinces were used. The results show that an hour adsorption time and 50 g/L as the ratio of zeolite usage per water sample volume are the optimum adsorption parameters at the initial solution concentrations of 0.6 ppm. 100% lead removal efficiency can be achieved in the adsorption systems of mordenite, offretite, and willhensonite. With regard to ferrierite, the removal efficiency is 86.8 %. Based on the preliminary study, it can be seen that the natural zeolites are effectively used for removing lead ion from

water. These findings are beneficial information for practical applications in industrial wastewater treatment with high efficiency and relatively low cost materials.

I_I0053 ADSORPTION OF COPPER ION ON NATURAL ZEOLITES

Usa Onthong^{1*}, Orasa Anan¹, Kaniththa Duangjitt¹, Parichat Khamsam¹ and Pornpan Pungpo²

¹ Department of Chemistry, Faculty of Science, Taksin University, Songkhla, 90000

² Department of Chemistry, Faculty of Science, Ubonratchathani University, Ubonratchathani, 34190

E-mail address: usa@tsu.ac.th

Abstract: Adsorption of copper ion from sample water has been investigated at laboratory scale by using natural zeolites. Natural zeolites as adsorbents used in this study are mordenite, willhensonite, offretite and ferrierite, found in the regions of Songkhla and Surathani provinces. The optimal adsorption conditions were firstly examined. The results reveal that the optimum adsorption parameters at the initial copper concentrations of 2.5 ppm are an hour adsorption time and the ratio of zeolite usage per water sample volume with 50 g/L. The adsorption efficiency are 100%, 99.70%, 92.81% and 60.15% from the adsorption systems of mordenite, willhensonite, offretite and ferrierite, respectively. On the basis of the present study, it proves that the natural zeolites can significantly reduce copper from sample water on laboratory scale. Therefore, the obtained results can suggest that the use of the natural zeolites as an effective adsorbent with relatively low costs for copper treatment from industrial wastewater.

I_I0054 ADSORPTION CHARACTERISTICS OF AFLATOXIN B1 ON COMMERCIAL BENTONITES

Urai Tengjaroenkul^{1*} and Bundit Tengjaroenkul²

¹ Department of Chemistry, Faculty of Science, Chiangmai University, Chiang Mai, Thailand,

E-mail address: urai.c@chiangmai.ac.th

² Department of Veterinary Medicine, Faculty of Veterinary Medicine, Khon Kaen University, Khon Kaen, Thailand

Abstract: The isothermal adsorption of aflatoxin B1 from aqueous solutions on some commercial bentonites at 25 °C have been investigated. The mixtures of 0.25 %w/v were shaken at 200 rpm for 24 hr. The concentrations of aflatoxin B1 solutions used were from 0.50 to 8.00 ppm. Adsorbed amounts of aflatoxin B1 were obtained from the determination of aflatoxin B1 concentration left in the solutions by UV-VIS spectrophotometry. Adsorption behavior of aflatoxin B1 could not applicable to Langmuir model and that mean non-monolayer adsorption approached. The experimental data could be better fit to modified Freundlich isothermal adsorption equation. For studied bentonites, adsorption isotherm plots were S-shaped that could be explained for multiple-site adsorption behaviors. The adsorption capacities were in a range of 1.61×10^{-3} – 4.52×10^{-3} mol/kg and the distribution constants were in a range of 2.52×10^5 – 3.60×10^5 .

J1_J0002 VOLTAGE SAG DETECTION METHOD IN POWER DISTRIBUTION SYSTEMS FOR POWER QUALITY ISSUE

Warunee Srisongkram* Wanchai Subsingha and Paisan Boonchiam**

Department of Electrical Engineering, Faculty of Engineering

* Rajamangala University of Technology (RMUT) Suannabhumi, Nonthaburi 1 Rd., Suanyai, Nonthaburi Thailand.

E-mail: warunee_sri@yahoo.com

**RMUT Thanyaburi, Rangsit-Nakornnayok Rd Pathumthani

E-mail: paisan@rmut.ac.th

Abstract: Nowadays, voltage disturbances have occurred in power system because of nonlinear loads, unsymmetrical load and faults. Therefore the detection technique is necessary and useful for improving the power system method. This paper presents the detection techniques of voltage sag that occurred in power system for improving the power quality. There are four types of detection method, namely rms, FFT, peak sequence analysis, dq detection method, and then these methods are compared.

J1_J0003 DESIGN AND PERFORMANCE ANALYSIS OF A PILOT-SCALE VACUUM FRYER

จันทร์ รุ่งจารัส*, ชัยรัตน์ ตั้งดวงดี*, สุวิทย์ เมธี*

* Department of Food Engineering,

** Department of Chemical Engineering, Faculty of Engineering, King's Mongkut University of Technology Thonburi, Thungkru, Bangkok, Thailand.

E-mail: jijun_aj@hotmail.com, Fax: (662) 470-9240

Abstract: The objective of this work was to design and construct a pilot scale vacuum fryer operating as a batch for 2 kg pineapple chips. The main components of the equipment are 1) frying vessel, 2) preheated oil tank, 3) vacuum pump, 4) condenser, 5) immersion electric heater, 6) oil centrifugal system, and 7) transfer oil pump. The design was based on an energy balance in order to maintain the frying oil temperature at $80 \pm 5^\circ\text{C}$ during the course of frying. The frying vessel was made of 4 mm thickness 304L stainless steel. A cylindrical shape elliptical head was designed to withstand the external pressure. The sizes of the vessel were 40 cm in diameter and 72 cm in height. The external jacket was filled with hot oil, which was heated by an immersion heater rated at 4.5 kW. The sample holder was equipped with a motor to get rid of excess oil by means of centrifugation. The preheated oil tank had a diameter of 30 cm with 68 cm in height. A rotary vane vacuum pump was used to reduce the pressure in the frying vessel to 60 mmHg. Shell & Tube heat exchanger was designed to condense vapor coming from the frying vessel. The performance test was carried out using frozen pineapple chips, which had an initial temperature of -20°C . It was found that the machine worked satisfactorily with the final product moisture content of 4.91 ± 0.28 percent (d.b.) and oil content of 17.04 ± 2.80 percent (w.b.) at 50 minutes frying time. In addition, the maximum temperature fluctuation was found to be in the range of $\pm 10^\circ\text{C}$. The efficiency of the condenser in terms of trapped water was 97 percent.

J1_J0004 A STUDY OF COMPRESSIVE STRENGTH OF CONCRETE USING QUARRY DUST AS FINE AGGREGATE AND MIXING WITH ADMIXTURE TYPE E

Prachoom Khamput*

* Department of Civil Engineering, Faculty of Engineering, Rajamangala University of Technology Thanyaburi, Pathumthani, Thailand 12110

E-mail: choomy_gtc@hotmail.com, Fax: (662)549-3412

J1

Abstract: This research is related to study the compressive strength of concrete using quarry dust as fine aggregate instead of sand. Ratio of cement: sand: rock is 1: 2: 4 (by weight) and at water-cement ratio (w/c) of 0.45. The admixture type E is added for increasing the compressive strength. Without using the admixture, it is found that the compressive strengths are 275, 260, 241 and 234 ksc for using quarry dust at 70%, 90%, 100% (sieve analysis) and 100% (not sieve analysis) respectively. When the admixture is added, the results of compressive strengths are 292, 287, 276 and 258 for 70%, 90%, 100% (sieve analysis) and 100% (not sieve analysis) of quarry dust respectively. Comparing the compressive strength at 28 days between concrete mixing with quarry dust and sand, the maximum compressive strength is 407 ksc for concrete mixing with 70% of quarry dust while the normal concrete has value of 348 ksc. From this research, the quarry dust could be used to replace sand in general concrete structures.

J1_J0005 USING RICE HUSK ASH FOR DEVELOPING STRENGTH OF ADOBE

Prachoom Khamput*

* Department of Civil Engineering, Faculty of Engineering, Rajamangala University of Technology Thanyaburi, Pathumthani, Thailand 12110

E-mail: choomy_gtc@hotmail.com, Fax: (662)549-3412

Abstract: This study aims to investigate the compressive strength and the bending strength (or Modulus of rupture) of the adobe brick mixing with rice husk ash. The rice husk ash is added by following contents: 0, 3, 6, 9, 12 and 15 by the total weight of the clay. In addition, the ratio of rice hulk is 1: 0.5 by volume of the clay and the water ratio is 1: 1 by weight of the clay. In testing process, the adobe bricks are cast in sizing of $10 \times 15 \times 30$ cm and dried for 48 hours. After that, put the adobe bricks into the sun-dried environment for 14 days and 28 days. By the testing results at 28 days, the edge wise compressive strengths are 1.10, 1.15, 1.17, 1.34, 1.37 and 1.44 ksc, the flat wise compressive strengths are 0.96, 1.04, 1.02, 1.04, 1.09

and 1.08 ksc, the edge wise moduli of rupture are 0.76, 0.80, 0.73, 0.81, 0.74 and 0.85 ksc, the flat wise moduli of rupture are 0.81, 0.85, 0.90, 0.85, 0.90 and 0.89 ksc respectively. This research indicates that rice husk ash could be mixed in to adobe bricks for increasing the strengths.

J1_J0008 Effect of Screw Rotating Speed on the Properties of Poly lactic acid(PLA)/Organoclay Nanocomposites Prepared by a Twin Screw Extruder

Aniwat Hasook¹, Hiroki Muramatsu², Shuichi Tanoue², Yoshiyuki Iemoto² and Tsunemune Unryu³

¹ Department of Industrial Engineering, Rajamangala University of Technology Isan, Nakorn Ratchasima, Thailand,
E-mail address: aniwat05@gmail.com

² Department of Materials Science and Engineering, University of Fukui, Japan

³ Industrial Technology Center of Fukui Prefecture, Japan

Abstract: This study analyzes the effect of different screw rotating speeds on the properties of nanocomposites prepared by melt compounding PLA with an organoclay in a co-rotating twin-screw extruder. Polyamide 12 was used as an additive. Two different screw rotating speeds, 65 rpm and 150 rpm, were used in this study. According to the tensile strength data, the Young's modulus and tensile strengths of the PLA/clay nanocomposites showed improvement at a screw rotating speed of 150 rpm. The d-spacing of PLA/PA12/Clay nanocomposites was independent of adding PA12. The size of the clay aggregates in the PLA/PA12/Clay nanocomposites is smaller than that of PLA/Clay. On the whole, the higher screw rotating speed (150 rpm) resulted in materials with better performance than the lower screw rotating speed (65 rpm) in a twin-screw extruder and the addition of PA12 showed the most improvement in the tensile strength and thermal stabilities.

J1_J0009 A GUIDELINE ON THE OPERATION OF AN ABSORPTION CHILLER WITH A CHILLED WATER STORAGE TANK

Somkiat Boonnasa¹, Pichai Namprakai²

¹, Department of Mechanical Engineering Technology, College of Industrial Technology, King Mongkut's Institute of Technology North Bangkok, Bangkok 10800, Thailand

², Department of Energy Technology, King Mongkut's University of Technology Thonburi, Thungkhru, Bangkok 10140, Thailand.

Abstract: This objective of this research was to find a guideline on the operation of an absorption chiller (AC) with a chilled water storage system in the view of engineering and economics. The studied factory usually used continuously the energy for chilling in the form of chilled water and the thermal energy in the form of a vapor throughout a week. The operation time of the AC was divided into 3 periods: Monday to Friday, Saturday and Sunday in which energy was consumed differently. We compared the operations in 3 scenarios: A, B and C. It was discovered that AC running at mean load (Scenario C) was the optimum. Its payback period, internal rate of return and net present value were 4.89 years, 45.21% and 178.59 MBaht respectively.

J1_J0010 A LOW-POWER HIGH VOLTAGE 2 kV_{dc} DC SWITCHING POWER SUPPLY FOR OZONE TUBE
Siseerot Ketkaew¹

¹ Faculty of Engineering, Ramkhamhaeng University (RU), Bangkok 10240, Thailand.
E-mail: siseerot@eng.ru.ac.th, Fax: (662)310-8579

Abstract: This paper presents a low-power high frequency high voltage DC switching power supply for ozone tube. The high voltage generating circuit is based on a flyback converter. The converter was designed to operate at 40 kHz switching frequency through a high frequency flyback transformer, a rectifier and filter circuits. The circuit is capable of producing up to 2 kV_{dc}. By adapting the highly nonuniform electric field to the electrode design of the ozone generator, one-hour operating yields the maximum ozone generating capacity of 30 mgO₃/hr.

J1_J0011 Lanthanum Separation by Batch Simulation of Continuous Countercurrent Liquid-Liquid Extraction
Jarunee Kraikaew¹, Wanee Srinuttrakul¹, Pipat Pichestapong², Chavalek Chayavathanangkur¹ and Manit Sonsuk¹

¹ Chemistry and Material Science Research Program, Office of Atoms for Peace, Bangkok 10900
E-mail address: jkraikaew@yahoo.com, Fax: (662)561-4081

² Rare Earth Research and Development Center, Klong Laung, Pathum-thani 12120

Abstract: Lanthanum (La) was separated from rare earth nitrate solution in dilute nitric acid by the mixture (1.2 M TBP-0.3 M D2EHPA)/kerosene compared with 50%(1.8 M)TBP/kerosene. The separation was accomplished by batch simulation of 6-stage and 8-stage continuous countercurrent liquid-liquid extraction and the flow ratio of the solvent per feed solution (S/F) equaled to two. It was found that when the mixture of TBP and D2EHPA was applied as the extractant, the concentrations and the percentages of La in raffinate from stage-6 and stage-8 were high. Furthermore, %yield of La in raffinate was higher than %yield obtained when 50%TBP/kerosene was extractant. From 8-stage continuous countercurrent liquid-liquid extraction simulation, the purity of La output in raffinate is as high as 97.2% with %yield of 80.2%.

J1_J0013 A Preliminary Study of Preparing Biodegradable Film from Starch
Pongchayont Sirikhajornnam and Panu Danwanichakul

Department of Chemical Engineering, Thammasat University, Pathumthani 12120
dpanu@engr.tu.ac.th

Abstract: In this research the optimum conditions to prepare films from corn and tapioca starch were determined. It was found that the suitable condition for obtaining gelatinized starch solutions was at temperature around 80-85°C and they were then dried at 100°C for 24 hours. Films from both corn and tapioca starch appeared homogeneous and suitable for utilization. To study the effect of glycerol used as a plasticizer on the properties of the film, starch was mixed with different amount of glycerol to obtain different mass ratio of starch to glycerol of 6:4, 7:3 and 8:2, respectively. As a result, for both types of starch, when increasing the amount of glycerol, both tensile strength and water absorbability of the film were decreased while film flexibility and water vapor permeability were increased. When comparing at the same glycerol content, it was found that the film allowing higher flux of water vapor and higher elongation percentage was from corn starch, whereas the film showing higher water absorption capacity and flexibility is from tapioca film showing higher water absorption capacity is from tapioca.

J1_J0014 ANALYSIS OF 2D FRACTURE MECHANICS PROBLEMS BY FINITE ELEMENT METHOD AND PHOTOELASTICITY TECHNIQUE

Anuwat Yodsangkham, Wiroj Limtrakarn*

* Department of Mechanical Engineering, Faculty of Engineering, Thammasat University, Rungsit Campus, 99 Mu 18, Klong Luang, Pathumthani 12121, Thailand.

E-mail: limwiroj@engr.tu.ac.th

Abstract: Finite element method and photoelasticity technique are presented to predict stress and stress intensity factor for fracture mechanics problems. This paper first describes 2D fracture mechanics theory, Finite element formulations and Q8 element. The computational procedure and its boundary conditions are then represented. Photoelasticity theory and its procedure are described. The validated examples of both techniques are single edge crack plate tension problem and double edge crack plate tension problem. The solutions show the efficiency of finite element method and have a good agreement with the photoelasticity results.

J1_J0019 TRANSMISSION EXPANSION PLANNING WITH ECONOMIC DISPATCH CONSTRAINT

Nattachote Rugthaicharoencheep, Somporn Sirisumrannukul and Nopporn Leeprechanon

Department of Electrical Engineering, Faculty of Engineering, King Mongkut's Institute of Technology North Bangkok, Bang Sue, Bangkok 10800, Thailand.

*Department of Electrical Engineering, Faculty of Engineering, Thammasat University (Rangsit Campus), Klong Luang, Pathumthani 12120, Thailand.

E-mail: mattachote@yahoo.com, spss@kmitnb.ac.th, nopporn@engr.tu.ac.th

Abstract: This paper presents a scenario analysis method for transmission expansion planning taking into account an economic dispatch constraint. The method involves postulating practical network topologies which are required in two optimization problems: economic dispatch and transmission investment. The methodology was tested with a 5-bus system. The study results show that a transmission connection scheme can be appropriately identified while satisfying the economic dispatch constraint.

J1_J0022 A STUDY OF COMPRESSIVE STRENGTH OF MORTAR MIXING FLYASH AND USING QUARRY DUST TO REPLACE SAND

Prachoom Khampou1

J1

¹ Department of Civil Engineering, Faculty of Engineering, Rajamangala University of Technology Thanyaburi, Pathumthani, Thailand 12110

E-mail: choomy_gtc@hotmail.com, Fax: (662)549-3412

Abstract: This research studies the compressive strength of mortar for the case of without fly ash and 50% of fly ash replacing in cement. The fixed ratios, binding agent to fine aggregate and water to binding agent, are 1: 2.75 and 0.52 by weight respectively. The ratios of quarry dust that uses instead of sand are 0%, 10%, 20% and 30% respectively. Mold of size 5x5x5 cm is used. Cure the mortars in the water. Test the samples when curing at age of 7, 14, 21 and 28 days under ASTM standard. From the results, it is found that the compressive strength increases as age of mortar increases. When using 50% of fly ash, the compressive strength is very low. However the adding of quarry dust results in increasing of compressive strength for the both cases. The best ratio of quarry dust to fine aggregate is 30: 70. This research shows that there is a possibility in well using of quarry dust in concrete work.

J1_J0023 ELECTRICAL PROPERTY CHARACTERIZATION OF ELECTROLYTE MATERIALS IN SOLID OXIDE FUEL CELLS BY AC - IMPEDANCE SPECTROSCOPY

AREERAK KHAMNOI¹, SUMITTRA CHAROJROCHKUL², SUPATRA JINAWATH³

¹ Office of Atoms for Peace, Chatuchak, Bangkok, Thailand

² National Metal and Materials Technology Center, Klong Luang, Pathumthani, Thailand

³ Department of Material Science, Chulalongkorn University, Bangkok, Thailand

Abstract: Yttria - Stabilized Zirconia (YSZ) is an important solid electrolyte used in Solid Oxide Fuel Cells (SOFC) due to its good electrical (0.1 siemens/cm at 1000°C) and mechanical properties. The electrical property of YSZ was measured using AC-Impedance Spectroscopy, in the temperature range of 275 – 600°C and over the frequency range of 0.05 – 10⁷

Hz. From the impedance spectra, the bulk and grain boundary resistances of YSZ pellets were significantly influenced by the containing impurities and the sintering conditions. The impurities in the starting powder were analyzed using X-Ray Fluorescence Technique (XRF), while the microstructure was investigated using Scanning Electrons Microscope (SEM). The correlation between the electrical conductivity and sintering temperature from various electrolyte materials was developed. As a result, the AC-Impedance Spectroscopy technique in combination with microstructural investigation can be used to study the electrical property of YSZ effectively.

J1_J0024 SEAL LEAKAGE TEST STATION FOR SEALING MATERIAL IN SOLID OXIDE FUEL CELL

APICHART JINNAPAT¹, SUMITTRA CHAROJROCHKUL², SIRITAN JIAMSIRILERT¹

¹ Department of Material Science, Chulalongkorn University, Bangkok, Thailand

² National Metal and Materials Technology Center, Klong Luang, Pathumthani, Thailand

บทต่อไป: ปัจจุบันประเทศไทยต่าง ๆ หัวใจประสมเป็นอย่างด้านราคาน้ำหนัก เชือกเหล็กที่เพิ่มสูงขึ้น ซึ่งราคาน้ำหนักดินเป็นสูงขึ้นอย่างนูน 70 ดอลลาร์ต่อ น้ำรั่วต่ำ และมีแนวโน้มเพิ่มสูงถึง 80 ดอลลาร์ต่อหน่วย (กรุงเทพธุรกิจ 2 ห.ค 49) ส่งผลกระทบต่อการเจริญเติบโตทางเศรษฐกิจของประเทศไทย โดยตรง เชื่อว่าจากปัจจัยทางการเมืองของประเทศไทยผู้ผลิตน้ำหนักนิยมในด้านเอกสารกลาง และน้ำหนักเชือกได้จากธรรมชาติที่ก้าวสูงจะมีผลดี จึงได้มีการคิดค้น ด้านเทคโนโลยีด้านพลังงานทดแทน ต่อ เชือกเหล็กเชือกเหล็กแบบของใช้ตัวของเชือก กำนันเดินรถและไฟฟ้าห้ามการเก็บภาระไว้ในฟ้าคราวของภัยสีดำจะ และออกเชือก เชือกเหล็กเชือกเหล็กแบบเป็น 2 แบบ ต่อ แนะนำอย่างดีและแบบแปรรูป โดยแบบแปรรูปมีประวัติที่หลากหลายกว่าแบบท่อ แต่เชือกปูนหินในการใช้งาน ต่อ เชือกเหล็กเชือกเหล็กแบบแปรรูปตัวอ่อนใช้รัศกีปูนกันแก้รัศกี เพื่อป้องกันการผลักดันของเกล้าโดยจะเจาะกันกับเชือกที่อุบัติภัยมีสูง ในภาคพื้นที่น้ำรั่วสูด ปูนกันแก้รัศกีซึ่งได้สร้างอุปกรณ์ทดสอบการรั่ว เพื่อใช้ทดสอบอัตราการรั่วของรัศกีปูนกันแก้รัศกี โดยถ้าตามมาตรฐาน ASTM F 37 - 89 ซึ่งบัง ไม่มีข้อจำกัดเรื่องรั่วในห้องทดสอบ อุปกรณ์ทดสอบการรั่วแบบเป็น 2 ส่วนต่อ หน้าเมล็ดน้ำดีและแบบทดสอบการรั่ว หน้าเมล็ดน้ำดีทดสอบการ รั่วใช้หัวเหล็กกล้าไว้รั่วในเกรด 316 เชื่อมติดกับหน้าเมล็ดเหล็กกล้าไว้รั่วผ่านเกรด ZMG ระบบทดสอบการรั่วในส่วนที่เป็นหัวน้ำภัยสีเขียวเหล็กกล้าไว้ สำหรับเกรด 316 และใช้สายยางภัยสีเขียวต่อเนื่องกับอุปกรณ์ทดสอบการรั่ว เชือกเหล็กกล้าไว้รั่วในเกรด 316 พบว่าอัตราการรั่วของระบบมีค่าน้อยประมาณ $3.76 \times 10^{-3} \text{ cm}^3 / \text{min cm}$

J1 J0025 NUCLEAR PULSE WAVE SHAPING WITH DSP DEVICE

Banpot Kakham¹, Suvit Punnachaiya¹ and Surapun Yimman²

1 Department of Nuclear Technology, Faculty of Engineering, Chulalongkorn University, Bangkok 10330, Thailand.

E-mail address: khannot@mtu.ac.th and fneson@eng.chula.ac.th

² Department of Industrial Physics & Medical Instrumentation, Faculty of Applied Science, King Mongkut's Institute of Technology North Bangkok, Bangkok 10520, Thailand.

Abstract: Nuclear pulse wave shaper using Digital Signal Processing (DSP) device was developed, in order to obtain a low noise nuclear pulse signal. Referring to the model 2011 Canberra spectroscopy amplifier, the transfer function of its analog filter was analysed. Two techniques of the digital signal processor were designed according to the analysed transfer functions. The first; TMS320C31 DSP starter kit was used; and the second; PCI-1712 data acquisition card with MATLAB programming were performed and combined with the developed program for displaying the signal waveform. The research results showed that the first technique with a DSP starter kit alone could not be correctly shaped pulse waveform due to the limitation of its performance. While the second technique could be shaped the pulse waveform in range of 1 μ s to 4 μ s continuously shaping time and the unipolar shaped pulse characteristics were similarly with the reference system. The count rate capability of over 10 kcps could be achieved.

J1_J0028 EXPERIMENTAL ON CONCRETE COLUMNS CONFINED WITH STEEL JACKETS SUBJECTED TO CONCENTRIC AXIAL COMPRESSION.

Jaksada Thumrongyut^a, Sittichai Seangsatith^b

¹⁴ School of Civil Engineering, Institute of Engineering, Suranaree University of Technology, 111 University Avenue, Muang District, Nakhon Ratchasima 30000, Thailand. Tel: (66)44-224420-1

E-mail: iaksada@yahoo.com

Abstract: This paper presents the experimental results on the concrete columns and the concrete columns confined with steel jackets under concentric axial compression in order to study the compressive behaviors, modes of failure, and effects of the confinement. Twenty seven specimens were tested in this study. The square columns have the cross section of 150 x 150 mm and the length of 750 mm. The steel jackets have the dimensions of 150 x 150 mm with 3.2 and 4.5 mm thickness. From the tests, it was found that the confined columns with both thicknesses of the steel jackets had similar behaviors. At the beginning, the columns had linear behavior up to 80-90 % of their ultimate strength. After that, the axial shortening and lateral expansion of the columns were increased rapidly. The confined jackets were inflated until the failure of the columns. At the ultimate strength, the confined columns with steel jackets had the loads higher than those of the concrete columns in the range of 42 to 218 %. In addition, it was found that the confinement increased the ductility of the columns.

J1 J0003 STRESS ANALYSIS OF CONTACT PROBLEMS BY USING ADAPTIVE MESHES.

Bunpong Dechapanichkul, Wirou Limtrakarn

¹ Department of Mechanical Engineering, Faculty of Engineering, Thammasat University, Rungsit Campus, 99 Mu 18, Klong Luang, Pathumthani 12120, Thailand.

E-mail: limwini@snar.tu.ac.th

Abstract: This paper presents stress analysis of contact problems by finite element method and adaptive meshes. Firstly, solid

mechanics theory and finite element formulations for contact problem are described. Then, adaptive remeshing technique is presented. The developed program is validated by two problems, contact between two cylinders problem and contact between rigid square and elastic foundation problem. The finite element solutions have a good agreement with the exact solution of both problems.

J1_J0034 Region of $\pm 0.5\%$ tolerance in Helmholtz coils for magnetic calibration

Sitthichai Pinkanjanarod, Witchukorn Phuthong, Nampueng Piemyoo, Nopparit Jinuntuya and Kanokpoj Areekul

Department of Physics, Faculty of Science, Kasetsart University, Bangkok

E-mail address: fscispr@ku.ac.th, fscinpr@ku.ac.th, and fscikaa@ku.ac.th

Abstract: Standard Magnetic Generator is the most necessary for magnetic calibration process. Many Instruments and sensors used in military, aviation, medication and various sorts of industry demand regular calibration however the number of metrology laboratories providing this service is still inadequate. Consequently, development of standard magnetic generators will affect many relevance organizations. In this research, Helmholtz coils, a selected type of magnetic standard source, is mathematically simulated to find a region of $\pm 0.5\%$ tolerance of average magnetic field at the centre of coils or the region of $\pm 0.5\%$ uncertainty of calibration. Information from this modeling will be the design parameters of real Helmholtz used as reference data for mathematical modeling for calibration and traceability.

J1_J0035 REMAVAL OF CARBOXYLIC GROUPS IN OIL PRODUCT FROM PYROLYSIS PROCESS OF JATROPHA CURCAS OIL

Amarnit Sitichinnawong, Samart Shianmon¹, Chinamas Jenkitjaroenchai¹, Pipop Arunjindawan², Supakij Suttipungwong¹,

Aran Wasantakorn¹

¹ Department of Materials Science and Engineering, Faculty of Engineering and Industrial Technology, Silpakorn University, THAILAND

² His majesty the King Phupan education and developing center, Sakon Nakhon Province, THAILAND

Abstract: *Jatropha curcas* oil comprises mainly fatty acid molecules. When these molecules are pyrolyzed at high temperature, they will break down into a large number of carboxylic groups resided in the pyrolyzed oil product. When applying the pyrolyzed oil to the engine, it may deteriorate the combustion process and causes the corrosion of the engine. The objective of this work was to study the possibility of removal the carboxylic contents during the pyrolysis process, hence removal of carboxylic acids of end oil product. The pyrolysis of *Jatropha* oil was carried out at high temperature under vacuum. The pyrolyzed oil products obtained from the pyrolysis with and without Calcium Oxide were analyzed using GC/MS. The results showed can be removal in the carboxylic contents of the pyrolyzed oil product with a catalyst when compared to the pyrolyzed oil product without a catalyst. The pH paper test was also conducted and in good agreement with the results obtained from GC/MS.

J1_J0037 NUMERICAL INVESTIGATION OF CONFINED IMPINGING JET FLOW WITH REYNOLDS STRESS MODEL

Smith Eiamsa-ard¹, Watcharin Noothong¹, and Pongjet Promvonge²

¹ Department of Mechanical Engineering, Faculty of Engineering, Mahanakorn University of Technology, Bangkok 10530, Thailand; e-mail address: smith@mut.ac.th

² Department of Mechanical Engineering, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

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Abstract: In this research, the applications of the k- ϵ turbulent model and Reynolds stress model (RSM) for prediction of impinging jet flow characteristic are described. The results of predicted axial and radial velocity profiles are compared with the experimental data. The computations indicated that the results predicted by both turbulence models are in good agreement with the experiments but the RSM performs better agreement in comparison with the experimental data. Moreover, effects of grid independent on prediction are also reported.

J2_J0001 EVALUATION OF CONVECTIVE HEAT TRANSFER COEFFICIENT OF GREEN PEPPER DRYING UNDER NATURAL CONVECTION

Marina Mani¹, Jomphob Waewsak², Suwit Phethuawiluk³, Pornpana Buaphet⁴, Piti Panichayunon⁵

^{1, 2, 3, 4, 5} Renewable Energy System Research and Demonstration Center, Physics Department Faculty of Science, Thaksin University, Songkhla, 90000, Thailand

E-mail address: marina@tsu.ac.th

Abstract: In this paper, an experiment has been made to evaluate the convective heat transfer coefficient obtained by green pepper open sun drying (natural convection). Values of the constants, C and n were obtained by a linear regression analysis from experimental data determined. Based on the values of C and n convective heat transfer coefficient of green pepper drying was $6.28 \text{ W/m}^2 \text{ }^\circ\text{C}$.

The experimental conditions are $Pr = 0.7$ and $1.3 \times 10^2 < Gr < 4.43 \times 10^2$

J2_J0007 SIMULATION OF HEAT TRANSFER OF LIQUID FOOD IN A BELL SHAPE CONTAINER.

Rachata Phokrachang¹ and Chairath Tangduangdee²

¹ Department of Food Engineering, King Mongkut's University of Technology Thonburi, 126 Pracha u-ttd Road, Bangkok 10140, Thailand, Tel: 02-4709244

Abstract: Transient temperature and velocity profiles of jelly liquid contained in a bell shape container were simulated during pasteurization process in order to study the movement of the slowest heating zone (SHZ). Navier-Stokes equations for a Newtonian fluid with varying density and viscosity as well as the energy equation were numerically solved using a commercial Computational Fluid Dynamics (CFD) package, FLUENT®. Natural convection showed a strong effect on the liquid flow patterns and the movement of the slowest heating zone. During heating for 1500 seconds the SHZ moved from the core of the container to the bottom and eventually stayed at a region, which is about 5-20 percent of the container height from the bottom and about 10-60 percent from the central line. The simulated temperatures at various locations were validated with the experimental data. The simulated results showed a good agreement with the observed data with an error of less than 1 percent.

J2_J0012 MATERIAL PROPERTIES IMPROVEMENT OF LANNA UMBRELLA PRODUCTS.

Pichai Liawruangrath and Isra Teerawatsakul

Department of Industrial Engineering, Faculty of Engineering, Chiang Mai University, Suthep Road, Chiang Mai, Thailand 50200.

E-mail: kaikookkookkai@yahoo.com

Abstract: Nowadays, Lanna umbrella is increasingly developed by Bor Sang Group to obtain several designs and to expand the manufacture to an industrial scale. Owing to the unique characteristics and the beauty of the lanna umbrellas, several countries imported them in a rather large scale. However, the life-time of the beautiful umbrellas are limited by quality of the materials. All materials can be destroyed by mold fungus but bamboo can also be destroyed by insects. The general properties of the materials (Sa paper, raw cloth and artificial silk) for covering the umbrella structure don't readily reach good standard qualities in cases of waterproof, heat retardation and UV protection. Improvements of the quality of all materials are investigated to obtain the long-life Lanna Umbrella for general purposes. Attempts at investigation to improve the general properties of bamboos, Sa paper, raw cloths and artificial silk in terms of anti mold fungus, insect protection, waterproof, heat retardation and UV protection were made by treatment with chemical solutions and surface coating materials to achieve the more efficient Lanna Umbrella for general purposes. With respect to bamboo bars and pieces, it was found that the most suitable sample treatment conditions that provide the best anti mold fungal activity were soaking the bamboo bars in 1% vinegar or 1% detergent solution for 6 hours and soaking the bamboo pieces in 2% copper sulphate solution for 6 hours. When bamboo bars and pieces were soaked in a mixture consisting of sheldrite (1:60) and ROCIMA243 (1:120) the best anti insect activity of the treated bamboos was obtained. It was found that the raw cloths treated with 3% solution of wood charcoal ash extract for 6 hours provided the best anti mold fungal activity. With respect to the preservation of artificial silks by treating with the chemical solutions in the same manner as with raw cloths, it was found that they exhibited the very strong anti mold and fungal activity probably owing to the artificial silks provide insufficient nutrients for mold and fungi to grow. The materials for covering umbrellas were treated with various chemicals and surface coating materials to find out the most suitable substances to improve the properties of the materials in terms of waterproof, heat retardation and UV protection. Evaluation by Multiple Attribute Decision Making, the most suitable coating material for Sa papers and raw cloths was tin oxide gel followed by urethane (3:1) whereas that for artificial silk was 1% PMMA.

J2_J0015 A FABRICATED PZT ACOUSTIC EMISSION SENSOR FOR PIPELINE LEAKAGE MONITORING.

Sitthichai Anuphap-udom¹, Kiranart Ratanathammapan¹, Nisanart Traiphol², Pitak Laoratanakul³

and Tonphong Kaewkongka¹

¹ Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok, 10330, Thailand.

² Department of Materials Science, Faculty of Science, Chulalongkorn University, Bangkok, 10330, Thailand.

³ National Metal and Materials Technology Center, National Science and Technology Development Agency, 114 Thailand Science Park, Pathumthani, 12120, Thailand.

E-mail address: sitthichai_tu@yahoo.com

Abstract: A fabricated acoustic emission (AE) sensor using lead zirconate titanate (PZT) and its application for pipeline leakage monitoring are presented. The experiment on pipeline test leak between the different pressure conditions and the sizes of cavity show that the fabricated PZT-AE sensor has a potential and can be detected the leakages in pipeline. Therefore, the proposed PZT-AE sensor offers an alternative for Non-destructive testing (NDT) particularly pipeline leakage monitoring applications.

J2_J0020 Modification of Pore Size of SBA-15 Mesoporous Silica Produced from Rice Husk Ash

Suchada Issaraporn¹, Metta Charoenpanich²

¹ Department of Chemistry, Faculty of Science and Technology, Pibulsongkram Rajabhat University, Phitsanulok 65000, Thailand

² Department of Chemical Engineering, Faculty of Engineering, Kasetsart University, Bangkok 10900, Thailand

Abstract: The pore diameter of SBA-15 mesoporous silica synthesized from rice husk ash has been modified by using swelling

agents such as 1,3,5-trimethylbenzene (TMB), 2,3,4-trimethylpentane (TMP), tetrahexylammonium bromide (THB) and N,N-dimethyldecylamine (DMD). The hydrolysis-condensation temperature of 35°C and hydrothermal treatment temperature of 110°C are the optimum synthesis temperatures. The effects of swelling agents were investigated for expanding the SBA-15 pore diameter. The swelling effect can be arranged in order as follows: TMB > TMP > THB ≈ DMD. Maximum pore diameter of SBA-15 is approximately 31 nm when TMB was used as the swelling agent.

J2_J0021 THE POWER GENERATION BY BIOMASS GAS ENGINE FOR APPLICATION IN PRODUCTION PROCESS OF SMALL-SCALE COMMUNITY INDUSTRY

J. Kaew-On¹, J. Waewsak¹, M. Mani¹, P. Buaphet¹ and P. Panichayunon¹

¹ Renewable Energy System Research and Demonstration Center (RERD) Physics Department, Faculty of Science, Thaksin University, Phatthalung, 93110, Thailand

E-mail address: jatuporn@tsu.ac.th

Abstract: The aim of this research is to study the biomass gas engine system for power generation which is applied in the production process of small-scale community industry. Results showed that the system should be composed of Imbert-type gasifier of 1 m³ with screw pressed for fuel feeding, cyclone, ash hopper, wet scrubber, volatile matter bank, gas cooling system, gas filter, gas engine of 1,425 cc and generator of 10 KWe. The used gasifier in this research is fixed bed downdraft and steam is used as an agent for gasification process of sawdust of rubber wood from wood processing industry in Phatthalung province.

J2_J0026 Development of physics experiment set controlled by microcontroller for data detection and calculation

Prarnot Satasuvon, Piyarat Bharmanee

Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand

Abstract: Measurement in many of physics laboratory sets can not be done accuracy due to human being's error and his or her physical constraint. Time or period measurement is one of those problems. Detecting data by experimenter's eye and his finger to start and stop timer watch is not good practical approach especially for case that the time value is small. Microcontroller based circuit with appropriate sensors module matched with that experimental set have been developed for measuring time period automatically. This automation system has not been only designed for this purpose but also for other mean of measurements. By changing the proper sensors and software written for specified requirement will make this system be a general purpose data collecting system. Pendulum motion experiment was selected for testing its workability. To enhance this system's functions, data can be transferred to database in microcomputer for later calculation. Graphical report can be shown on monitor or printed on paper too.

J2_J0027 Electroforming Technique

ประพันธ์ เจริญไชย¹, เกียงไกร ใจน้อย², ดันดิกร ชัยนันท์², ภาณุช มั่นคงพงศ์²

¹ Division of Research and Development Rajamangala University of Technology Lanna Northern Campus Chiang Mai Thailand 128 Huay Kaew Road, Muang District Chiang Mai, Thailand 50300 Phone : +66-0- 5322-1576, +66-0-5389-2780 Fax : +66-0-5321-3183

² Department of Engineering Rajamangala University of Technology Lanna Northern Campus Chiang Mai Thailand 128 Huay Kaew Road, Muang District Chiang Mai, Thailand 50300 Phone : +66-0-5322-1576, +66-0-5389-2780 Fax : +66-0-5321-3183

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Abstract: Electroforming Technique is the forming of objects in 3 dimensions by using metal coating or plating technique on non-conductive materials such as wax work-piece. The work-piece is then heated to melt the wax from the original 3 dimensional metal-plated workpiece. The advantage of this technique is that the work obtained is more finely-detailed than that of the casting or molding, securing all the details of the original work. In addition, the work will be lighter in weight, saving many times the metal content required in the molding technique. With the principle required, the researching team has therefore conducted the study on the impact of electric current, plating time, the size of the work-piece, and the proper condition of electroforming technique, by using electric current in the range of 0.1-0.4A with the plating duration of 60-180 minutes and the sizes of the workpieces of 1.72 cm, 6.99 cm and 15.48 cm respectively. According to the study, it is found that the proper condition of electric current is 0.2A providing shiny and smooth surface with good cohesion in the workpiece. The longer the workpiece is subject to the plating; the higher the degrees of thickness, shininess, and smoothness are. When the electric current is increased, the thickness is increased along the edge than in the inner area of the workpiece; however, electric current exceeding 0.4A, contrary to the earlier outcome, results in matt, irregular and even burnt surface. The purpose of the study of this technology is to apply the knowledge gained to handicrafts and jewelry products in Thailand.

J2_J0029 THERMAL PERFORMANCE OF A SMALL SCALE SOLAR PHYSIC NUT DRYER

S. Ravangvong¹, J. Waewsak², M. Mani², S. Phethuayluk² and P. Buaphet²

¹ Graduate Student, Physics Department, Faculty of Science, Thaksin University, Songkhla, 90000, Thailand

² Renewable Energy System Research and Demonstration Center (RERD) Physics Department, Faculty of Science, Thaksin University, Phatthalung, 93110, Thailand

E-mail address: sunantasak@hotmail.com

Abstract: The purpose of this research is to investigate the thermal performance of a small scale solar physics nut dryer which is described in terms of drying air temperature, drying rate and drying time. Initial and final moisture contents were also investigated based upon the AOAC standard. It was found that the initial and moisture contents of the physic nut were about 32.06%db. and 5%db. respectively. Under typical ambient condition of Phattalung province, the drying air temperature was about 55 °C when the solar radiation intensity was about 700 W/m². Furthermore, the drying time was about 9 hr.

J2_J0031 Effect of Glossy and Matte Coating for Plain Paper on Inkjet Print Quality

Suchapa Natpradit and Nitus Tipsotnaiyana

Department of Printing and Packaging Technology, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, 126 Pracha-Utis Rd., Bangmod, Thungkru, Bangkok 10140, Thailand.

Abstract: The objectives of this study are 1) to produce glossy and matte coating materials for inkjet paper, 2) to study paper surface properties after coating, and 3) to compare the inkjet print qualities among plain paper, coated paper and commercial ink jet paper. Acrylic resin as a binder was mixed with polyvinyl alcohol for glossy coating, and mixed with fume silica for matte coating. Each 100-gram plain paper was coated using a bar coater with a film thickness of 4 μ m and printed with an ink jet printer. The results showed that print qualities of coated paper were significantly better than that of plain paper. The glossy coated paper showed better coating adhesion, more sharpness, less color shift, and better ink rub resistance than did the matte coated paper. However, the matte coated paper indicated faster ink drying, more color saturation, more light fastness and higher print contrast. Compared with commercial inkjet paper, the matte coated paper had higher color saturation and less color shift, but longer ink drying time.

J2_J0032 PERFORMANCE STUDY OF SOLAR FORCED CONVECTION PADDY- DRYER

N. Nankongnab¹, P. Buaphet¹, C. Chancham², M. Mani¹, S. Phetuayluk¹ and J. Waewsak¹

¹ Renewable Energy System Research and Demonstration Center (RERD) Physics Department, Faculty of Science, Thaksin University, Phatthalung, 93110, Thailand

E-mail address: nnoppanu@tsu.ac.th, Tel&Fax: (66-74)693975

² B.Sc.(Physics), Physics Department, Faculty of Science, Thaksin University, Songkhla, 90000, Thailand

Abstract: The research is aimed to study the performance of forced convection solar dryer for paddy drying in Phatthalung province. The results indicated that the system is continuous hot air flow rate. Paddy, Chai-nat 1, was successfully dried in developed system. The average hot air temperatures were 35 °C. Drying time was 8 hour for paddy drying from moisture content of 25 % d.b. to 5 % d.b. The efficiency of the whole unit obtained was 49 %. This drying technology is suitable for small-scale process of dried paddy in the southern area of Thailand.

J2_J0036 THERMAL PERFORMANCE A SOLAR ASSISTED ELECTRICAL CHILLI DRYER.

P. Buaphet¹, N. Nankongnab¹, T. Yaibok², M. Mani¹, S. Phetuayluk¹ and J. Waewsak¹

¹ Renewable Energy System Research and Demonstration Center (RERD) Physics Department, Faculty of Science, Thaksin University, Phatthalung, 93110, Thailand

² B.Sc. (Physics), Physics Department, Faculty of Science, Thaksin University, Songkhla, 90000, Thailand
E-mail address: pompana@tsu.ac.th.

Abstract: This research studies on thermal performance of hybrid dryer for chilli dryer. By a usage for a force-convection solar and an electrical dryer. It demonstrates that it is one of drying technologies suitable for drying chilli of small-scale process in southern areas. Four cases were investigated, namely, hybrid dryer as air recycling and no air recycling, solar dryer as air recycling and no air recycling, respectively. Experiments were set up in order to study of temperature, initial and final moisture contents, drying rate, and specific energy for chilli drying, at a fixed drying air temperature of 50°C. The results also revealed that the optimized drying rate in the first case. Drying time was 9 hours for reducing the moisture content from 109.42 %db. to 31.98 %db. The solar radiation intensity was found to be 500 W/m². Finally, the specific energy was 679 MJ/kgH₂O_{exp}.

K1_K0023 POPULARIZATION OF SCIENTIFIC DISCOURSE: COMMUNICATING HEALTH SCIENCE IN THAILAND

Savitri Gadavajj

School of Language and Communication, The National Institute of Development and Administration (NIDA), 118 Serithai Road, Klongchan, Bangkapi, Bangkok 10240, Thailand.

E-mail: savitri@nida.ac.th, Fax: (662) 377-7892

Abstract: This paper explores an issue of science popularization in Thailand, gauging the effectiveness of texts and to find the guidelines that would enhance it. Sixty five articles on health science have been collected for analysis. Four major problematic textual features have been revealed: reiteration of known facts, oversimplification, excessive details with high degree of complexity and excessive usage of technical terminologies.

K2_K0001 Development of an Instructional Set for a Laboratory in Biology Course for First-Year Thai Science Student Teachers

Nantarat Puengpang

Ph.D. Candidate, The Program to Prepare Research and Development Personnel for Science Education, Faculty of Education, Kasetsart University, Bangkok, Thailand

Vantipa Roadrangka

Lecturer, Department of Education, Faculty of Education, Kasetsart University, Bangkok, Thailand

Bronwen Cowie

Researcher, The Center for Science and Technology Education Research, University of Waikato, Hamilton, New Zealand

Correspondent author: Nantarat Puengpang

Email address: g4586021@ku.ac.th

Abstract: The objectives of this case study research are (1) to study the instructor's regular practice and beliefs in teaching and learning in a Laboratory in Biology Course and investigate first year Thai science student teachers' biological concepts, the nature of science concepts, science process skills and attitudes towards biology after they have participated in the course, (2) to create the guiding principles to develop an instructional set based on a learner-centered approach for the Laboratory in Biology Course from the findings of the first objective of the study, the National Education Act, 1999, and a review of documents and related research reports, and (3) to develop an instructional set for the Laboratory in Biology Course for Thai science student teachers based on the guiding principles generated from the second objective. The research study was conducted from June 2003 to October 2005.

The findings revealed that the regular practice in the Laboratory in Biology Course was teacher-centered and emphasized the promotion of biological concepts. The participant instructor believed that science student teachers must have correct concepts before doing laboratory activities. After the science student teachers participated in the course, their biology concepts were mostly in form of partial understanding and alternative conceptions were found in every topic. The science student teachers' nature of science concepts were mostly appropriate. Most science student teachers had better skills in interpreting data and drawing a conclusion than identifying problems, formulating hypotheses, identifying variables and designing an experiment. Their attitudes towards biology were mainly found to be positive. From these findings, a consideration of the National Education Act, 1999 and a review of documents and related research reports, ten guiding principles for the development of an instructional set for the Laboratory in Biology Course based on a learner-centered approach were generated. The instructional set was comprised of an instructor manual, a student activity book and a student thinking book.

K2_K0002 TECHNICAL TEACHER SKILLS AND KNOWLEDGE DEVELOPMENT MODEL.

Sittischok Soontongpas¹

¹ Department of Civil and Environmental Engineering Technology, College of Industrial Technology, King Mongkut's Institute of Technology North Bangkok, Pibulsongkram Road, Bangsue, Bangkok, Thailand.

E-mail: scp@kmitnb.ac.th, Fax: (662)587-4356

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Abstract: The objective of this research is developing the technical teacher skills and knowledge model. The research procedure is divided into 2 stages : The fist stage is to studying the technical teacher skills and knowledge model through 114 population who are executives and instructors of Industrial Education Faculty from 4 institutes includes King Mongkut's University of Technology Thonburi, King Mongkut's Institute of Technology Ladkrabang, King Mongkut's Institute of Technology North Bangkok, and Rajamangala University of Technology. The subject is purposively from executives and instructors who have over 5 years experience in this field. Research instrument is a questionnaire concerning opinions toward the model. The research result is the new model. The second stage is prepared for model development and evaluation by developing model based upon the research result from the first stage. The model is afterward evaluated by 13 experts. Evaluation instrument is questions concerning the model. The research finding points out that the experts are consensus with the model in the first stage. The research result reveals the technical teacher skills and knowledge model consisting of self-management skills and knowledge, cooperative skills and knowledge, and technical skills and knowledge.

K2_K0004 AN APPLICATION OF THE LOCAL SCIENTIFIC WISDOM TO DEVELOP THE LEARNING RESOURCE ABOUT ELEPHANTS AT SURIN ELEPHANTS VILLAGE

Assistant Prof. Sopa Simarugumpai¹, Mr. Saravut Tantivat², Ms. Sukchai Sompongpan¹, Ms. Kannika Meemark¹, Mr. Prasong Tungprasit¹, Mr. Krit Pinthong³, Associate Prof. Surawit Simarugumpai³

Department of Chemistry¹, Department of Physic² Department of Biology³, Faculty of Science and Technology, Surinra Rajabhat University, Surin-Prasart Road, Muang, Surin 32000, Thailand.
e-mail address: surinpim@yahoo.com, Tel/Fax 044-521393

Abstract: The objectives of this research were:

1. to choose the knowledge resource by brainstorming and extract the knowledge, the local wisdom, and the local scientific lesson on Surin elephants from the findings of the 2004 research,
2. to apply them to the learning sets of Surin elephants, and
3. to experiment by using the learning sets in the knowledge resource, and to develop the sustainable knowledge resource in Surin elephants village continuously.

The participants were a researcher team and students from Surinra Rajabhat University, teachers and students from three secondary schools and seven primary schools near by, and the inhabitants of Surin Elephants Village. The methods employed were brainstorming, in-depth interview, focus group discussion, workshops, experiment and research with the aim to try out the learning sets on the knowledge resource. It was found that:

1. Ajeing Buddhist temple was the suitable place for the knowledge resource and the laboratory for natural science.
2. The results of the knowledge extracts conformed with the local scientific lessons on Surin elephants from the findings of the 2004 research, in four units.
3. The application of this knowledge from the findings of the 2004 research, was varied in accordance with the form of learning process in each unit was the suitable for place in Ajeing Buddhist temple etc., tale, game and sheet of knowledge.
4. The learning sets were divided into twelve topics in the primary schools, and ten in the secondary schools.
5. In the higher education level, two research papers and two experiments were completed.
6. The results from using the learning sets showed that both teachers and students had better knowledge about Surin elephants. They achieved scientific skills. They realized the important of the knowledge resource in the temple. They were well aware of Surin elephants conservation. The teachers and the students were satisfied with these learning sets most.

K2_K0005 IMPROVING THE STUDENTS' SKILLS IN DRAWING THE FISCHER PROJECTION FORMULAS OF TWO-CHIRAL MOLECULES BY ILLUSTRATING THE 3D ANIMATION MOVIE OF THE FORMULA CONVERSION.

Itsara Khantikaew¹, Porntip Tantivong², and Netrapit Kaewchoay²

¹ Chemical Research Institute, Rajamangala University of Technology Thanyaburi, Pathumthani, Thailand.

² Rajamangala University of Technology Thanyaburi, Pathumthani Campus, Pathumthani, Thailand.

* Email-address: itsara@rmut.ac.th

Abstract: In the Stereochemistry experiment in Organic chemistry laboratory 2, the 3D animation movie was used to assist the illustration of the conversion of the wedge formula of two-chiral molecule into the Fischer projection formula. The students' learning skills in drawing the Fischer projection formulas from the corresponding wedged formulas were comparatively measured. The results of the measurements showed that the 3D animation movie helped 71.43 percent of the students to draw the Fischer projection rightly.

K2_K0006 Computer tools for science communication and education

R. Koul¹, Nantaporn Chookaew², Pornthip Liewtrakul³

1. Associate Professor of Science Education, Pennsylvania State University, USA

2. Doctoral student, Faculty of Industrial Education and Technology, King Mongkut's University of Technology, Thailand

3. Doctoral student, Faculty of Industrial Education and Technology, King Mongkut's University of Technology, Thailand

Abstract: This poster presentation is intended to help science educators learn about the instructional use of computer tools to promote problem-based science teaching and learning. The presentation will focus on the utilization of following computer tools in science and technical education and research: "semantic tools" to represent knowledge, "modeling tools" to find and test relationship in complex system and to make predictions about mathematical, physical, biological, and environmental system, and "argumentation tools" to observe, model, and promote explanatory coherence of reasoning.

K2_K0009 Development of Molecular Models from Atoms in Molecules Theory

ไกวิทย์ กิจวิทย์พิทักษ์ พรรถพันธ์ คำโยว เนสุกร ลุวรรณพัชร์ และ วิชณุ ธรรมเดโช

สำนักวิชาวิทยาศาสตร์ มหาวิทยาลัยลักษณ์ 222 ตำบลไทรบุรี อำเภอคลองหลวง จังหวัดปทุมธานี 80160

E-mail: kkowit@wu.ac.th

Abstract: Molecular models based on Atoms in Molecules Theory were constructed in both X3D and real models for functional group demonstration. The molecular surface was iso-electron density at 0.01 au, and the surfaces that divided the molecule into functional groups were inter-atomic surfaces calculated by MORPHY. The real models were created from computer models by a rapid prototyping machine. These models will be employed as teaching and learning media about molecules in fundamental science curriculum by Institute for the Promotion of Teaching Science and Technology (IPST).

K2_K0010 Research and Development of Science Learning Unit on Biodiversity in Nong Han, Kumpawapi, Udon Thani for secondary and university levels

Chuaychusri Sripuman¹, Varunya Jeerawipoonwun¹, Chaweeuwun Tawara¹, Suntiparp Siriwattanaphaiboon², Chomyong Chaibubon, Aroonsuk Chaibubon, Hirun Sawangkaew

¹ Udon Thani Rajabhat University, 64 Thahan Road, Makkhang, Muang, Udon Thani 41000, Thailand.

E-mail: parsuk@yahoo.com

² Khon Kaen University, Muang, Khon Kaen 40002, Thailand.

Abstract: The objectives of this participatory action research were: to study community context, life styles and local wisdom concerning biodiversity in the Nong Han wetland, to construct new knowledge of local science on diversity and to develop the learning unit on diversity for secondary and university levels, and to extend this results of the study to other educational institutes. The duration of time was during November 2003-September 2004. Results of the study are as follow: community context, life styles and local wisdom showed that most local people were rice farmers, fishermen and agriculturists. Most of them conserved local arts and culture as Candle Festival etc. Local science on biodiversity in this area was: biodiversity of birds were 107 species within 55 species of local birds, 52 species of migratory birds, water plants were 50 species, Fish were 44 species, phytoplankton were 90 species, zooplanktons were 37 species, and benthose and periphyton were 39 species. From this study, Learning units on biodiversity for secondary and university levels were constructed and they comprise: (1) Learning kits on biodiversity in the Nong Han wetland: water plants, fish and birds, (2) Instruction Manual on surveying natural habitats for secondary students on biodiversity of birds in the Nong Han wetland, Kumpawapi, (3) Instructional Material of birds, (4) Laboratory Directions for students on biodiversity of phytoplankton, zooplankton, water plants, fish, benthos and periphyton. The results of this study can be distributed to other 10 educational institutes in the Northeast of Thailand in terms of expanding the idea of studying local wisdom which brings about the fruitfulness of local community.

K2_K0011 ILLUSTRATING THE DIMENSIONS OF THE BONDING MOLECULAR ORBITALS OF ETHANE, ETHENE, AND ETHYNE BY USING THE 3D ANIMATION MOVIES.

Itsara Khantikae

Chemical Research Institute, Rajamangala University of Technology Thanyaburi, Pathumthani, Thailand.

Email-address: itsara@rmut.ac.th

Abstract: In teaching Organic chemistry 1, the instructor developed the three 3D animation movies to illustrate the virtual models of the bonding molecular orbitals of the carbon-carbon bonds in the molecules of ethane, ethene, and ethyne. The created movies illustrated the dimensions around the bonding molecular orbitals. These computer assisted instruction (CAI) media could excite the students in class well.

K2_K0012 Development of Web-Based Instruction for a Hardware Computer course

Narongsak Srism¹, Tanawut Chailungkarn¹

Department of Computer and Information Technology, Faculty of Science and Technology, Chiangrai Rajabhat University, Muang, Chiangrai 57100, Thailand.

E-mail: Narongsak@cru.in.th. Fax: (665)370-2758

Abstract: The research aimed to develop a Web - Based Instruction (WBI) for the computer hardware lesson, which was a part of the subject *Information Technology* at Chiangrai Rajabhat University. Tools used for developing the system were Macromedia Dream Weaver MX as web editor for both HTML and PHP tags and commands and MySQL for data based management and PHP language. This program was divided into two sections: learner control and instructor control. In the first section, registered students were able to study the course content and play the millionaire game for earning the test scores. Lecturer could create his online subject material directly to the system and was able to check the test scores of individual student in the latter section. There were 200 undergraduate students participated in this system. The evaluation result revealed that the system has worked properly and met all the required functions.

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K2_K0013 DEVELOPMENT OF ENVIRONMENTAL EDUCATION LEARNING MODEL TO ENHANCE KNOWLEDGE ATTITUDE AND BEHAVIOR ON WATER RESOURCES OF LOWER SECONDARY SCHOOL STUDENTS IN SAMUTSONGKRAM PROVINCE

Jongdee To-im¹, Pintip Ruenwongs^{1,2}, Kampanad Bhaktkul³, and Sorrayut Ratanapojnard⁴

¹Institute for Innovation and Development of Learning Process, Mahidol University, Rama 6 Road, Bangkok, Thailand. E-mail: jongdeetoim@gmail.com Tel: 0-9131-3046

² Department of Biochemistry, Faculty of Science, Mahidol University

³ Faculty of Environment and Resource Studies, Mahidol University

⁴ Department of Biology, Faculty of Science, Mahidol University

Abstract: This study is a research and development which aims to develop environmental education learning model to enhance students' knowledge, attitude and behavior on water resources. In this learning model, the content is integrated to environmental problems in the community, student - centered, and using inquiry based approach. The study's goals are to study and develop learning model to provide capacity building in environmental science for students, educators and communities, as well as to construct and strengthen educators' network in science and environmental education for life long learning. In addition this model will enhance knowledge, attitudes and behaviors about water resources of middle school

students who will be the key person for sustainable development in environmental education.

Five schools are involved in this study. Teachers in each school developed their own curricula for teaching their students with supports from the researcher team who acted as facilitators. Researchers act like mentors for supporting before, during and after learning model development. Small group discussions, school visits, trainings, seminars, workshops, demonstrations, and instructional materials supports were activities that provided for teachers who involved in this study. Five different learning models were developed according to teachers' plan. After implementation of their learning model on environmental education, t-test analysis was performed. Independent t - test was used for evaluate students' knowledge, attitude and behavior on water resources between students who participated and did not participate. The results show statistical significant difference on knowledge, attitude and behavior between students who participated in this study and control students ($P=0.001$). Students who participated had higher performance than students who did not participate. Thus, paired t - test was used for testing students' knowledge, attitude and behavior on water resources before and after attending teaching and learning by using developed learning models. The results show that after learning models implementations students had statistical significant higher overall knowledge, attitude and behavior than before ($P=0.001$).

K2_K0014 DEMONSTRATION APPARATUS OF ATOMIC FORCE MICROSCOPE FOR NANOSCIENCE STUDY

Chatchalal Wongchoosuk¹, Somrit Una², Kanitha Katanyukunanon³, Teerakiat Kercharoen¹

^{1, 2, 3, *} Department of Physics and Center of Nanoscience and Nanotechnology, Faculty of Science, Mahidol University, Bangkok 10400, Thailand

Abstract: We have designed and invented the demonstration apparatus of Atomic Force Microscope (AFM), aiming to introduce high-school students into the nanoscopic-level forces. Our objective is to create something which can persuade them to have interest in the field of nanotechnology. This AFM demo kit is constructed from simple materials, available at street shops. The principle of the demonstration apparatus is not complicated and it is quite easy for K12 students to understand. However, the main basic principle of the real AFM is still preserved in this AFM instruction kit. From the experiment, the image of surface is rather different from real substance. The height of substance will appear sharply. Image filter as a tool in MATLAB is employed to modify the image of the surface. So, the image of surface after using the filter is in agreement with real substance within 1 cm resolution.

K2_K0015 Development and Implementation of A Program for Primary Teacher Professional Development on Instruction of Nature of Science

Tepkanya Promkatkeaw¹, Sunan Sungong², Pawinee Srisukvatananan³ and Samarn Kaewviyudh⁴

¹ Ph.D. Candidate (Science Education), Department of Education, Faculty of Education, Kasetsart University, Bangkok, 10900

² Ph.D. (Curriculum and Instruction), Department of Education, Faculty of Education, Kasetsart University, Bangkok, 10900

³ Ph.D. (Educational Measurement and Evaluation), Department of Education, Faculty of Education, Kasetsart University, Bangkok, 10900

⁴ Ph.D. (Bioscience), Department of Zoology, Faculty of Science, Kasetsart University, Bangkok, 10900

Abstract: This research is a study of development and implementation of a professional development program on lower primary school teachers' understanding and instructing of the Nature of Science (NOS). Case study and action research were employed as research method in the development and implementation of the program. This program was constructed based on prior understanding and instructing of NOS of four participant teachers found from case studies. It was found that before participants attended the program, they had mixed traditional and contemporary views of science, held partial understanding of science processes and process skills, and struggled in integrating and teaching conceptions of NOS explicitly in science classes. These primary data guided the program designing and development cooperating with consideration of Thai science standards documents, the effective teacher development model and approaches based on the social constructivist perspective, the explicit instructional approach for NOS, and content framework derived from NOS conceptual scheme and general agreed characteristics for NOS instruction. After the program has been audited and improved based on suggestions of experts in science education, it was implemented by researcher with the same participants who participated in the case studies. Action research method was used to find out program's effectiveness. From the implementation of the program, it was found both advantages and disadvantages which provided insight for the improvement of the program.

K2_K0016 COMPUTER ASSISTED INSTRUCTION (CAI) FOR MASS SPECTROMETRY

Wasna Jaturonrusmee^{*}, Kanitha pattharakitti and Rattanaporn Pichedrujirot

* Department of Chemistry, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand, E-mail address: wasna.jat@kmutt.ac.th

Abstract: A computer assisted instruction program for mass spectrometry was developed by using Authorware 5.0, Adobe ImageStyler 1.0 and Adobe Photoshop 7.0. The contents included the basic theory, the instrumentation and the interpretation of mass spectra. The program was also provided examples, and exercises, with emphasis on mass spectra interpretation to determine the structure of unknown compounds and solutions for self study. The software improved the efficiency in learning and teaching this aspect of chemistry.

K2_K0017 REINFORCEMENT FOR THAI STUDENTS TO UNDERSTAND CONCEPTS IN PROTEIN PURIFICATION BY A VIRTUAL CLASS PROGRAMME TRANSLATED INTO THAI

Somkiat Phomphisuthimas¹, Bhinyo Panijpan¹, Edward J. Wood² and Andrew G. Booth²

¹ Institute for Innovation and Development of Learning Process, Mahidol University, Rama VI, Bangkok 10400, Thailand.
E-mail: phsomkiat@hotmail.com

² School of Biochemistry and Molecular Biology, University of Leeds, Leeds LS2 9JT, UK.

Abstract: Purification of protein from a complex mixture is an important step in biochemistry. A JavaScript simulation programme has been written by Andrew G. Booth in English to reinforce the concepts involved in protein purification for the second-year students in the University of Leeds, UK. This programme was not developed for self-learning; therefore, students need to have at least the concepts of protein purification before hand. In 2005, the newly written programme using Python was translated into various languages including the Thai one. The translation from the original into Thai, however, is constrained by differences between the characteristics of two languages such as structure and semantics. The first generation of Thai version was aimed to teach undergraduates, the same as that in the UK. However, most undergraduate students in Thailand learn only a few theories and carry out no experiment on protein purification. Therefore, a mixed population of postgraduates and undergraduates was taught with English-Thai programme. This bilingual programme could help Thai students to better learn the concepts of protein purification as determined by an overall favourable feedback towards this programme with a mean of 3.94. In the students' opinions, this programme can also help them to plan the protein purification experiments and future research. The Thai version has thus been used to be a concept guide in protein purification and has been taught at both undergraduate and postgraduate levels.

K2_K0018 The Conceptual Understanding of Light Refraction of Thai High School Students

Kreetha Keawkhong¹, Narumon Emarat², Kwan Arayathanitkul², Chernchok Soankwan² and Ratchapak Chitaree²

¹ Institute for innovation and development of learning process, Mahidol University, Thailand

² Department of physics, faculty of science, Mahidol University, Thailand

Abstract: This research shows the results of an investigation in conceptual understanding of light refraction of high school students in Bangkok. This is done by using the conceptual test which comprises of a series of open-ended questions. The results from the investigation show that the tendency of students misunderstandings in light reflection are the same for each high schools. Moreover, some of them can not apply the refraction principle for light phenomena. The results of this research are useful for the improvement of an appropriate teaching method. They can be used as a guide to design the apparatus and the learning process of refraction of light.

K2_K0019 The Use of Interactive Lecture Demonstrations in Force and Motion to Teach High School-level Physics in Thailand

Umpol Jairuk¹, Kwan Arayathanitkul²

¹ Institute for Innovation and Development of Learning Process, Mahidol University, Bangkok, Thailand

² Department of Physics, Faculty of Science, Mahidol University, Bangkok, Thailand

Abstract: This paper presents the results of an experiment using the microcomputer-based interactive lecture demonstrations (ILDs) to teach force and motion for 133 high-school students in Bangkok in the second semester of academic year 2004. To evaluate the effectiveness of the ILDs, the Force and Motion Conceptual Evaluation (FMCE), which was translated into Thai language, was administered to the students at the beginning and the end of the ILDs. The results indicated that, after using the ILDs, there was a 0.26 normalized gain in student's performance, while, by using lecture, there was 0.12 normalized gain in student's performance. In particular, there were very high gains in the topic of acceleration and Newton's third law. The study suggests that the ILDs can help high-school students develop conceptual understanding of force and motion.

K2_K0020 Investigation of students' Misconception in Direct Current

Supasip Fuengfung¹, Kwan Arayathanitkul², Chernchok soankwan²

K2

¹ Institute for Innovation and Development of Learning Process, Mahidol University, Bangkok 10400, Thailand

² Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand

Abstract: In this research, we will present the results of the study of misconception of direct current by using the Electric Circuits Concept Evaluation (ECCE) with the first year student of Rajamangala University of Technology Bangkok. The ECCE standardized test, developed by Ron Thornton and David Sokoloff at Oregon University was used to test students' understanding in the concept of direct current. The translated version of the ECCE was used with Thai first year civil engineering students at Rajamangala University of Technology Bangkok.

The standardized test was used before and after the traditional teaching on the topic of direct current. The results show that many students have misconception in fundamental topics such as brightness of bulbs in parallel circuit, potential difference across the bulb in series circuit, and current through bulbs in complex circuit.

The analyzed results from the test show poor student performance. This indicates the need for new teaching method in the topic of currents to make student gain better understanding in the topics of the direct current.

K2_K0021 INTEGRATING HANDS-ON YEAST BIOCONTROL OF PLANT DISEASES IN BIOLOGY COURSE OF GRAD 11 CLASS

Arun Chanchaichaovivat¹, Pintip Ruenwongsai²

¹ Institute for Innovation and Development of Learning Process, Mahidol University, Rama 6th, Bangkok, Thailand.

E-mail: arun_46@hotmail.com, Fax: (662)354-7345

² Department of Biochemistry, Faculty of Science, Mahidol University, Rama 6th, Bangkok, Thailand.

Abstract: The knowledge of yeast biocontrol of anthracnose disease in chili fruits has been used to create a hands-on learning model for biology course in the topic of organism interrelationship of Grade 11 class. This aimed to enhance conceptual understanding, critical thinking ability and to evaluate the attitude of students toward hands-on biocontrol. Multiple choice test with reason explanation was used to assess the conceptual understanding and the ability to think critically of students was evaluated by holistic critical thinking scoring rubric constructed by Facione (1994). The results from t-test analysis indicated that the treated group (32 students) studying hands-on yeast biocontrol had higher conceptual understanding and critical thinking ability than the control group (31 students) taught by lecture only with significant differences at $P < 0.05$. Moreover, students of the treated group showed positive attitudes toward the learning model with most agreement in the case of hands-on biocontrol help them practice their scientific skill.

K2_K0024 SCORM 1.2 CONFORMANCE CONTENT: VELOCITY AND ACCELERATION

Chalongchai_Teerasutornnakul

Faculty of Science and Art, Burapha University Chanthaburi Campus Thamai District, Chanthaburi Province, Thailand. 22170, (66)(39)310-000, FAX (66)(39)310-128

chailongc@buu.ac.th, cha1962@yahoo.com

ABSTRACT: The objectives of this study were (1) to develop SCORM 1.2 conformance e-learning content in physics on the topic of velocity and acceleration based on 85/85 efficiency criteria, (2) to compare the students' achievement prior to and after learning this e-learning content, (3) to determine the students' opinion on this E-Learning. The first group of sample consisted of 70 students of Burapha University, Chanthaburi campus (selected by simple random sampling) and the second group consisted of 50 high school students from Chanthaburi and Trad provinces (selected from students who have computer at home). Both groups were students in the second semester of the 2005 academic year. The instruments were the SCORM 1.2 Conformance e-learning content on the topic of velocity and acceleration, an achievement test, and a questionnaire on students' opinion toward the e-learning content. Statistics for data analysis includes E1/E2, mean, standard deviation, and T-test. The results showed that (1) the efficiency of the e-learning was at 85/85, (2) students' achievement after learning was increased significantly at the 0.05 level, and (3) this e-learning content is more interesting than the traditional method and it encourages learners to develop and improve their learning outcomes

K2_K0025 COMMUNITY EMPOWERMENT FROM THE COMPETENCY BASED STUDENT-CENTERED LEARNING MODEL

Prabhop Dansethakul¹, Chartchalerm Issarankura-Na-Ayudthaya², Phannee Pidetcha³, Rungrot Cherdtrakulkit², Virapong Prachayatasitkul²

¹ Department of Clinical Chemistry, Faculty of Medical Technology, Mahidol University, Aroonamarin Road, Bangkok, Thailand. E-mail:prabhop41@hotmail.com, Fax: (662) 412-4110

² Department of Clinical Microbiology, Faculty of Medical Technology, Mahidol University, Aroonamarin Road, Bangkok, Thailand.

³ Department of Medical Laboratory Center, Faculty of Medical Technology, Mahidol University, Aroonamarin Road, Bangkok, Thailand.

Abstract: A competency based of student-centered learning module for community empowerment was developed within the course of the Clinical Microbiology and Immunology, Department of Clinical Microbiology, Faculty of Medical Technology, Mahidol University. The main objective of the module was to gain learning skills and competency development of the Medical Technology (MT) student to transfer general microbiology knowledge for the purpose of community health promotion.

Learning based was set up into 3 platforms in the community of Klongmai, Sampran District, Nakhonprathom province. These included (i) Infectious disease knowledge for the community by the poster type; (ii) Microbes in daily life and food production involvement; and (iii) Demonstration of microscopic microbial examination and hand washing practice. All together, 50 residents of the Klongmai community, and 80 MT students were as the target group of this model. By after action, interview and questionnaire responding, 68.57% the MT student aware of the significant role playing of Medical Technologist for community health promotion. Among this, 55.71% gained their confidence to play part as a leader for empowerment team which was five fold increasing as compared to the pre-action survey. Meanwhile, a two fold increasing, 58.57% of MT student demonstrated their competence as an efficient team-worker.

K2_K0026 COLLECTION OF GEOLOGICAL SAMPLES FOR THE ROCK GARDEN MUSEUM

Thitirat Insalee

Department of Geotechnology, Faculty of Technology, Khon Kaen University, Khon Kaen 40002 Thailand

E-mail: ithiti@kku.ac.th

Abstract: The Geological Museum of Geotechnology Department has been established since 2001. The purpose of this museum is to display and use as teaching and learning media for students and school teachers in the vicinity. The

small specimens are displayed in the museum, whereas the large ones are exhibited outside as the rock garden. The specimens were collected from various geological field trips and field works. These geological collections were identified and classified into 8 categories including volcanic rocks (1), mainly collected from Buriram; intrusion rocks (2) and metamorphic rocks (3), taken from Loei and Petchaboon; sedimentary rocks (4), collected from the Khorat Plateau in the Northeastern region; meteorites and tektites (5), basically found on gravel beds; fossils (6); gems, collected from (7) and economic minerals (8). The Museum and rock garden can serve as the education resources for earth science education.

K2 K0027 STUDENTS' UNDERSTANDING ON OPEN-ENDED QUESTIONS IN SOUND WAVE

¹ ອົກສອນທີ່ ຮັງໄສຍ່, ນ້າມ ອາຮຍະກົມນິຕກຸລ², ເສີມໂສກ ພະນັກງົມ³

¹ Institute for Innovation and Development of Learning Process, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok, Thailand.

E-mail:apisit5@hotmail.com.

² Department of Physics, Faculty of Science, Mahidol University.

Abstract: This research presents students' performance on a series of open-ended questions in sound wave. The sample of this study is a group of 44 Matthayom six students who had learned sound wave. The questions in the test are a series of open-ended questions related to the principles of sound wave. The results show that many students have misconceptions on the principles of sound wave. The most common misconception is students' explanation on the relationship of speed, frequency and wavelength. They believe that the speed of sound depends on the frequency of vibration of the medium and also wavelength. Moreover, the results show that students use wave diagrams to describe the displacement of the medium causing them to believe that sound wave is a transverse wave.

K2_K0028 Teaching and Learning using Conceptual Change Perspectives to Promote Grade 10 Students' Understanding and Problem-Solving Skills of Stoichiometry

Chanyah Dahsah, Sunan Sung-ong, Naruemon Yutakom, Sudjit Sanguanruang Kasetsart University, Bangkok, Thailand

Richard K. Coll, Bronwen Cowie Centre for Science and Technology Education Research, the University of Waikato, New Zealand

Abstract: Stoichiometry is one of the most important topics in chemistry. The literature suggests that many students have difficulty in understanding and applying the stoichiometry concepts. In this work we identified Thai student conceptions for stoichiometry using a purpose designed questionnaire - the *Stoichiometry Concept Questionnaire*, and then we report the development of a series of stoichiometry learning units (SLUs) which seek to enhance students' understanding of, and problem-solving skills in, stoichiometry. Conceptual change theory was used as the theoretical based for the development of the units, in which we drew upon a situation analysis of students' understanding and problem-solving skills, along with observation of teaching and learning when designing the SLUs. The units were implemented by three volunteer teachers in three Grade 10 science classrooms from three different schools. The results of the evaluation suggest that the units offer an alternative for the teaching stoichiometry and helping students develop their understanding, and enhancing their problem-solving skills, of stoichiometry.

K2_K0029 SIMPLE DEMONSTRATION APPARATUS AND HANDS-ON ACTIVITY FOR CONSTRUCTING CONCEPTS OF SCANNING PROBE MICROSCOPES.

Unchada Phuapalboon¹, Bhinyo Panijpan¹, Teerakiat Kerdcharoen², Siripat Pratontep³, Tanakorn Osotchan²

¹ Institute for Innovation and Development of Learning Process, Mahidol University, Bangkok Thailand

² Capability Building Unit in Nanoscience and Nanotechnology, Faculty of Science, Mahidol University, Rama VI Road, Bangkok 10400

³ National Nanotechnology Center, 11 Thailand Science Park, Patumtani, 12120

Abstract: The simple demonstration apparatus were constructed and hands-on activity was set to improve in the concept of scanning probe microscope. The first activity, "attach me please", aims to demonstrate the moving atom by scanning tunneling microscopy (STM) with actual scaling. The cylinder with diameter of 50 cm was used to represent the tip with solenoid wired around soft iron at the tip edge. Sphere iron ball with diameter of 1 mm was employed as an atom and was shaking up and down as analog for thermal vibration. The second activity, "where is the surface?", aims to demonstrate the principle of STM by using model conducting surface covered by carbon powder. The ohmmeter connected to the metal bar and model surface was implemented to indicate the current through the carbon powder at constant height. The third one, "touch me with love", is a hands-on activity to help understanding on atomic force microscope (AFM). The participants drag the plastic and aluminum ruler with sharp bottom at the end through the various rough surfaces. Forty teachers from various fields participated and evaluated the activities. From the evaluation study, it was found that the demonstration apparatus and hands-on activity can enhance the understanding in the concept of scanning probe microscope at high level.

K2_K0030 Investigation of Student Understanding Force and Motion Using Concentration Analysis

RE_Research Investigation

Department of Physics, Faculty of Science, Chiang Mai University, Chiang Mai, 50200 Thailand

e-mail address: pornratw@chiangmai.ac.th

Abstract: The objectives of this study have two folds — 1) investigating students' basic understanding of force and motion and

2) employing the model analysis in evaluating multiple-choice test. The main instrument in studying conceptual understanding of mechanics is Force and Motion Conceptual Evaluation (FMCE). The FMCE test was administered to 746 engineering freshmen taking an introductory physics with calculus at Chiang Mai University. The first algorithm of model analysis, called the concentration analysis was used in evaluating student responses. The concentration factor for each question was obtained and plotted versus score on each question. Then each question was categorized according to the 3-level scheme in order to interpret overall student understanding. The results from the concentration analysis indicated that most students come into the physics classroom with a weak understanding about force and have misconceptions about force and momentum.

M_M0001 Characteristics and physical stability of nanoparticles entrapped with mineral water from various sources in Thailand

Aranya Manosroi¹, Walailak Witkittilak¹, Pensak Jantrawut¹, Pitis Jainonthee¹, Kenji Sugibayashi² and Jiradej Manosroi¹

¹ Pharmaceutical Cosmetic Raw Materials and Natural Products Research and Development Center (PCRNC), Institute for Science and Technology Research and Development, Faculty of Pharmacy, Chiang Mai University, Thailand

² Faculty of Pharmaceutical Science, Josai University, Japan

Abstract: In this study, we investigated the characteristics and stability of nanoparticles entrapped with mineral water from various hot spring locations in Thailand comparing with distilled water (control). Sources of mineral water were selected which On-Luay (Sankamphaeng district), Pong Kum (Doi Saket district) and Ranong Province, that contained high content of metals (such as Mg²⁺, Ca²⁺, and Na⁺), which are useful for skin. Thirty six formulations of niosomes entrapped with mineral water were prepared by chloroform film method. The nanoparticles were composed of Tween 20, 60, 61, 80 and Span 20, 40, 60, 80 and 85 with cholesterol in the ratio of 1:1. The total concentration of the non-ionic surfactants and cholesterol was adjusted to 20 mM. The particle size observed under the optical microscope was small unilamellar vesicle with the diameter range of 50-550 nm., which were the smaller than control (2.47-5.23 μM)(n=12) significantly(P=0.05). The order of the particle sizes of Span 40<60<80<20< Tween 61<60<80<20 at 65.21±15.57, 93.66±18.86, 99.15±16.67, 170.02±38.03, 176.25±11.56, 186.67±90.89, 200.16±132.19 and 486.32±54.92 nm. respectively. Span 85 can not prepare niosomes because no film was obtained. Stability of niosomal formulations at condition 4°C, RT and 45°C was observed at initial 1, 2 and 3 months indicated that. Span 20, 40 and 60 showed the best stability because of less sedimentation and layer separation as well as the uncharge particle size observed under the optical microscope and Zeta Potential/Particle Sizer Nanoparticles entrapping with mineral water from Sankamphaeng gave the most stable with the less sedimentation and small particle size than other mineral water resources. Percentages of entrapment were investigated by separating niosome from unentrapped mineral water by Sephalose column and the Na⁺ contents which was used as a marker was determined by atomic absorption. Precent entrapment of Na⁺ were 84.95±14.32, 76.43±20.98 and 61.01±12.35% for Span 40, 60, and 20 respectively. Percent entrapment was decreased with times.

M_M0002 CHARACTERISTICS OF NANOPARTICLES ENTRAPPED WITH BIOACTIVE COMPOUNDS EXTRACTED FROM WASTES OF RICE BRAN OIL INDUSTRIES IN THAILAND

Aranya Manosroi¹, Bomchat Chutoprapat², Masahiko Abe³, Jiradej Manosroi^{1,2}

¹ Natural Product Research and Development Center (NPRDC), Institute for Science and Technology Research and Development, Chiang Mai University, Chiang Mai 50200, Thailand.

² Faculty of Pharmacy, Chiang Mai university, Chiang Mai 50200, Thailand.

³ Department of Pure and Applied Chemistry, Faculty of Science and Technology, Tokyo University of Science, 2641 Chiba, Japan

Abstract: The objective of this study was to extract the bioactive compounds from wastes of rice bran oil industries in Thailand and entrap in nanoparticles (liposomes and niosomes) to be used as cosmetic raw materials, in order to increase the value of agricultural products and for the substitution of the import cosmetic raw materials. The selected 7 rice bran and rice bran oil samples from 2 factories were acid distilled rice bran oil (AT, AK), crude rice bran oil (CT, CK), refined rice bran oil (RK), defatted rice bran (DBT, DBK) and one sample of rice bran from Chiang Mai market was RBM. The 8 samples were extracted by 80% methanol with alkaline hydrolysis. The ferulic acid contents were analyzed by HPLC. The three rice bran samples (DBT, DBK and RBM) were extracted for phytic acid by dissolving in 2.4% hydrochloric acid. The phytic acid contents were determined by spectrophotometry according to AOAC standard method. The ferulic acid contents were found in AT, CT, AK, CK and RK and RBM samples at 4.01, 0.72, 3.52, 0.52, 1.47 and 1.79 g/100 g respectively, but not found in DBT and DBK samples. Amounts of phytic acid were found in DBT, DBK and RBM samples at 41.23, 64.39, 248.62 ug/g respectively. AT and RBM samples were selected to extract for ferulic acid and phytic acid respectively. The extracts at 5% was entrapped in liposomes and niosomes by chloroform film method with sonication. Three formulations of DPPC/CHOL, Tween61/CHOL and Span60/CHOL at 1:1 molar ratio were selected. Physical characteristics of pH, particle sizes and sedimentation were investigated. Tween61/CHOL at 1:1 molar ratio entrapped with the ferulic acid and phytic acid extracts showed the best physical stability with the particle sizes of 95.6 ± 23.8 nm and 92.1 ± 22.3 nm, respectively. This formulation will be used for further development of topical formulation.

M

M_M0003 PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF ESSENTIAL OIL IN AROMATHERAPY MASSAGE

Tapanee Hongratanaworakit¹ and Gerhard Buchbauer²

¹ Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Srinakharinwirot University, Nakhon-nayok 26120, Thailand
Email: tapanee@swu.ac.th, Fax: (662)-37-395096

² Department of Clinical Pharmacy and Diagnostics, Faculty of Life Sciences, University of Vienna, Althanstrasse 14, A-1090 Vienna, Austria.

Abstract: The aim of the study was to investigate the physiological and psychological effects of sweet orange oil (*Citrus sinensis*, Rutaceae) in healthy subjects after transdermal absorption. Thirty nine healthy volunteers participated in the experiments. Four physiological parameters, i.e. blood pressure, breathing rate, pulse rate, skin temperature were recorded. Psychological responses were assessed were assessed in terms of alertness, attentiveness, calmness, mood, relaxation, and vigor. Sweet orange oil caused significant decreases of breathing rate and pulse rate which indicate a decrease of autonomic arousal. At the emotional level, subjects in the sweet orange oil group rated themselves more cheerful and more

vigorous than subjects in the control group. This finding points towards an increase of psychological arousal.

M_M0004 FORMULATION OF CREAM BASE READILY FOR MIXING WITH VEGETABLE AND FRUIT EXTRACTS

Thawatchai Phaechamud, Sompong Lawilas, Kanokporn Burapapadth, Kornkarn Kamprasert, Kampanart Huanbutta and Gaysorn Chansiri

Department of Pharmaceutical Technology, Faculty of Pharmacy, Silpakorn University, Nakhon Pathom, 73000, Thailand.
Email address: gaysom@email.pharm.su.ac.th

Abstract: Concentrated cream base readily for mixing with vegetable and fruit extracts was prepared using isopropyl isostearate as an oil phase, polyacrylate 13/polyisobutene/polysorbate 20 as an emulsifier, methyl paraben/propyl paraben as a preservative and distilled water as a water phase at a ratio of 15:3.5:1:40. An average viscosity and pH of the obtained concentrated cream base was $37,866.67 \pm 11,477.08$ cps and 6.87 ± 0.26 , respectively. The concentrated cream base exhibited glossy look and milky white color. It was stable after 6 cycles of temperature cycling test. The concentrated cream base was readily to be mixed with vegetable or fruit extracts at a ratio of 3:2.

M_M0005 DEVELOPMENT OF A SKIN CARE PRODUCT FROM BAN-DUNG SALT MUD, UDONTHANI

MANEENUT PRASERTTHAWONSIRI

¹ นักศึกษาหลักสูตรวิทยาศาสตร์มหานักยานพิท สาขาวิชาความงามและวิทยาศาสตร์สุขภาพ

² คณะเภสัชศาสตร์ มหาวิทยาลัยอุบลราชธานี

³ ภาควิชาธรณีวิทยา คณะเทคโนโลยี มหาวิทยาลัยอุบลราชธานี

ABSTRACT: A skin care product from Ban-dung Salt Mud, Udonthani, was developed by collecting and processing the mud into dry powder. Chemical and microbiological tests of the product suggested that it passed the quality control in cosmetics in terms of heavy metals and microbes and contained certain levels of 7 essential minerals. Forty females, met the inclusion criteria, volunteered in the skin moisture and pH testing upon using the product with a double-blinded comparison to a commercial product. The average moisture and pH of the skin, measured 15 mins after application significantly increased with all age groups ($p<0.01$). All of the volunteers (100%) reported cooling sensation. Ban-dung Salt Mud could be potentially further developed as a source of raw materials of mud pack products for skin moisturizing and pH adjustment.

M_M0007 Protection of α -Lipoic acid and dihydrolipoic acid against Intracellular mitochondrial reactive oxygen species)

(Jirapan Mounjaroen¹, Yonyut Rojanasakul², Patrick S Callery³, Vimolmas Limpipat and Ubonthip Nimmannit¹)

¹ Department of Basic Pharmaceutical Sciences, School of Pharmacy, West Virginia University, USA

² Pharmaceutical Technology (International) Program, Chulalongkorn University ³Microbiology, Faculty of Pharmaceutical Science, Chulalongkorn University

Abstract: Oxidative modification alters the function of proteins and plays an important role in the decline of cellular function during aging process. The mitochondria may be the primary cellular source and target of endogenous reactive oxygen species (ROS) as they are produced as a normal byproduct of the electron transport system. α -Lipoic acid (α -LA), naturally occurring compound, is present in all parts of the body as part of several multienzyme complexes involved in energy formation. It is reduced to dihydrolipoic acid (DHLA) in the pyruvate dehydrogenase complex. In this investigation, α -LA was extracted from Thai spinach (*Spinacia oleracea*) and characterized using LC-MS. DHLA was synthesis by reducing α -LA and characterized using ESI-MS. Intracellular free radical production was determined by using dichlorofluorescein (DCF) and dihydroethidium bromide (DHE), cell-permeable oxidation-sensitive probes. For quantitative analysis of ROS and O_2^- formation, flow cytometry analysis was performed. The levels of O_2^- and ROS in NHDF cells were significantly reduced in the systems treated with α -LA and DHLA. Interestingly, both α -LA and DHLA blocked mitochondrial ROS generation. Moreover, they also increased growth rate of normal dermal human skin fibroblast (NHDF). Therefore, α -LA and DHLA might be useful in products containing anti-free radical and stimulate cell renewal.

I_M-0008 RAT SKIN TRANSDERMAL ABSORPTION OF AZELAIC ACID-CYCLODEXTRIN COMPLEXES

Aranya Manosroi^{1,2}, Atchara Panyosak², Jiradej Manosroi^{1,2}

¹ Natural Products Research and Development Center (NPRDC), Institute for Science and Technology Research and Development, Chiang Mai University, Chiang Mai 50200, Thailand

² Faculty of Pharmacy, Chiang Mai University, Chiang Mai 50200, Thailand

E-mail address: pmpti005@chiangmai.ac.th, atchara_pys@hotmail.com

Abstract: This study aimed to investigate the transdermal absorption of an aqueous solution of azelaic acid (AA) complexed with hydroxypropyl- β -cyclodextrin (HP β CD). Equimolar of AA and HP β CD complexes were prepared by physical mixture (PM), coevaporation (COE) and freeze-drying (FD). The complexes were characterized by infrared spectroscopy (IR), differential scanning calorimetry (DSC) and X-ray diffractometry (XRD). The AA contents were assayed by a HPLC. Transdermal absorption studies of AA, PM, COE and FD products across the full-thickness abdominal skin (the male Wistar rats) were conducted, using vertical Franz diffusion cells at $32 \pm 1^\circ\text{C}$. The donor compartment was filled with 2 ml of samples (10mM). An amount of 12 ml of pH 7.4 phosphate buffer saline (PBS) was put in the receiver chamber. After 4, 6, 8 and 12 h, the cells were withdrawn. The amount of AA in the stratum corneum (SC) was collected by stripping the skin, using 3M Scotch MagicTM tape. For AA in the viable epidermis and the dermis (VED), the whole skin was cut into small pieces, and AA was

extracted from the skin using methanol. Samples in methanol were derivatized and analyzed for AA by HPLC. From IR, DSC and XRD investigation, PM and COE methods gave partial inclusion complexes, whereas FD formed complete complexation. The fluxes ($\mu\text{g cm}^{-2} \text{h}^{-1}$, $n=3$) in SC, VED and receiver chamber were at 30.60 ± 4.78 , 28.27 ± 6.16 and $6.03 \pm 2.31 \mu\text{g cm}^{-2} \text{h}^{-1}$ which were more than the uncomplexed which gave 22.06 ± 3.24 , 26.51 ± 3.20 and $0.38 \pm 0.03 \mu\text{g cm}^{-2} \text{h}^{-1}$ respectively. This present study has suggested that AA complexed with HP β CD by the FD process gave not only the complete inclusion, but also improved the aqueous solubility of AA thereby increasing the permeation through skin. FD method might be the most proper process for the preparation of the complex in the development of AA for topical products.

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N1-N0004 GROUNDWATER RECHARGE ASSESSMENT OF RIVER BASIN IN THAILAND

Tipwimon Chumpukawin¹, Tavisakdi Ramingwong²

^{1,2}Department of Geology, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand;

e-mail address: ¹Chumpukawin@yahoo.com, ²tavisak@chiangmai.ac.th

Abstract: The total area of Thailand is about 513,115 km². Topographically, the country can be classified into 25 river basins (Royal Irrigation Department) and the country rocks comprised of Precambrian – Quaternary rocks (Department of Mineral Resources, 2001). These rock formations can be hydrogeologically classified into 9 units, as follows: Recent alluvial deposits, Younger terrace deposits, Older terrace deposits, Colluvial deposits, Limestone/Carbonate unit, Sedimentary rock unit, Metasedimentary and Metamorphic rock unit, Volcanic rock unit and Granitic unit. Recharge into each river basin will depend on rainfall, permeability of rock and influence of slope. Using average rainfall data during eighteen year period (1987-2004), designated infiltration factor and slope factor, it is found that the average recharge range from 0 - 570 mm/yr, or 0 - 12 percent of local annual rainfall. The calculated recharge is useful for future water management of each river basin.

N1_N0006 TROPOSPHERE ATMOSPHERIC OBSERVATION BY MIE SCATTERING LIDAR AT SRISAMRONG, SUKHOTHAI PROVINCE

Siriluk Ruangrungrote¹, Akkaneewut Chabangbon² and Arunee Intasorn¹

¹Department of Physics, Faculty of Science, Srinakharinwirot University, Bangkok 10110, Thailand.

²Department of Geology, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand.

E-mail address: sirilukr@swu.ac.th, akkane@geo.sc.chula.ac.th and arunee@swu.ac.th

Abstract: In 1995-2004, Mie scattering lidar system was installed and developed at Srisamrong, Sukhothai province under the observatory for atmospheric radiation research founded by Thai and Japanese scientists. With the raw data collected in 2003-2004, the tropospheric atmosphere of this urban region was studied. In this work, the variation of vertical profiles of range corrected signals for distinct 2 months of December (winter) 2003 and March (summer) 2004 were performed. Further studies of related local parameters supporting this work have still been required for precise and reliable characterization of aerosol studies in our environmental atmospheres. Additionally, in the future we wish to utilize this tool for climatological research in Thailand.

N1_N0007 THE VERTICAL DISTRIBUTION OF OZONE OVER SONGKHLA, THAILAND.

Pakhwian Vanichnukhroh¹, Sathon Vijarnwannaluk², Boosarasiri Thana³

¹ The Meteorological Department, Sukhumvit Road, Bangna, Bangkok, Thailand 10260.

E-mail: pakhwian@metnet.mtd.go.th, Fax: (662)361-3640

² Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok, 10330.

³ Department of Geology, Faculty of Science, Chulalongkorn University, Bangkok, 10330.

Abstract: The vertical distribution of ozone is a significant requirement in monitoring the atmospheric ozone layer. It can be measured by Ozone Sonde, ground-based Dobson or Brewer spectrophotometer and satellite-based instruments. In order to provide a data set of ozone profile over Songkhla the Umkehr measurements taken by the Brewer spectrophotometer No.120 authorized by the Meteorological Department during 2001-2003 and TOMKEHR software developed by the World Ozone Data Center in 1992 were used in this study.

The ozone profile calculated using TOMKEHR software expressed good agreement with those from SAGE II satellite and Malaysia Ozone Sonde measurements as for a latitudinal dependence. The vertical distribution of ozone over Songkhla was found that the height of maximum density is 26-28 km above the earth surface and its annual average concentration is approximately 4.70×10^{12} molecules/cm³ in 2001, 4.90×10^{12} molecules/cm³ in 2002 and 4.70×10^{12} molecules/cm³ in 2003 respectively. There is no significant change in long term as a meaning of ozone depletion in tropical regions during these years, except that high value of the ozone at near surface has showed its role as a pollutant in urban site.

N1_N0008 Time variation of aerosol in Bangkok

Aphantree Yuttaphan¹, Boosarasiri Thana², Sathon Vijarnwannaluk³

¹ Thai Meteorological Department

² Department of Geology, Faculty of Science, Chulalongkorn University

³ Department of Physics, Faculty of Science, Chulalongkorn University

Abstract: From the time variation of aerosol in Bangkok using AERONET data at Chulalongkorn site during 2003 -2004 found that AOT were mostly high in summer and winter, low in rainy season. The comparison between the AOT and daytime average air temperature found that while AOT were greater than 0.4, the air temperature was greater than 33 °C in summer and decreased than 0.2 °C in winter. For rainy season, AOT were lower when rainfall was greater than 10 mm. In addition, the variation of AOT shown as a cycle mostly every 4-7 days and corresponding with the variation of air temperature. The Angstrom exponent values showed the fine mode particles with loading dominant in summer and winter, the volume size distribution showed on two modals with a fine mode more dominant than other. For the analysis of AOT and back-trajectory, revealed that there were the aerosols from China to Thailand.

N1

N1_N0010 DAYTIME ESTIMATION OF THE HEAT BUDGET FROM ROUTINE METEOROLOGICAL DATA AT NON-IRRIGATED PADDY FIELD IN SUKHOTHAI, THAILAND

SARINGKARNPHASIT Anurat¹, ATTAROD Pedram², PAKOKTOM Tiwa² and AOKI Masatoshi²

¹ Thai Meteorological Department, 4353 Sukhumvit Rd. Bang Na, Bangkok, 10260 Thailand ²Tokyo University of Agriculture and Technology,

Abstract: This paper is presented to find out the empirical model for hourly estimation of the surface heat budget from routine meteorological data during daytime in Thailand. The model is designed for paddy field, but it contains parameters which take account of the surface properties in general. The required input meteorological data are no more than the air temperature and relative humidity at screen height, single wind speed and total cloud cover. The output of the model is in terms of incoming solar radiation, net radiation, latent heat flux and sensible heat flux. For one year of observations at non-irrigated paddy field in Sukhothai, Thailand, we obtained satisfying results between observations and estimates. It appears that the root mean square error are $\sigma = 105.7 \text{ W/m}^2$ for incoming solar radiation, $\sigma = 68.1 \text{ W/m}^2$ for net radiation, $\sigma = 83.0 \text{ W/m}^2$ for latent heat flux and 36.1 W/m^2 for sensible heat flux.

N1_N0011 The Observatory for Atmospheric Research at Phimai

S. Nakapadungrat, B. Thana, A. Chabangorn and M. Hashizume

Earth Sciences Program, Department of Geology, Faculty of Science, Chulalongkorn University, Phayathai Road, Bangkok, Thailand.

E-mail: nsomchai@geo.sc.chula.ac.th, Fax: (662)218-5443

Abstract: The distribution of radiative energy mechanism is complicated in the Asian monsoon region with the monsoon circulation caused by the ocean-land contrast at the continental scale. There are numerical simulations, for example, indicating that upper and lower level clouds play the important but different roles in the energy flow on a continental scale. The effect of global warming due to greenhouse gas increasing is especially large and sensitive budget structure over land areas. Therefore, to understand the climate formation of this region, it is important to study the effect of clouds, water vapor and surface conditions on the radiative budget of this region. The high accuracy and temporal continuous instruments are need for radiative fluxes measurement and related ancillary quantities for this study. So, the Observatory for Atmospheric Radiation Research was constructed in the corporation between Thai and Japanese scientists under GAME-T project. The Observatory was located at Sri Samrong, Sukhothai, Thailand about 700 km., north of Bangkok. The Observatory contained some of equipments that can divide into 4 groups as below;

1. Water vapor observation group composed of Global Positioning System and Microwave radiometer or Water vapor radiometer.
2. Atmospheric radiation and surface meteorological component group composed of Upward and down looking Pyranometers and Pyrgeometers, Pyrheliometer, and automatic thermometer, barometer and anemometer.
3. Aerosol observation group, there are Sky and i-Sky radiometer and Lidar.
4. Wind Profiler to observe air parcel movement by Doppler RAdio Detection And Ranging or Doppler RADAR technique.

All of the instruments control by PC and working automatically. After the observation, data stored in the PC, download to computer server and transferred to the server at Chulalongkorn University. Because the observatory at Sri Samrong was too narrow for extensive field of research activities therefore, it was decided to move to Chaleamprakiet Royal Rain-making Research Center, Phi Mai, Nakhon Ratchasima in January 2005. The Observatory was renamed as "The Observatory for Atmospheric Research".

N1_N0012 AEROSL OPTICAL DEPTH OBTAINED BY MULTI-FILTER RADIOMETER (MFR-7)

W. Chairat, B. Thana, A. Chabangorn, B. Thana and S. Wannarukwian

Earth Sciences Program, Department of Geology, Faculty of Science, Chulalongkorn University, Phayathai Road, Bangkok, Thailand.

E-mail: wasuntra@gmail.com, Fax: (662)218-5443

Abstract: Multi-filter Radiometer (MFR-7) has been installed at the Observatory for atmospheric radiation research at Sri Samrong, Sukhothai (17°09'N, 099°51'E) by the cooperation of Frontier Research Center for Global Change (FRCGC), Japan since 2002. This instrument is design to measure global, diffuse and direct solar irradiance. For this study, we apply direct irradiance data of 3 wavelengths (415, 500 and 985 nm.) from MFR-7, during January 2003 to investigate aerosol optical depth (AOD) by Beer-Lambert-Bouguer law ($I = I_0 e^{-\alpha t}$). AOD was 0.68 – 0.31 at 500 nm at Sri Samrong site. Trajectory analysis has shown that higher AOD aerosol come from the west site of Sri Samrong observatory from mid to late of January. AOD was increase from early to late of January 2003.

N2-N0001 CERTAIN CHARACTERISTICS OF DICKITE FROM SARABURI, THAILAND

Seriwat Saminpanya¹, Pornchala Maneeratpairoj¹, Angsana Himasuttidach¹, and Buncha Silpasakulsuk²

¹ Department of General Science, Faculty of Science, Srinakharinwirot University, 114 Sukhumvit 23, Khlong Toey Nua, Watthana, Bangkok 10110. E-mail: seriwat@hotmail.com

² Department of Physics, Faculty of Science, Srinakharinwirot University, Sukhumvit 23, Khlong Toey Nua, Watthana, Bangkok 10110, Thailand.

Abstract: The characteristics of dickite samples from the deposit at Khao Cha-Om, Tambon Cha-Om, Amphoe Kaeng Khoi, Saraburi Province, Thailand were investigated. The techniques used include SEM, TEM, WD-XRF, XRD, FTIR and Raman microprobe. The samples show their cryptocrystalline habit exhibiting pseudo-hexagonal plates stacking together like books, variation in chemical composition as well as some varieties coexist with quartz.

**N2_N0002 PALEOECOLOGICAL ANALYSIS OF MOLLUSCAN ASSEMBLAGES FROM BANGKOK CLAY
IN SAMUT PRAKAN**

Yoshio SATO

Department of Geology, Faculty of Science, Chulalongkorn University, Phayathai road, 10330 Bangkok.

Abstract: Holocene deposit, Bangkok Clay in Bangkok central plain are well observed in the sandpit of Samut Prakan. Block sampling and NaTPb treatment of sample blocks had been carried out for the Paleoecological analysis of fossil molluscan assemblages. It reveals that only one cycle of transgression and regression is recognized in Bangkok Clay. The transgression is characterized by Veremolpa - Moerella Assemblage and the regression is characterized by Cryptonatica - Paphia Assemblages. The beginning of the transgression is also characterized by the brackish water molluscan assemblage.

**N2_N0013 Uranium Contents Analysis In Soils at Pattani and Narathiwat Provinces
with the Gamma Spectrometer**

ະະຫວຸນ ທີ່ມສຸກີ ແລະ ພ່າງທີ່ພົມ

ການວິຊາວິທະຍາຄາສົກ ຄະແວງທະນາຄາສົກແລະເກມໂນໄລຍີ ມາກວິທະຍາລັບສອງຂາດວິນທົກ ອໍານາໂມເນືອງ ຈັງຫວັດປັດຕານີ້ 94000

Abstract: The Uranium contents in soil samples in Pattani and Narathiwat provinces were investigated. The global positioning system device was used to identify the location of the collected samples. All the collected samples were heated at 120°C for 20 hours before sieving by using 18 mesh sieve. Each soil sample of 100 gram with the particle size less than 1 mm was kept in a sealed plastic container for one month to reach the secular equilibrium. The gamma ray spectrometer was used to analyze the equivalent uranium content at the 1.76 MeV photopeak that emitted from Bi-214.

The result showed that the average uranium content in 46 locations of Pattani province at the 0 - 5 cm and 5 - 10 cm depth were 4.09 ± 0.19 ppm and 5.11 ± 0.20 ppm, respectively. For the Narathiwat province with 54 locations of collected sample sites, the analyzed uranium contents at the 0 - 5 cm and 5 - 10 cm depth were 4.53 ± 0.20 ppm and 5.42 ± 0.21 ppm, respectively. The uranium content contour was performed to identify some areas that may be harmful to human.

**N2_N0014 EVALUATION OF THE TSUNAMI DISASTERS ON 26TH DECEMBER 2004 ALONG THE SHORELINE
RANONG TO KHA LAC - LAMRU**

Yoshio SATO

Department of Geology, Faculty of Science, Chulalongkorn University, Phayathai Road, 10330 Bangkok.

Abstract: The tsunami disasters along the shoreline from Ranong to Khao -Lak Lamru have been investigated totally, 5 times for 1 month in 2005. Principles for the Tsunami disasters observed and established in Japan are applicable to those in Thailand. In Thailand, the first wave was pulling waves. So many foreigners tried to go far out at sea. An after that, when the second pushing wave attacked the beach, nobody came back to the beach and died. Sumatra - Andaman earthquake is belonged to the APlate boundary type. So, on account of periodicity of the earthquake, next Tsunami is predictable. Cycles of the Tsunami are expected 60 to 63 years. It is also important to study historical Tsunami disasters.

**N4_N0005 A Survey of Ruditapes variegatus (Sowerby, 1852) at Kho Kham Yai, Sichang District,
Chonburi Province**

Nichaya Praditsup¹, Sompob Rungsupa¹, Monthon Ganmanee², and Padermsak Jarayaphan¹

¹ Aquatic Resource Research Institute, Chulalongkorn University, Phayathai Road, Bangkok, Thailand.

² Department of Fisheries Science, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Chalongkrung Rd., Bangkok, 10520, Thailand.

Abstract: The distribution and population variation of Venus Clam Ruditapes variegatus (Fam. Veneridae) were studied at Kho Kham Yai, Sichang district, Chonburi province during May 2005 to April 2006. R. variegatus is normally found inhabiting in medium (0.25 - 0.50 mm) and coarse sand (0.50 - 1.00 mm). The highest and lowest population densities were found in June and November, respectively. The recruitment of the small clams (5-10 mm in shell length) took place from May to July and September. This study also reveal a relationship between percentage of organic content and density of R. variegatus ($r = -0.291$, $p < 0.05$).

N4

O1_O0002 ATOMISTIC SIMULATION OF THE STRUCTURE OF AMORPHOUS POLYSTYRENE

Kongvit Prasitnok^{1,2}, Supagorn Rugmai^{3,4}, Wantana Klysubun⁴, Visit Vao-soongnern^{1,2}

Laboratory of Computational and Applied Polymer Science (LCAPS)¹, School of Chemistry² and School of Physics³, Institute of Science, Suranaree University of Technology, National Synchrotron Research Center⁴, Nakhon Ratchasima, Thailand.

E-mail: visit@sut.ac.th, Fax: 04-4224-185

Abstract: A static, atomistically detailed model of dense, glassy polystyrene was simulated using molecular mechanics/molecular dynamic hybrid method. Initial chain conformations which were generated using a Monte Carlo technique including periodic boundary conditions, were relaxed by potential energy minimization. Detailed analysis of the minimized structure indicated that intermolecular packing effects create a large variety of chain conformations different from the purely intramolecular ground states. The distribution of the torsion angles of the minimized structures did not show the expected behavior of the model compounds (dimer) indicating the intermolecular interaction dominate the local preferences. The systems are amorphous, exhibiting random coil behavior. The predict Hildebrand solubility parameter and Neutron/X-Ray structure factor are in reasonable agreement with the experimental values

O1_O0003 MOLECULAR DYNAMICS SIMULATION OF POLYETHYLENE OXIDE: POTASSIUM IODIDE ELECTROLYTES

Porntip Seema^{1,2}, Supagorn Rugmai^{3,4}, Wantana Klysubun⁴, Visit Vao-soongnern^{1,2}

Laboratory of Computational and Applied Polymer Science (LCAPS)¹, School of Chemistry² and School of Physics³, Institute of Science, Suranaree University of Technology, National Synchrotron Research Center⁴, Nakhon Ratchasima, Thailand.

E-mail: visit@sut.ac.th, Fax: 04-4224-185

Abstract: Molecular dynamics simulations of pure tetraglyme, a model for amorphous PEO, and tetraglyme:potassium iodide (KI) complexes with an ether oxygen:K⁺ ratio of 10:1 were performed at 400 K. Structural analyses were done to investigate PEO conformations, I⁻ and oxygens coordination by K⁺. The mean-square radius of gyration shows that PEO chains become more compacted upon complexation with salt. Dihedral angle population density distributions for PEO chains show that the *trans* conformation is favored for C-O bonds while the more compact *gauche* conformation is favored for C-C bonds. Both bonds prefer less *trans* conformation enforced by coordination of adjacent oxygens to K⁺. Diffusion coefficient for both K⁺ and I⁻ were estimated from the mean square displacement. K⁺ was found to diffuse slightly slower than I⁻ in PEO.

O1_O0006 THE STRUCTURE OF IRON-STARCH.

Saifon Vinitnontharat¹, Ekasith Somsook¹

¹ Department of Chemistry, Faculty of Science, Mahidol University, Rama 6 Road, Rachathewi, Bangkok 10400 Thailand.

Abstract: Iron is an essential element for metabolic processes in human body, such as oxygen carrier, DNA synthesis and electron transport. A human body needs iron approximately 10-20 mg per day. The persistent abnormality in iron balance leads to either iron deficiency anemia or hemosiderosis. The medication of iron deficiency disease normally uses iron complexes, oral iron-supplement or intravenous iron-supplement i.e. iron-polysaccharide, iron-dextran, iron-sucrose and ferrous gluconate. Even though, iron saccharide has been used for medication for more than 50 years, the structure of iron saccharide has not yet been clearly understood. In this work, the study on the structure of iron-starch samples were carried out. X-ray powder diffractograms showed that the as-prepared iron-starch samples were in amorphous phases. FT-IR spectra of iron-starch samples displayed the same band as one of iron-oxides. Indicating that the core structure of the iron-starch samples was similar to iron-oxide. X-ray absorption spectroscopy (XAS) results showed that the only oxidation state iron(III) was found. Shifted of absorption edge at different energies with various types of starches, indicated different interactions of iron with starch.

O1_O0011 ANGLE-RESOLVED PHOTOEMISSION STUDY OF ENERGY-BAND STRUCTURE ON NICKEL (111)

Hideki Nakajima¹, Moragot Buddhakala², Somchai Chumpolkulwong², Prayoon Songsiririthigul^{1,2} and Akito Kakizaki³

¹ National Synchrotron Research Center, Nakhon Ratchasima 30000, Thailand

² School of Physics, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand

³ Institute for Solid State Physics, The University of Tokyo, Kashiwa, Chiba 227-8581, Japan

Abstract: This report provides new information on the bulk-energy-band structure of metallic Ni(111) using angle-resolved photoemission spectroscopy. On the basis of free-electron final-state model, we revealed bulk energy-band dispersions. The obtained bulk energy-band dispersions show a fair agreement with energy-band calculations using local density approximation (LDA) and beyond LDA. These analyses suggest the dynamical screening effect brought about by off-site as well as on-site electrons should be concerned to explain the appearance of satellite structures as well as the energy-band dispersions obtained here.

O1_O0018 AN INVESTIGATION OF CLEAN P-TYPE GALLIUM NITRIDE (0001) SURFACES USING SYNCHROTRON RADIATION FROM SIAM PHOTON SOURCE

Chanchana Thanachayanont¹, Somchai Chumpolkulwong², and Prayoon Songsiririthigul^{2,3}

¹ National Metal and Materials Technology Center, 114 Thailand Science Park, Paholyothin Rd., Klong 1, Klong Luang, Pathumthani 12120, Thailand.

E-mail: chanchm@mtec.or.th, Fax: (662)564-6447

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² School of Physics, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand

³ National Synchrotron Research Center, Nakhon Ratchasima 30000, Thailand.

Abstract: p-GaN (0001) surfaces were treated with HCl, annealed at 550 °C for 10 minutes and nitrogen-sputtered for 15 minutes. Auger electron spectroscopy (AES), synchrotron photoemission spectroscopy (PES) and low energy electron diffraction (LEED) were used to study surface cleanliness, electronic properties and surface structure of the p-GaN (0001) surfaces, respectively. Results obtained showed that treating the surface with HCl will leave chlorine and carbon on the surface. These contaminants were removed after annealing at 550 °C for 10 minutes but oxygen was found instead. Oxygen was removed by nitrogen-sputtering for 15 minutes. Clean surface was found to have (1x1) surface but did not improve the electronic structure as expected.

O1_00019 OXIDATION STATE INVESTIGATION OF SULFUR IN NATURAL AND SYNTHESIS GLOVE BY X-RAY ABSORPTION SPECTROSCOPY (XAS)

Wanwisa Pattanasiwisa¹, Jaruwan Siripetawee², Orasa Patarapaiboolchai³, Pairote Klinpituksa⁴ and Wantana Klysubun¹

¹ National Synchrotron Research Center, Surapat 3 Build, Nakhon Ratchasima 30000

² College of Medicine and Public Health, Ubon Rajathanee University, 85 Satholmark Rd. Warinchamrap, Ubon Rajathanee 34190

³ Department of Mechanical Engineering, Prince of Songkla University, Had Yai, Songkla 90112

⁴ Department of Science, Faculty of Science and Technology, Prince of Songkla University, Muang, Pattani 94000

Abstract: Rubber and products made from rubber are the first and foremost exported goods in Thailand. Several techniques have been used to improve the quality of rubber product but none can provide details about the chemical structure mainly the sulfur-crosslinks and oxidation states of sulfur within the rubber. Since sulfur is introduced during vulcanization process, understanding the local environment of sulfur atoms can lead to a better understanding about the elasticity of rubber product. X-ray absorption spectroscopy (XAS) is one of the powerful technique of synchrotron light application. It is the only technique to identify the chemical properties within the rubber products. XAS measurements were carried out using synchrotron radiation source at the Siam Photon Laboratory. This preliminary work, we was successful enough for distinguishing oxidation states of sulfur atom between natural and synthesis rubbers in vulcanization process.

O1_00021 TRANSGENIC THALASSEMIA HEMOGLOBIN E FROM HUMANIZED MOUSE: X-RAY CRYSTALLOGRAPHIC AND FUNCTIONAL INVESTIGATION

Chariwat Samanchat¹, Lukana Ngwiwsara², Jisnuson Svasti^{2,3}, Duangporn Jamsai⁴, Suthat Fucharoen⁴, and Palangpon Kongsaeree¹

¹ Department of Chemistry and Center for Protein Structure & Function, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok, Thailand.

² Department of Biochemistry and Center for Protein Structure & Function, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok, Thailand.

³ Chulabhorn Research Institute, Vibhavadee-Rangsit Highway, Bangkok 1021 Thailand

⁴ Thalassemia Research Center, Institute of Science and Technology for Research and Development, Mahidol University, Salaya Campus, Nakorn Pathom 73170, Thailand.

Abstract: Hemoglobin E (HbE), the most common β -thalassemic disease in Southeast Asia, is caused by a substitution of Glu by Lys at codon 26 of the β -globin gene. Clinically they are very heterogeneous in severity. Individuals homozygous HbE exhibit mild thalassemia, while the combination of HbE with a β -thalassemia mutation exhibit highly variable severity. A novel C57BL/6 Transgenic murine model of HbE were generated by S. Fucharoen's group with knock out mice that had deletions of the β -globin genes in order to create mice expressing chimeric hemoglobin (mu β_2 ; hu β_2). Evidently, human β^E -transgene can be expressed and functioned *in vivo*. The structural investigation of transgenic hemoglobin would eventually reveal the involved mechanism in atomic level leading to better understanding of thalassemic mouse model before the development for testing antisense therapy and some antioxidant drugs instead of testing in human.

O1_00022 CRYSTAL STRUCTURE AND DIELECTRIC PROPERTIES OF A-SITE DOPED $(\text{Bi}_{1-x}\text{Y}_x)(\text{MNB})\text{O}_3$, ($\text{M} = \text{Fe}^{3+}, \text{In}^{3+}$) Bi-PYROCHLORES

Brendan J. Kennedy³

Weenawan Somphon^{1,2}, Valeska Ting², Yun Liu², Ray L. Withers², Qingdi Zhou³, and Brendan J. Kennedy³

¹ National Synchrotron Research Center, Nakhon Ratchasima 30000, Thailand.

E-mail: weenawan@nsrc.or.th

² Research School of Chemistry, Australian National University, Canberra, ACT 0200, Australia.

³ School of Chemistry, Sydney University, Sydney, Australia.

Abstract: In this work, we investigate the local structure and associated dielectric properties of a family of Bi-based pyrochlore phases, namely $\text{Bi}_2(\text{MNB})\text{O}_6$, ($\text{M} = \text{Fe}^{3+}$ and In^{3+}) with a 1:1 $\text{M}:\text{Nb}$ ratio on the pyrochlore B sites. At 1 MHz and room temperature, the dielectric constant of $\text{Bi}_2(\text{FeNb})\text{O}_6$ (BFN) was found to be 100 while its dielectric loss was 0.007. For $\text{Bi}_2(\text{InNb})\text{O}_6$ (BIN), under the same conditions, the corresponding dielectric constant was 133 and the dielectric loss 0.002, respectively. These results suggest this family of Bi-pyrochlore phases have potential for application as dielectric materials as well as expanding the options available to adjust the physical properties of current Bi-containing pyrochlore phases. A

composite $\text{Bi}_2\text{Fe}_{0.5}\text{In}_{0.5}\text{NbO}_6$ (BFIN) intermediate was also synthesized to optimize associated dielectric properties.

O2_00001 *In vitro* permeation study of an extract of *Phyllanthus amarus* using shed scale of *Ophiophagus Hannah* as a barrier

Aroonsri Priprem¹, Sarayut Radapong², and Srisomporn Preeprame¹

¹ Faculty of Pharmaceutical sciences, Khon Kaen University, Khon Kaen, Thailand.

² Graduate student in Master of Science, Khon Kaen University, Khon Kaen, Thailand.

Abstract: *In vitro* permeation study of *Phyllanthus amarus* extract using shed snake scale as a barrier membrane, side-by-side diffusion cells with a controlled temperature at 32°C and UV spectrophotometric analysis at a λ max of 277 nm. After 4 h, permeants were observed in the receptor. Qualitative analysis by TLC showed several band colors under UV light at 254 and 366 nm. HPTLC of the permeants at 4 h gave 2 out of 8 peaks at Rf values of 0.42 and 0.72 with an extent of permeation of 2.4 and 0.25%, respectively. It is concluded that the extract of *P. amarus* could permeate the barrier and each component permeated differently.

O2_00004 The effect of medicinal plant extracts on cytoplasmic membrane of multidrug resistant bacteria by flow cytometry

Wisatre Kongcharoensuntorn¹, Chintana Chirathaworn², Wipaphorn Jaikua¹, Atinop Pongpanich²

¹ Department of Biology, Burapha University, Bangsaen, Chonburi, 20131, Thailand

² Department of Microbiology, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand, 10330

Abstract: The *Dracaena loureiri* Gapnep., *Myristica fragrans* Houtt. and *Mansonia gagei* Drumm. were investigated for their abilities to enhance bacterial permeability by flow cytometry. This experiment exhibited enhancement of herb extracts to disrupt the cytoplasmic membrane of living bacterial cells. The membrane - impermeant nucleic acid stain of ethidium bromide of *Acinetobacter baumannii* and *Staphylococcus aureus* were tested by FACscan flow cytometry. The varied concentration of herb extracts were tested theirs ability to enhance permeability of multidrug resistant bacteria. The results indicated that herb extracts could promote intracellular accumulation of ethidium bromide in both strains of multidrug resistant bacteria. In the treatment of crude extracts to *Acinetobacter baumannii* the lowest concentration of *D. loureiri* Gapnep., *M. fragrans* Houtt. and *M. gagei* Drumm. that showed the brighter signal and uniformly fluorescent were 0.1, 0.05 and 5 mg/ml, respectively. Also, the treatment with 0.1 mg/ml of *D. loureiri* Gapnep or *M. fragrans* Houtt. enhanced bacterial permeability of ethidium bromide into cell membrane of MRSA.

O2_00005 THAI MEDICINAL PLANT EXTRACTS POSSESSING ANTI-BACTERIAL ACTIVITY AGAINST CATFISH PATHOGENS, *AEROMONAS SOBRIA*

Paweeena Wadbu¹, Sineenat Siri¹, Nilubol Kitancharoen², and Prasart Phonimdaeng³

¹ Department of Biochemistry, Faculty of Science, Khon Kaen University, Muang, Khon Kaen, Thailand.

E-mail:pawwad@hotmail.com, Fax: (6643) 342-911

² Department of Fishering, Faculty of Agriculture, Khon Kaen University, Muang, Khon Kaen, Thailand.

³ Department of Microbiology, Faculty of Science, Khon Kaen University, Muang, Khon Kaen, Thailand.

Abstract: This research was to study the effect of Thai medicinal plant extracts against bacterial pathogens of catfish, *Aeromonas sobria*. Eighty-two samples both extracted in water and 75% ethanol derived from 41 species of Thai medicinal plants were tested by agar well diffusion assay. The water-extracted samples of pomegranate (*Punica granatum*), rose apple (*Eugenia javanica*), and Ma-kum-kai (*Drypetes rexburghii*) exhibited the highest antibacterial activities, orderly. Their minimal inhibitory concentration (MIC) values were 6.25, 12.50, and 12.50 mg/ml, respectively. The minimal bactericidal concentration (MBC) values of all three extracts were at 12.50 mg/ml. The MBC/MIC values of these plant extracts indicated that they were bactericidal (≤ 4). The primary analyses of their active chemicals were carried out by TLC-bioautographic and TLC-chemical assays. The antibacterial components of *P. granatum* extract separated on TLC plate were classified in phenolic/flavonoid and steroid groups. Active components of *E. javanica* extract were tested positively to steroids and proantocyanidins, while steroids were the active components of *D. rexburghii* extract.

O2_00007 FORMULATION OF ANTIFUNGAL CREAM FROM *Impatiens balsamina* Linn.

Chanthira Kaewthong¹, Somsak Wongwan², Watcharee Netisingha³, Suwanna Vejabhikul³, Pongpant Netisingha⁴

¹ Pharmacy Section, Srimahaphot Hospital, Prachinburi, Thailand

² Pharmacy Section, Bang-rakam Hospital, Phitsanulok

³ Department of Pharmaceutical Sciences, Faculty of Pharmacy, Chiang Mai University, Chiang Mai, Thailand.

⁴ Department of Pharmaceutical Care, Faculty of Pharmacy, Chiang Mai University, Chiang Mai, Thailand.

Abstract: The purpose of this study was to prepare an antifungal cream from *Impatiens balsamina* Linn (lb). The dried leaves were macerated in methanol and the extract was reextracted with chloroform. The final extract was tested by agar diffusion method for its antifungal activity against *Trichopyton rubrum* and *Trichopyton mentagrophytes* and the optimum concentration to be used in lb cream which was found to be 20%. Three formulations of 20% lb creams were then prepared using the selected bases and tested for antifungal activity against the 2 organisms mentioned in comparison with the 2% ketoconazole cream available in the market. It was found that the three lb creams possessed higher antifungal activity than the proprietary preparation. The results suggested the potential of lb cream to be further developed into an effective antifungal cream.

O2_00008 The effects of crude extracted *Kaempferia parviflora* on human cholangiocarcinoma cells proliferation, metastasis and apoptosis

Sunida Tiamyuyen¹ and Vijitra Leardkamolkarn²

¹ Toxicology Graduate Program, Faculty of Science, Mahidol University

² Department of Anatomy, Faculty of Science, Mahidol University, Bangkok, 10400, Thailand

Abstract: This study was aimed to investigate the anti-proliferation, anti-metastatic and apoptotic effects of the crude extracts from *K. parviflora* on human cholangiocarcinoma cell line. Firstly, cytotoxic effect and 50% inhibitory concentration (IC_{50}) were evaluated and determined by MTT assay. Then, the appropriated doses were selected for further investigation on anti-metastasis and induction of apoptosis, by transwell invasion and DAPI staining assays, respectively. The results shown that the cell viability of HuCCA-1 cells exposed to ethanol and hexane extracts were decreased in a dose-dependent manner and the 50% inhibitory concentrations (IC_{50}) values were 29.97 and 36.81 μ g/ml, respectively. The selected low cytotoxic dose of each extracts slightly reduced HuCCA-1 invasion and the selected high cytotoxic dose induced nuclear fragmentation in the cells. Further study on mechanisms of metastasis inhibition and cell death induction by *K. parviflora* are underway.

O2_00009 Antimicrobial property of the essential oil and crude extract from Patchouli leaves

(*Pogostemon cablin*)

Pongsin winitchai¹, Warunee Thanapane¹, Wuttinant kongtud¹, Jessadaporn Ruangmarerong², Chowwanee Meewang² and Supatchalee Supjarean².

¹ Kasetsart Agricultural and Agro-Industrial Product Improvement Institute, Kasetsart University, Bangkok.

² Department of Microbiology, Kasetsart University, 50 Pahonyothin Road, Bangkok, Thailand.

Abstract: Concentration (MIC) of patchouli oil and crude patchouli extracts Agar diffusion method with 2 strains of *Propionibacterium acnes* and *Staphylococcus epidermidis*. It was found that the efficient inhibitory concentration for the previous 2 strains of patchouli oil in acne facial foam compared with Trichosan in the level of studying at 0.5% and 1.0%. respectively. The result showed that the MIC of patchouli oil and crude patchouli extracts that could inhibit the 2 strains was 64 mg/ml. The result also demonstrated that Trichosan with concentrations of 0.5% and 1.0% significantly showed better inhibition than acne facial foam containing patchouli oil. However, the concentration of patchouli oil at 0.5% and 1% in acne facial foam showed the efficiency to inhibit the microbial acne growth of 2 strains, *P. acnes* and *S. epidermidis*, followed by the standard. In addition, both concentrations of patchouli

O2_00010 Determination of lipophilicity values of flavonoids using butanol-water system and calculation methods

Montree Tungjai¹, Wilart Pompimon² and Samlee Mankhetkorn¹

¹ Laboratory of Physical Chemistry, Molecular and Cellular Biology, Department of Radiologic Technology, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai, Thailand.

² Faculty of Science, Lampang Rajabhat University, Lampang, Thailand.

¹ E-mail:samlee@chiangmai.ac.th, Fax:053-949207

Abstract: This study aims to determine the lipophilicity of a series of flavonoids that the carbon atoms at different positions in ring A, B and C was substituted by hydroxyl, methoxyl group or hydrogen atom, by using butanol-buffered system and the concentration of flavonoid was analyzed with reverse phase HPLC. The pH of buffered solution was varied from 2 to 12. The ratio of flavonoid concentration in butanol to aqueous phase, the so-called partition (P) and log P represents the lipophilicity values. Among compounds studied, catechin is the simplest in chemical structure and its log P values experimentally determined was equal to 0.38 ± 0.04 . Experimental data suggested that the conjugation characteristics and hydroxyl substitution pattern were the most important determinants of log P of flavonoids. The log P values with respective to the chemical structure of compounds were analyzed and the numerical log P differences resulting from the various substitutions of as H, hydroxyl and methoxyl groups at various carbon positions of flavonoid nucleus was obtained. The log P values of flavonoids can be estimated from the expression: $\text{Log P} = \text{Log P}_{(\text{catechin})} + \Delta \text{Log P}_{(\text{ring A})} + \Delta \text{Log P}_{(\text{ring B})} + \Delta \text{Log P}_{(\text{ring C})}$. There is very good relation (Slope = 1.084 and $R^2 = 1$) between the calculated log P and experimental log P values in butanol/buffer systems. Using the log P expression can correctly predict the log P values of the flavonoids studied and other flavonoids in octanol/buffer.

O2_00012 LACK OF GENOTOXIC ACTIVITY OF CURCUMA COMOSA EXTRACT ON MICRONUCLEUS FORMATION OF MOUSE BONE MARROW CELLS

Lakana Himakoun, Pranom Puchadapirom, Surapol Kongtim, Punya Temcharoen

Department of Pathobiology, Faculty of Science, Mahidol University, Bangkok 10400, Thailand.

Abstract: *Curcuma comosa* Roxb. commonly known as Waan chak mod look, is widely used as in indigenous medicine in all regions of Thailand. In spite of its long use, there have been only few studies of its toxicity. Therefore, the present study aims to investigate the genotoxicity of *C. comosa* by using micronucleus assay in polychromatic erythrocyte (PCE) of mouse bone marrow. Male mice orally received the hexane extract of *C. comosa* at a dose of 250, 500 or 1000 mg /kgBW. At 24 and 48 hour after treatment, the animals were sacrificed and number of micronucleus were determined. Hexane extract at all doses had no effect on the micronucleus formation in the mice bone marrow cells at any time point when compared to the control ($p < 0.05$).

In conclusion, hexane extract of *C. comosa* is lack of genotoxic effect as assumed by micronucleus test in PCE of

mouse bone marrow. However, at the very high dose, the extract did have cytotoxic effects on the cells.

O2_O0013 ACETYLCHOLINESTERASE INHIBITORS FROM *Feroniella lucida*

Sitthidesch Sombund, Santi Tip-pyang and Preecha Phuwapraisirisan

Natural Products Research Unit, Department of Chemistry, Faculty of Science, Chulalongkorn University, Bangkok, 10330, Thailand.

Abstract: Nine furanocoumarins were isolated from the stems of *Feroniella lucida*. Three compounds are novel structures having an oxolane, oxane and oxepane moiety. The overall structures and configuration were determinated by spectral method.¹ All compounds were tested for Acetylcholinesterase; five of which were active against the enzyme.

O2_O0014 ANTIOXIDANT XANTHONES FROM *Cratoxylum cochinchinense* (Lour.) Blume

Suthee Udomchotphruet^{1,2}, Preecha Phuwapraisirisan¹, Sern Surapinit^{1,2} and Santi Tip-pyang¹

¹ Natural Products Research Unit, Department of Chemistry, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand.

Email: suthee_udom@hotmail.com

² Program of Biotechnology, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand.

Abstract: Two new xanthones named cratoxylumxanthone A (1) and cratoxylumxanthone B (2) together with six known compounds: dulcisxanthone B (3) 2-geranyl-1,3,7-trihydroxy-4-(3-methylbut-2-enyl)xanthone (4), α-mangostin (5), β-mangostin (6), cochinchinone A (7) and garcinoneA (8) were isolated from *Cratoxylum cochinchinense* stems. The structure of new compounds were characterized by 1D and 2D NMR techniques. The isolated compounds showed free radical scavenging against DPPH and lipid peroxidation inhibition.

O2_O0015 ANTIRADICAL ACTIVITY OF VOLATILE OIL AND EXTRACT FROM THAI ZINGIBERACEOUS PLANTS.

Jakaphun Julsrigival, Suneet Chansakaow, Suwanna Vajabhikul, Chaiyat Chaiyasut

Department of Pharmaceutical Sciences, Faculty of Pharmacy, Chiang Mai University, Chiang Mai, Thailand.

E-mail: j_julsrigival@hotmail.com, Fax: (665)3222-741

Abstract: The objective of this research was to study antiradical activity of extract and volatile oil from 5 kinds of Zingiberaceous plants: *Alpinia galanga* (L.) Willd, *Curcuma longa* Linn., *C. mangga* Val. & Zijp., *Zingiber montanum* (Koen.) Theilade, *Z. officinale* Valeton. The extract was obtained by continuous extraction using 95% ethanol as solvent. The residue was extracted by reflux technique with water to obtained water extract. Volatile oil of these plants was prepared by hydrodistillation. For testing of antiradical activities, ABTS (2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) assay was used and compared with the activity of known antioxidant, Trolox (milligram of Trolox per gram of sample). Results indicated that the antiradical activity obtained from alcoholic extract of *C. longa*, volatile oil and water extract from *Z. montanum* showed highest activities of 187.543, 56.469, and 32.058 mg/g in each group respectively.

O2_O0016 VERIFICATION OF THAI TRADITIONAL MEDICINE BY CHEMINFORMATICS

Daungmanee Chuakheaw, Chak Sangma

Cheminformatics Research Unit, Department of Chemistry, Faculty of Science, Kasetsart University, Bangkok, Thailand.

Abstract: In this study, a part of Thai traditional medicine was verified using a novel cheminformatics method. It was carried out by virtual screening on the structural database of Thai medicinal plants for anti-neuraminidase compounds. The screening procedure was a combined method of molecular docking and the scoring functions. After the candidates structures were obtained, traditional formulations were analyzed to see if the plants having these candidates were included in the formula. The results showed that few traditional formulations contain most of the potential herbs. This implied that there was a correlation between the Thai traditional knowledge and the results using cheminformatics.

O2_O0017 Investigation on Antimicrobial Activity of *Eclipta prostrata* Linn.

Weena Chutimanitskul¹, Dhanupat Pasutanun¹, Thummaruk Suksrichavalit²,

Rungrot Cherdtrakulkit², Supaluk Prachayasittikul¹, Virapong Prachayasittikul² and Somsak Ruchirawat³

¹ Department of Chemistry, Faculty of Science, Srinakharinwirot University, Sukhumvit 23, Bangkok 10110, Thailand

² Department of Clinical Microbiology, Faculty of Medical Technology, Mahidol University, Bangkok-noi, Bangkok 10700, Thailand

³ Laboratory of Medicinal Chemistry, Chulabhorn Research Institute, Vipavadee Rangsit Highway, Bangkok 10210, Thailand

Abstract: *Eclipta prostrata* Linn., a medicinal plant of family Compositae, has been used as antiflatulent, laxative, anti-venom and local anesthetic actions. The crude hexane extract was separated using repeated silica gel column afforded eight fractions (G1-G8) and stigmasterol together with a mixture of stigmasterol and β-sitosterol. The fractions were evaluated for antimicrobial activity using agar dilution method against 28 strains of microorganisms. The results showed that all the tested fractions (G1-G8) inhibited many microorganisms at concentration 64-256 µg/mL. Particularly, fractions G5 and G6 completely inhibited the growth of *C. diphtheriae* NCTC 10356 at 64 µg/mL.

O2_00020 HYDNOCARPUS ILICIFOLIA EXTRACTS FOR INHIBITION OF FUSARIUM OXYSPORUM AND XANTHOMONAS CAMPESTRIS

Napasawan Hatthakitpanichakul and Janpen Tangjitaroenkun

Faculty of Resources and Environment, Kasetsart University, Si Racha campus, Chonburi, Thailand.

E-mail: som@src.ku.ac.th, Fax: (66) 038-354587

Abstract: This research has the aim to extract active crudes from *Hydnocarpus ilicifolia* – the medicinal plant found in tremendous quantities on Nam-Sub hill, Kasetsart University at Si Racha campus – for inhibition of 2 categories of plant pathogenic organisms - *Fusarium oxysporum* - causing of Fusarium wilt and *Xanthomonas campestris* - causing of citrus canker. *Hydnocarpus ilicifolia* leaves were extracted with hexane, dichloromethane and ethanol by comparison of 2 methods - soxhlet extraction and ambient temperature extraction. Then the extracts were tested with *Fusarium oxysporum* and *Xanthomonas campestris* by disc diffusion. The results indicated that soxhlet dichloromethane and ethanol extracts showed greater activity on *Fusarium oxysporum* than hexane extracts. Furthermore, soxhlet ethanol extract produced more efficient to inhibit *Xanthomonas campestris* than hexane and dichloromethane extracts. Whereas the ambient temperature ethanol extract produced more efficient to inhibit both of the organisms than their corresponding hexane and dichloromethane extracts. In addition, on the whole, the ambient temperature extracts showed greater activity than the soxhlet extracts.

O2_00023 FLUORESCENCE RESONANCE ENERGY TRANSFER STUDY OF QUERCETIN AND QUERCETRIN INTERACTION WITH BOVINE SERUM ALBUMIN IN PHYSIOLOGICAL SOLUTION: DETERMINATION OF BINDING CONSTRAINTS AND BINDING SITES

Winit Choiprasert and Samlee Mankhetkorn¹

Laboratory of Physical Chemistry, Molecular and Cellular Biology, Department of Radiologic Technology, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai, Thailand.

¹ E-mail: samlee@chiangmai.ac.th, Fax: 053-949207

Abstract: We sought to use bovine serum albumin (BSA) as a protein fluorescence probe system, coupling excited-state intermolecular Förster energy transfer and intramolecular proton transfer (PT). BSA contains tryptophan residues, which transfers its excitation energy to quercetin or quercetin, an acceptor exhibiting excited-state intramolecular PT. We demonstrate such a coupling in BSA-quercetin and -quercetin complexes, excited via the single intrinsic tryptophan. Analysis of spectroscopic data leads to the conclusion that two binding sites are involved in the bovine serum albumin-quercetin and quercetin interaction. In physiological buffer pH 7.3 at 37°C, the molecules bound to the higher affinity binding site and to the lower affinity site, has the association constant of K_1 equal to $2.36 \times 10^5 \text{ M}^{-1}$ and $1.27 \times 10^5 \text{ M}^{-1}$ and K_2 equal to $4.2 \times 10^6 \text{ M}^{-1}$ and $3.22 \times 10^6 \text{ M}^{-1}$ for quercetin and quercetin, respectively. These microscopic binding constants did not change when the reactions were performed in the same conditions at pH 4 but the complexes were dramatically decreased. This signified that the electrostatic interaction plays a major role in stabilizing complex.

O2_00024 Screening of Thai Medicinal Plants for Antimalarial Activity

Nattida Suwanakitti^a, Surachai Pornpakkul^b, Nattaya Ngamrojanavanich^b, Khanitha Pudhom^b

^a Program of Biotechnology, Faculty of science, Chulalongkorn University;

^b Department of Chemistry, Faculty of science, Chulalongkorn University;

Abstract: *Andrographis paniculata*, *Streblus asper*, *Abutilon indicum*, and *Heliotropium curassavicum* were selected for the study based on their ethnomedicinal values. Their crude extracts were screened for in vitro antimalarial activity against the chloroquine-resistant (K1) strains of *Plasmodium falciparum*. The crude extract of *A. paniculata* showed the most effective than other extracts. Four andrographolides (1-4) and flavonoid (5) isolated from the EtOAc crude extract of *A. paniculata* were also evaluated for their in vitro antimalarial activity. Andrographolide (1) and flavonoid (5) exhibited significant inhibition of *P. falciparum* growth with IC_{50} value of 5.96 and 2.03 $\mu\text{g/mL}$, respectively. Furthermore, in vivo antimalarial activity against *P. berghei* on ICR mice of andrographolide (1) were evaluated using Peters' 4-day test and it showed 30% parasitemia suppression at a dose of 50 mg/kg/day and 43 % at a dose of 100 mg/kg/day by intraperitoneal (ip) administration without any significant toxicity.

O2_00025 IN VIVO IMMUNOMODULATING ACTIVITY OF WOOD EXTRACTS FROM CLAUSENA EXCAVATA BURM. F.

Aranya Manosroi^{1,2}, Aurasorn Saraphanchotiwittaya³, and Jiradej Manosroi^{1,2}

¹ Faculty of Pharmacy, Chiang Mai University, Thailand

E-mail: pmpti005@chiangmai.ac.th, Fax: (665)389-4169

² Natural Products for Thai Traditional Medicines Research Unit, Pharmaceutical Cosmetic Raw Materials and Natural Products Research and Development Center (PCRNC), Institute for Science and Technology Research and Development (IST), Chiang Mai University, Thailand

³ Department of Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, Naresuan University, Thailand

Abstract: Immunomodulating effects in Balb/C mice of aqueous extract (CEHW) and the Thai folklore preparation (CEHF) of *Clausena excavata* Burm. f. were investigated. Haemagglutinating antibody (HA) titers at day 0, 7, 14, 21, 28 and 35 from the serum of animals fed or injected intraperitoneally with the extracts for 5 days were compared and evaluated for humoral mediated Immunity (HMI). Footpad swelling test was used to determine delayed type hypersensitivity for cell mediated immunity (CMI). CEHW and CEHF injected intraperitoneally and administered orally exhibited the same maximum antibody

production of 1/800. Both extracts given orally reached the maximum antibody titer at day 7, which was 2 weeks faster than by intraperitoneal administration. However, antibody titers from CEHW injected intraperitoneally diminished without retaining whereas the CEHF retained for 1 week. Moreover, CEHW gave CMI response more than the CEHF. This study suggested the potential in vivo immunomodulating activities of extracts from *Clausena excavata* supporting our previous *in vitro* studies.

O2_O0028 Purification of polyphenols of Siamois® red wine and study of their efficacy of antiproliferative and apoptosis-inducing activity against erythromyelogenous leukemic and small cell lung carcinoma cell lines

วิภา ลากูน, สามารถ เดชสุภา, ไพบูลย์ เวียงพัฒนพงษ์, มนต์รี ตั้งใจ, วินิจ ชัยประเสริฐ, วรุวรรณ ปราบมก., สมพงษ์ ศรีบูรี, ธนกร โภทันย์ และ สารี มนัสสก์กรน*

Laboratory of Physical Chemistry, Molecular and cellular Biology (PCMBC), Department of Radiologic Technology, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai, Thailand.

E-mail: samlee@chiangmai.ac.th, Fax: (665)394-9207

Abstract: The chemical analysis and separation of polyphenols of Siamois® red wine and their potential inhibition of leukemic and small lung carcinoma cell growth were studied. The Siamois® red wine powder was composed of flavonoids, phenolic acids and proanthocyanidin and the total polyphenolic contents is 45% of dried weight powder. Quercetin (IC_{50} ; K562 = $10 \pm 0.8 \mu M$ and GLC4 = $22 \pm 1.6 \mu M$), quercetin glycoside (IC_{50} ; K562 = $6 \pm 1 \mu M$ and GLC4 = $8 \pm 1 \mu M$) and kaempferol (IC_{50} ; K562 = $13.2 \pm 0.8 \mu M$ and GLC4 = $20.6 \pm 1.6 \mu M$) were majority found. These molecules exhibited two fold of antiproliferative activity against MDR cells compared with their corresponding parental cells. The mixture of mamo wood extract and Siamois® red wine show higher antiproliferative activity than Siamois® red wine alone. In addition, Siamois® red wine powder induces apoptosis in all cell lines and flavonoids were proposed as their active molecules by which mediate action at mitochondria of cells.

O2_O0027 FREEZE-DRIED WHITE KWAO KRUAD (PUERARIA MIRIFICA) POWDER PROCESSING

Surachai Keawboonreang*, Suchada Chaisawadi¹, Waraporn Methawinyasilp¹

* Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand

E-mail: surachai@pdti.kmutt.ac.th, Fax (662)-4707548

Abstract: White Kwao Krua (*Pueraria Mirifica*), one of the Thai medicinal herb, has been recognized for Thai folk medicine centuries for its remarkable health-enhancing properties and although known for specific application. Some of the main components, miroestrol and deoxymiroestrol, extracted from Kwao Krua have been shown to have estrogen like effects. Because of the components in Kwao Krua has substantial health benefits, its extracts are made by concentrating active ingredients from the rhizomes and used as ingredients in cosmetic and pharmaceutical industry. The White Kwao Krua powder which contains the high contents of active ingredients and the same properties of the fresh White Kwao Krua is in a great demand for stability with high quality. The freeze dried White Kwao Krua powder processing has been developed and implemented at the Production Services, Industrial Park, KMUTT. The preliminary results show one hundred kilograms of White Kwao Krua produced 9.6 kilograms of dried White Kwao Krua by using hot air oven. These dried products produced 1.48 kilograms of freeze dried White Kwao Krua powder. The quality of freeze dried White Kwao Krua has been analysed in active ingredient to compare with the fresh one. The results showed actives ingredients in freeze dried White Kwao Krua powder had the same quality as the fresh White Kwao Krua. The stability of the freeze dried powder is now on the process of stability test. The waste utilization and clean production on freeze-dried White Kwao Krua powder has been proposed for further study to make it feasible in commercial production.

O2_O0028 APPLICATION OF MEDICINAL PLANT EXTRACTS FOR ANTI - PROPIONIBACTERIUM ACNES ACTIVITY.

Piyada Saenghirun and Malee Srisodsuk

Department of Microbiology, Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen, Nakhon Pathom, Thailand 73140.

Abstract: *Propionibacterium acnes* is an anaerobic bacteria found around skins and hair follicle areas. It is the causative agent of acne vulgaris or pimples. In this study the effect of 68 of 95% ethanolic and water extracted medicinal plants were tested for inhibitory effect on *P.acnes* by paper disc agar diffusion method. The bacterium was grown on brain heart infusion agar at 37°C under anaerobic condition for 5 days, then the inhibition zones were determined. The 95% ethanolic extracted fresh medicinal plant which include *Pluchea Indica*, *Butea superba* and *Azadirachta indica*, as well as dry *Azadirachta indica*, *Garcinia mangostana* and *Pouzolzia pentandra* were found to exhibit high inhibitory effect against *P. acnes* with inhibition zone of 2.2, 2.07, 1.77, 1.70, 1.77 and 1.67 cms., respectively. In general, fresh and ethanolic extracted medicinal plant had higher inhibitory effect against the bacterium than the dry or water extracted plant.

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กระทรวงวิทยาศาสตร์และเทคโนโลยี



สำนักงานคณะกรรมการวิจัยแห่งชาติ (วช.)



สำนักงานกองทุนสนับสนุนการวิจัย (สกว.)



กลุ่มธุรกิจสำรวจ ผลิต และก้าชธรรมชาติ บริษัท ปตท.จำกัด (มหาชน)



บริษัทชาร์ปเทพนค์ จำกัด และ บริษัท โปรดักส์ คอนซัลแตน จำกัด (PRODUCTS CONSULTANT)



ศูนย์ปฏิบัติการวิจัยเครื่องกำเนิดแสงซินโคร์ตันแห่งชาติ (ศวช.)



บริษัทมาลีสามพาราน จำกัด (มหาชน)



สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ (สวทช.)



สำนักงานคณะกรรมการการอุดมศึกษา (สกอ.)



ศูนย์พันธุ์วิเคราะห์และเทคโนโลยีชีวภาพแห่งชาติ

คณะกรรมการชุดต่างๆ ในการจัดงานประชุมวิชาการวิทยาศาสตร์ และเทคโนโลยีแห่งประเทศไทยครั้งที่ 32

1. คณะกรรมการดำเนินงาน

ที่ปรึกษา

คุณเจตราชพงษ์ กว้างสุขสติธรรม
รองกรรมการผู้จัดการใหญ่
บริษัท ปตท.สำรวจและผลิตกําชีวกรรมชาติ จำกัด
คุณพิลเมธย์ จันทรุเบกษา¹
ผู้อำนวยการฝ่ายครัวการบันไทย
คุณณัตรชัย บุญรัตน์
ประธานคณะกรรมการบริหาร
บริษัท มาลีสามพาราน จำกัด (มหาชน)
ดร.มรกต ตันติเจริญ²
ผู้อำนวยการศูนย์พันธุ์วิศวกรรม
และเทคโนโลยีชีวภาพแห่งชาติ
ประธานคณะกรรมการ
รศ.ดร.นภาวรรณ นาพรัตน์ราภรณ์
กรรมการ
คณบดีคณะวิทยาศาสตร์
มหาวิทยาลัยลักษณ์
รศ.ดร.ศุภวรรณ ดันยานันท์
รศ.ดร.สุรินทร์ เหลาสุขสติธรรม
ศ.ดร.จำรัส สิมตระกุล
คุณ มนัชดา สีตะอ่อน
เลขานุการ
อาจารย์พิทักษ์ นิลนพคุณ

2. คณะกรรมการฝ่ายวิชาการ

รศ.ดร.นภาวรรณ นาพรัตน์ราภรณ์
ประธานคณะกรรมการ
รศ.ดร.รา华รัตน์ ศุภศิริ
รองประธานกรรมการฝ่ายประสานวิชาการ
ผศ.ดร.สุนี รักษาเกียรติศักดิ์
รองประธานฝ่ายจัดการข้อมูล
อาจารย์พิทักษ์ นิลนพคุณ
เลขานุการ
รศ.เพ็ญรัตน์ วงศ์วิทยากร
กรรมการและผู้ช่วยเลขานุการ

นางฤทิเมล แสงชัยธรรม

กรรมการและผู้ช่วยเลขานุการ

กรรมการสาขาวิชาการ

A. Math, Computing and IT

ประธานสาขา: ศ.ดร.ยงค์วิมล เสนบูร์
ประธานร่วม: ศ.ดร.ชิตชนก เกลือลินทร์พิร์
กรรมการ
รศ.ดร.มนต์พิทักษ์ เพียงสุวรรณ
Prof. Dr. Julian Paultre
รศ.ดร.พัชรา ไชยลริยา
รศ.ดร.เนญจวรรณแสง วิรัฒน์ปัญพิร์
รศ.ดร.นวรัตน์ อนันต์ชื่น
ศ.อ่านวย ชนันไทย
ศ.ดร.สมชาย ธรรมพงษา³
ศ.ดร.อุพารัณ์ เบ็มประสีกิริ
รศ.ดร.กฤษณะ เนียมมณี
ดร.วิชาญ ลิวเกิร์ติกุล
รศ.ดร.อัจฉรา หาญชูวงศ์
รศ.ดร.พีระพันธ์ โภพสสติธรรม
รศ.ดร.วีระ จันทร์คง
รศ.ดร.มาสตรา วงศ์อินวุฒิ

B. Biological Science

ประธานสาขา: ศ.ดร.ม.ร.อ.ชัยณุสรณ์ สวัสดิ์วัตต์

B1: Biology, B2: Microbiology, B3: Genetics

ประธานสาขา: ศ.ดร.สิริรัตน์ วงศ์พิริ

ประธานร่วม: ท ดร. ปราณอม จันทร์ใจดี

กรรมการ

ผศ.ดร.มาลินี ฉัตรมงคลกุล
ผศ.ดร.สุพัฒน์ เจริญพรวัฒนา⁴
ผศ.ดร.ศุภจิตรา ชัชวาล
ผศ.ดร.พงศ์ธาริน โล่ตรอก
ดร.พงษ์ชัย หาญยุทธนากร
ดร.ชัชวาล ใจชื่อสกุล
กรรมการและเลขานุการ: ผศ.ดร.จันทร์เพ็ญ จันทร์เจ้า

B4: Biotechnology, B5: Biochemistry

ประธานสาขา: ศ.ดร.ม.ร.อ.ชัยณุสรณ์ สวัสดิ์วัตต์

ประธานร่วม: รศ.ดร.ธารารัตน์ ศุภศิริ

กรรมการ

รศ.ดร.รัชนีกร กัลล์ประวิท

รศ.ดร.พวงรัตน์ ยงวนิชย์

รศ.ดร.พรพิพิพัชช์ ชัยมณี

รศ.ดร.索พิล วงศ์คำ

รศ.ดร.สุนันทา วัฒนาไก

รศ.ดร.รอมิตา วัฒนาไก

ดร.บูรชัย สนธิยานนท์

ผศ.ดร.พิสิฐ ประพันธ์วัฒนา

ผศ.ดร.พวงพว สุทธิพงษ์ชัย

ผศ.ดร.ชินจิตต์ บุญเนตร

ผศ.ดร.กัณยาภัตน์ สุพิมลย์วัฒนา

ดร.สุจินต์ อังกุราวิรุทธิ์

รศ.ดร.เอกอرج เบญจว่องศักดิ์ชัย

กรรมการและเลขานุการ: รศ.ดร.ฤทธิ์ สุราฤทธิ์

C. Chemistry

ประธานสาขา: ศ.ดร.จำรัส ลิ้มตระภูร

C1: Analytical Chemistry

ประธานสาขา: รศ.ดร.ยุวดี เชี่ยววัฒนา

ประธานร่วม: ศ.ดร.เกตุ กรุดพันธุ์

กรรมการ

รศ.ดร.เพริศพิชญ์ คงชาหารณา

รศ.ดร.ภาวดี สุกี้ไวยกิล

รศ.ดร.คณิต ဂณัชณ์ถุง

รศ.ดร.อรุณรัตน์ ชี้ต่างถุง

ผศ.ดร.อรุณศิริ ชีตางถุง

รศ.ดร.ชนอง เอกสิทธิ์ส

ผศ.ดร.ดวงใจ นาคะปรีชา

ดร.วเรศ วีระสัย

ผศ.ดร.อพิทaya ศิริกัญญาณนท์

ผศ.ดร.จรุญ จักรมุนี

ดร.สมชาย ลาภอนันต์นพคุณ

รศ.ดร.ศุภลักษณ์ ศรีจารันย์

ผศ.ดร.รจนา บุรีคำ

ผศ.ดร.อรพินท์ เจียรณา

ผศ.ดร.รัศมี ชัยสุขสันต์

อาจารย์วีณา เสียงเพราะ

อาจารย์นิรันดร์ พงษ์พันธ์

C2: Inorganic Chemistry

ประธานสาขา: รศ.ดร. นวัชชัย ตันกุลานิ

ประธานร่วม: รศ.ดร. สุจิตรา ยังมี

กรรมการ

รศ.ดร. อรุณรัตน์ ชัยลภากุล

รศ.ดร. นาลพรรณ จันทร์ศิริ

ผศ.ดร. อัญชลี สุกแสลงปัญญา

ผศ.ดร. นงนุช เหมืองสิน

ผศ.ดร. เสาร์กษ์ เพื่องสวัสดิ์

ผศ.ดร. บุษยรัตน์ ธรรมพัฒนาภิจ

ดร. อริชา ฉายลุวรรณ

ดร.วสกា เอื้องไมตรีกิริมย์

ดร. โสมวดี ไชยอนันต์ลุริท

กรรมการและเลขานุการ: ดร.นิปกา สุขกิริมย์

C3: Organic Chemistry

ประธานสาขา: รศ.ดร.วีรบุรุษ วีไลวัลย์

ประธานร่วม: รศ.ดร.มังคล ลุขวัฒนาสินิพิริ

ผศ.ดร.เทียนทอง ทองพันธุ์

กรรมการ

รศ.ดร.บุญสิ่ง คงคาทิพย์

รศ.ดร.สมเดช กนกเมธากุล

รศ.ดร.สมยศ สุกี้ไวยกิล

รศ.ดร.ปัญชา พูลโภค

ผศ.ดร.อรุณรัตน์ พันธุ์อุมาวิน

ผศ.ดร.วรินทร์ ชวศิริ

ดร.ชุติมา ศุภากาญจน์

ดร.พนศักดิ์ พลอยประดิษฐ์

ดร.พุทธินันท์ มีເພົ່າພັນຸ້ງ

กรรมการและเลขานุการ: ดร.พัลลภ ตันเจียงค์

C4: Physical Chemistry

ประธานสาขา: ศ.ดร.จำรัส ลิ้มตระภูร

ประธานร่วม: ผศ.ดร.ยุทธนา ตันติรุ่งโรจน์ชัย

กรรมการ

รศ.ดร. สุก้า หารหน่องบัว

ผศ.ดร. พิญธ์ พันธุ์

ดร.จักร แสงมา

ดร.ธนาิน นานอก

ดร.เพญศรี บุญสวาร์คส่ง

ดร.รังกล จารุภัทราช

ดร.วารุษ วีระสัย

ดร.เอกสิทธิ์ สมสุข

ผศ.ประวิทย์ สุดแก้ว

ศ.ดร. กฤชดา สาริก

ผศ.ดร. ไธนพร ดำเนินวิรุฬห์

ผศ.ดร. สุนันทา เแข็งรัตน์

กรรมการและเลขานุการ: ดร.อภินันท์ รุจิรัตต์

C5: Medicinal Chemistry

ประธานสาขา: รศ.ดร.รากม่อน คงคำพิพพ์

ประธานร่วม: รศ.ดร.พลังเพล คงเสรี

กรรมการ

รศ.ดร.สุรินทร์ เหลาสุขสมิตร

รศ.ดร.ปทุมรัตน์ ชูจินดา

รศ.ดร.สุนิตย์ อุขลารามุ

รศ.ดร.วัชรินทร์ รุกข์ไชยศิริกุล

กรรมการและเลขานุการ: รศ.ดร.ชัยณุชา ภนกเมธากุล

D. Physic

ประธานสาขา: ผศ.ดร.สุพัคก์ ยกส้าน

ประธานร่วม: ผศ.ดร.บุญโถสุติ เม่าสวัสดิ์ยารยง

ศ.ดร.วิรุฬห์ สายคณิต

ศ.ดร.สมชายก่องเต็ม

รศ.ดร.พิเชษฐ์ ลิ้มสุวรรณ

รศ.ดร.บัญชา พนเจริญสวัสดิ์

รศ.ดร.รัศมีตรา ทุ่นสวัสดิ์

รศ.ดร.วิทยา อmurกิจบำรุง

รศ.ดร.สุกิจ ลิมป์จันรงค์

E. Materials Science

ประธานสาขา: ศ.ดร. ทวี ตันธนศิริ

ประธานร่วม: รศ.ดร.วีระศักดิ์ อุดมกิจเดชา

กรรมการ

รศ.ดร.สุพล อนันดา

รศ.ดร.จีระพงษ์ ตันตระกูล

รศ.ดร.ทวีชัย อุมาศักดิ์ชัย

Dr. Robert Molloy

ดร.วนิดา จันทร์วิคุล

ดร.สมนึก ศิริสุนทร

ดร.ศิริรัตน์ เจียมศิริเลิศ

ผศ.ดร. รัตติกร ยิ่มนันรัตน์

F. Agricultural Science

ประธานสาขา: ศ.ดร.สายชล เกตุชา

ประธานร่วม: ผศ.สมโภชน์ น้อยจินดา

กรรมการ

ศ.ดร.สายอันด์ ทัดศรี

ศ.ดร.อุทัยรัตน์ ณ นคร

รศ.ดร.นิพนธ์ ทวีชัย

รศ.ดร.ประทักษิร ดาบทิพย์วรรณ

ผศ.ดร.กิตติ โพธิปักษ์

ผศ.ดร.ชัยภูมิ บัญชาศักดิ์

กรรมการและเลขานุการ: ผศ.ดร.สพ. ภาณุศาดาณท์

G. Food Science

ประธานสาขา: ศ.ดร.อรอนงค์ นัยวิคุล

ประธานร่วม: รศ.ดร.สายวารุพ ชัยวนิชศิริ

กรรมการ

รศ.ดร.สุคนธ์ชื่น ศรีงาม

รศ.ดร.ส่งวนคร หรือญเจริญ

ดร.ภาณุณิ วารัญญาณนท

ผศ.ดร.ปราจิณร หงสประภาส

ผศ.ดร.สุเมธ ตันตระเสียร

ผศ.ดร.อุบลรัตน์ สิริวัทราชวรรณ

ดร.ธนัณย์ มหาวนิช

กรรมการและเลขานุการ: ดร.วรรณ คงเป็นสุข

H. Biomedical Science

ประธานสาขา: ศ.นพ.ยง. ถู่วรวงษ์

ประธานร่วม: ศ.นพ.อภิวัฒน์ มุติรางกู,

รศ.นพ.ศิลป์ เชาวน์ชื่น

กรรมการ

รศ.พญ.ณัฐรีญา หิรัญกาญจน์

รศ.ดร.จินตนา จิรดาวย

ผศ.ดร.เทวิน แทนคำเนาว

รศ.ดร.ศันสนีย์ ไชโยรุจัน

ผศ.น.สพ. ดร.อลงกรณ์ อุมาศิลป์

ทญ.อรนาญ มาตั้งคสมบัติ

ดร.วันชัย อัศวานาสกุล

รศ.ดร.สิงค์ วงศ์คำ

รศ.ดร.ปรัชญา คงทิวเติศ

ดร.พรพงศ์ สิมประเสริฐ

กรรมการและเลขานุการ: ผศ.ดร.อั้ตรศรี เดชะปัญญา

I. Environment Science

ประธานสาขา: รศ.ดร.สุเมธ ชวadech

ประธานร่วม: ศ.ดร.วิจิตร จงวิศาล

กรรมการ

รศ.ดร.วิศณุ มีอยู่

รศ.ดร.สันทัด ศิริอันันต์ไพบูลย์

กรรมการและเลขานุการ: ดร.จันทร์ ทองคำเกา

J. Engineering and Technology

ประธานสาขา: ผศ.ดร.สมชาย วงศ์วิเศษ

ประธานร่วม: รศ.ดร.สุทธิชัย อัลสะบารุ้งรัตน์

กรรมการ

ดร.สุรชัย สนิทไจ

ดร.สมเด็จ เออมมณี

ดร.อนรรษณ์ ขันธะวนะ

ผศ.ดร.เกียรติ พฤกษากร

ผศ.ดร.จุ่งใจ บันประยนต์

กรรมการและเลขานุการ: ดร.วิสสิรี รุ่งรัตนกุล

K. Science Communication and Education

ประธานสาขา: ผศ.ดร.ยุวดี นาคระมดุงรัตน์

ประธานร่วม: ศ.ดร.วรรธน์พิพา รอตแรงค์

กรรมการ

รศ.ดร.กัญญา พานิชพันธ์

รศ.ดร.พินทิพย์ รินวงศ์

ผศ.ดร.ปริญท์ ชัยวิสุทธิวงศ์

ผศ.ดร.นฤมล ยุตตาม

ดร.พงษ์ประพันธ์ พงษ์โสภณ

กรรมการและเลขานุการ: ดร.ชัชวาลย์ บัวระพันธุ์

L. Health and Sport Science

ประธานสาขา: รศ.ดร.สุพิตร สมารีโต

ประธานร่วม: ศ.นพ.ธีรัตน์ ภุชานันท์

กรรมการ

รศ.นพ.ปัญญา ไนมุก

ศ.ดร.สมบัติ กาญจกิจ

ดร.สิบสาข บุญวิรบุตร

ผศ.ดร.ราตรี เรืองไทย

รศ.ดร.สุปรารถ ขวัญบุญจันทร์

รศ.ดร.ศิริรัตน์ หริรัญรัตน์

M. Beauty and Cosmetics Science

ประธานสาขา: ศ.ดร.มาลิน จุลศิริ

ประธานร่วม: รศ.ดร.อุบลพิพิญ นิมมานนิตร์

กรรมการ

ดร.พรชัย ใจสักกติ

รศ.ยุวดี วงศ์กระจาง

รศ.ดร.อรุณศรี บริเปรม

รศ.ดร. เนติ วรรนุช

ผศ.ดร.ทัศนา พิทักษ์สุริพงษ์

ดร.วันตี รังสิวิจิราประภา

อาจารย์ จิตราศี สุประส่งค์

ดร.เมธิน Müdünkılıç

ผศ.ดร. ขวัญจิตร อึ้งโพธิ์

ผศ.นัฐรูป แก้วนพรัตน์

Yuishi Vayanabe

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ประธานสาขา: ผศ.ดร.สมชาย นาคระมดุงรัตน์

ประธานร่วม: รศ.ดร.วีระศักดิ์ อุดมโชค

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ผศ.พัชร์สุ วรรณชื่า

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รศ.ดร.วิสุทธิ์ พิสุทธิawan

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ผู้ประธานงาน: ผศ.ดร.ประยูร ส่งสิริกุล

กรรมการ

Professor Helmut Wiedemann

รศ.ดร.สกุล ลิมปิจานน

ผศ.ดร.ศุภกร รักใหม่

ดร.ประพงษ์ คล้ายสุบรรณ

กรรมการและเลขานุการ: ดร.บัวภาล พูลเพิ่ม	(ผศ.พิษณุ สถิตศาสตร์)	กรรมการ
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ผศ.ดร.สำราญ ภัตรพานิช	5. นางสาวลดา มนีนิล	กรรมการ
ดร.คณิต สุวรรณบวรรักษ์	6. นางสาววิภาวดี ครุฑทอง	กรรมการ
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2. รองคณบดีฝ่ายวิชาการ (รศ.ดร.ศุภารณ ตันตยาณนท์) รองประธานกรรมการ	7. อ.ดร.ต่อศักดิ์ สีสันนันท์	กรรมการ
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7. รองคณบดีฝ่ายจัดการศึกษา (รศ.สุเมตร คงชื่นลิน)	12. อ.ดร.ศุภวิน วัชร์มูล	กรรมการ
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3. อ.ดร.พจี เพียรสนกุล	กรรมการ	9. อ.ดร.ตันพงศ์ แก้ววงศ์	กรรมการ
4. อ.ดร.พิชญาดา เกตุเมฆ	กรรมการ	10. อ.ดร.นุชนารถ วุฒิประดิษฐกุล	กรรมการ
5. อ.ดร.ชัชวาล ใจซื่อสกุล	กรรมการ	11. อ.ดร.กุลยา สมบูรณ์วิวัฒน์	กรรมการ
6. อ.อนันช อาชาภัค	กรรมการ	12. อ.ดร.รัชฎ พิชญางค์	กรรมการ
7. อ.ไฟแนนซ์ เดชสกุลธร	กรรมการ	13. ผศ.ดร.วราภรณ์ ตั้งพสุธาดล	กรรมการ
8. รศ.ดร.อุรุมาศิลป์ ปันสุข	กรรมการและเลขานุการ	14. ผศ.ดร.รัชลิตา ลิปกรณ์	กรรมการ
9. นางสาวไสลagna หัวชาตรี	ผู้ช่วยเลขานุการ	15. อ.ดร.ดวงกมล พันธ์ศรี	กรรมการ
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2. รศ.ดร.ศิริรัตน์ เรืองพิพัฒน์	กรรมการ	17. อ.ดร.นัยนันทน์ อริยกานนท์	กรรมการ
3. ผศ.ดร.รัฐชาติ มงคลนาวิน	กรรมการ	18. อ.ดร.รุ่งกานต์ นัยสินธุ์	กรรมการ
4. ผศ.ดร.วรรควร พันธุ์มนนาวิน	กรรมการ	19. นางสมศรี พินัยนิติศาสตร์	กรรมการและเลขานุการ
5. ผศ.ดร.ดวงหน้าย พีญตระสุกุล	กรรมการ	20. นางจินตนา เอี่ยมสะอาด	กรรมการ
6. ผศ.ดร.กานกพิทย์ ภักดีบำรุง	กรรมการ	21. นางสาวนุญธิค่า ศิริอ่อนุการวัฒนา	กรรมการ
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Amporn Saekee	C3_C0252	Apivat Baramee	K2_K0027
Amporn Wiengmoon	E_E0079	Apivat Mutirangura	C5_C0048
Ampun Chaikul sareewath	G_G0028		H_H0039, H_H0040
Anan Athipomchol	C6_C0005	Apivat Wisitsorasak	H_H0041, H_H0042
Anawat Pinisakul	I_I0027	Apivat Boonkhuang	D_D0044
Anchalee Tasanakajon	B5_B0197, B4_B0038 B5_B0037, B5_B0199 B5_B0179, B5_B0208	Aporn Bualuang	D_D0013
Anchalee Chuthaputti	H_H0016, H_H0017 H_H0026, H_H0020	Aporn Chuncharunee	B5_B0102, B5_B0103
Anchanee Sangcharoen	B5_B0059	Aran Incharoenakdi	H_H0024
Ancharie Na Chiangmai	B5_B0114		H_H0029, B5_B0035
Andrew G. Booth	K2_K0017		B6_B0036, B5_B0044
Andrew J. Demello	C1_C0230		B6_B0102, B5_B0103
Angsana Himasuttidach	N2_N0001		
Aniroot Dunmuk	B1_B0082	Aran Wasantakom	J1_J0035
Aniwat Passako	I_I0038	Aranya Mahosroi	B4_B0009, H_H0008
			B6_B0024, C3_C0009
			H_H0007, H_H0009
			M_M0008, M_M0001
			M_M0002, O2_O0025
			B2_B0156

Chakorn Chinvongarnorn	C1_C0205	Charitchai Knittanal	B6_B0069, B6_B0077
Chalasai Chaiyasorn	D_D0008		B6_B0106, B6_B0110
Chalee Paibulkichakul	I_J0020, I_J0022		B6_B0111, B6_B0124
	F_F0002	Charitchalerm Isarankura-Na-Ayudhy	C3_C0167, H_H0035
Chalerm Wanarak	D_D0022		B4_B0154, B4_B0168
Chalerm Ruangvivachai	C1_C0072, C1_C0117		B5_B0143, B6_B0145
	C1_C0118, C1_C0120		B6_B0147, C3_C0151
Chalermchai Kaewmaneechai	E_E0108		C3_C0163, K2_K0025
Chalermpol Suwanphakdee	B1_B0050	Chanuwan Rakamne	B1_B0116
Chalermpol Kirdmanee	B4_B0053, B4_B0094	Chat Pholnak	D_D0025, D_D0008
	B4_B0096, B4_B0098	Chatchalai Veranitisagul	C2_C0041
Chalermporn Thongpoon	C5_C0045, C5_C0048	Chatchalida Boonpanaid	C1_C0172
	C5_C0046	Chatchantha Thanbun	C3_C0252
Chalisa Louicharoen	B3_B0046	Chatchanok Karatal	C3_C0067, C3_C0111
Chalobol Wongsawad	B4_B0008, B1_B0011	Chatchawal Wongchoosuk	K2_K0014
	B1_B0013	Chatchawan Changtam	C3_C0249, C3_C0250
Chalobon Yoosook	C5_C0274	Chatyira Chuaynukool	C1_C0130
Chaloemsin Permtermsin	H_H0029	Chatraphun Somton	C1_C0019
Chalongchar Teevasutonsakul	K2_K0024	Chatthapon Mungkundar	H_H0033
Chamnan Promjantuk	D_D0014	Chatuporn Sawatruksa	C1_C0227
Chan Inntam	C4_C0096, I_J0048	Chatyapha Pongchan-O	C2_C0104
Chanaiporn Danvirutai	C4_C0258, C2_C0218	Chaval Sriwong	C2_C0078
	C4_C0279	Chavalek Chayavadhanangkur	C1_C0031, J1_J0011
Chanan Angsuthanasombat	B5_B0159	Chaveng Pakawatchai	C1_C0064, C2_C0147
Chanchai Thongpin	E_E0099		C2_C0218, C2_C0222
Chanchana Thanachayanon	E_E0102, O1_O0018		C2_C0224, C2_C0244
Chanida Palanuvej	H_H0004, H_H0017		C4_C0093
	H_H0016, H_H0020	Chawalit Hongprayoon	B4_B0184
	H_H0026	Chawanit Sittidilokratna	B2_B0006
Chanida Sangsawirup	B1_B0004	Chaweewan Chawattana	D_D0066
Chanin Nantasenamat	B6_B0147, B5_B0145	Chaweewan Sapcharoenkun	E_E0070
Chanin Tirawattanawanich	B6_B0177	Chaweewun Tawara	K2_K0010
Chanin Nantasenamat	C3_C0163, C3_C0167	Chemchok Soankwan	K2_K0018, K2_K0020
Chanita Ponglimanont	C3_C0067	Chetsada Gonsurin	B1_B0192
Channarong Poolperm	C2_C0128	Chidchanok Meechaisue	E_E0098
Channarong Choowong	C5_C0005	Chinnae Thumarongthum	B4_B0030
Chanpen Karuwan	C1_C0203	Chinamas Jenkitjaroenchal	J1_J0035
Chapeng Angchakan	D_D0060	Chinarat Wittayaaprapakorn	E_E0059
Chanprapa Imjongjirak	B4_B0038, B5_B0039	Chinapong Kritayakornupong	C4_C0166, I_J0027
Channuangrit Channok	D_D0004	Chintana Chitchamnong	O2_O0004
Chansawang Ngamphongsai	F_F0051	Chintana Tocharoentanaphol	B5_B0133
Chantana Kankamol	B4_B0153, B4_B0160	Chirawat Kluenrat	D_D0034
Chantanee Buranathai	H_H0021	Chisanucha Sattaponpun	H_H0003
Chanthana Susawaengsup	C1_C0173	Chitchol Palarak	B1_B0176
Chanthaporn Chinara	F_F0013	Chitnarong Sirisathikul	D_D0002
Chanthira Kaewthong	O2_O0007	Chittima Laohpongspaisan	C4_C0074
Chantragarn Srisomsap	B5_B0121, B5_B0069	Chookpitit Thepsithar	B1_B0209, F_F0006
	B5_B0061, B5_B0107		F_F0007, F_F0008
	B5_B0122, B5_B0083		F_F0009, F_F0010
	B5_B0131		F_F0011, F_F0015
Chanugorn Tabtimsai	C4_C0279		F_F0017, F_F0018
Chanwit Chityuttakan	D_D0056, E_E0089		F_F0019
	E_E0095	Cholittha Sarasuk	C1_C0105
Chanya Chaicharoenpong	C3_C0038	Chom Sosawang	D_D0024
Chanyah Dahsah	K2_K0028	Chome Thongleurn	D_D0015
Chaowalee Jaisuk	B3_B0135	Chompoonuch Puchmark	E_E0011, E_E0083
Chaowaneepom Chepprasop	B6_B0018	Chompoonuth Pomcharoennop	B5_B0097
Charida Pukahula	B2_B0156, B4_B0188	Chomyong Chaiubon	K2_K0010
Charwat Samanchal	O1_O0021	Chonlada Lewis	E_E0050
Charles S. Henry	C1_C0186	Chonlada Komno	C3_C0009
Charmsak Sukkaew	E_E0003	Chonladee Cheewasedtham	I_J0036
Charoen Chinwanitcharoen	E_E0104	Chonlayut Raweewan	C5_C0046
Charoen Nakason	E_E0051	Chontita Rattanakul	A_A0008
Charoen Khamla	F_F0059	Choosak Poonsawat	E_E0019, E_E0045
Charoenchai Jaisawang	C3_C0254		E_E0042

Choosri Sriibhen	B5_B0114	Dujeutai Pongkao Kashima	E_E0105
Chortip Kantachot	B1_B0019	Dumrong Lohalaksanadech	I_I0004
Chowwanees Meewang	O2_O0009	Duriya Chantasingh	B4_B0187, B4_B0127
Chuaychusri Sripuman	K2_K0010	Duthathai Fujaroen	B2_B0054
Chuchaat Thammacharoen	C4_C0161, C4_C0162		
Chumpunnee Naksiri	F_F0054		E
Chuntip Kumnuantip	E_E0018, E_E0020	Eakachai Pathomsunyaporn	B2_B0104
Chureerat Phokaew	H_H0041	Eakaphun Banhyeeekhun	B2_B0104
Chutamat Phraphuchamnong	B1_B0158	Eakasit Somsook	C2_C0222
Chutarat Saengkul	I_I0013	Edward J. Wood	K2_K0017
Chutikorn Nopparat	H_H0022	Ek Sangvichien	B1_B0189
Chutima Sinlapavech	B5_B0025	Ekachai Hoornivathanha	D_D0049
Chutima Matayatsuk	C1_C0146	Ekachai Chukeatirote	B1_B0017, B3_B0007
Chutima Thongkasam	C4_C0187		B4_B0030, F_F0024
Chutima Paksunchai	D_D0034	Ekaphan Swaisitang	E_E0048
Chutima Eamchotchewalit	E_E0056, E_E0058	Ekasith Somsook	C4_C0109, C4_C0257
	E_E0062		O1_O0006, C2_C0100
Chutima Hanjavanit	B1_B0029, B1_B0116		C2_C0128, C4_C0099
Chutima Kukusamude	C1_C0120	Ekawan Luepromchai	I_I0042, I_I0045
Chutrat Assawathee	B3_B0115	Ekgapon Chutchawatkulchai	E_E0052
	D	Eksuree Saksomchai	C1_C0158
D Martens	C1_C0213	Enrico Traversa	C2_C0041
D La-Orattapong	D_D0056	Evelyne Bachre	B5_B0179
Damras Wongswang	A_A0009		F
Damras Pumnuan	D_D0037	Fanny L.-Y.Shek	C2_C0107
Damrongsaik Maneepongswadi	D_D0023, D_D0024	Fred J. Sigworth	B6_B0159
Daranee Chokchaichamnankit	B5_B0122, B5_B0203	Fuanglada Veerasai	D_D0048
	B5_B0121, B5_B0083		D_D0047
	B5_B0131	Fumihiro Nakajima	D_D0018, D_D0017
Daranee Sridate	D_D0058	Fuyumi Kobayashi	C1_C0127
Darawan Thongbute	B2_B0172, B2_B0178		G
Dares Kaswket	D_D0018		
Daungamol Nuntasri	E_E0061, E_E0074	G.M. Greenway	C1_C0122
Daungmanee Chuakheaw	O2_O0016	Galayanee Doungchawee	I_I0032
Daungtawan Foungfunga	E_E0082	Gaysorn Chansiri	M_M0004, B2_B0076
David Harding	C2_C0145	George Rowlands	D_D0029
	C4_C0164	Gerd Katzenmeier	B3_B0163
David Ruffolo	D_D0010, D_D0029	Gerhard Buchbauer	M_M0003
	D_D0026, D_D0027, D_D0028	Grlangsak Chairote	B4_B0101
David J. Harding	C2_C0003		H
David A. Simpson	B1_B0019		
David Stc. Black	C3_C0211	Harald Rösner	C3_C0087
Dhanupat Pasutunun	O2_O0017	Harinare Mungpayaban	C1_C0225
Dhassida Sooksawat	C2_C0244	Harit Pitakjakpipop	I_I0031
Dhiravut Chantip	H_H0034	Harry Adams	C2_C0003
Dhirayudh Yokubol	H_H0044	Maharoom Himsuhr	N2_N0013
Direk Injan	H_H0008, H_H0009	Hataichanok Neimsup	C4_C0082
Donald M Croke	C1_C0186	Hathawan Kraisuwan	F_F0043
Dondej Tungtrakanpong	I_I0039	Heiko Leutbecher	C3_C0087
Doongjal Thirathumthavorn	G_G0023	Herbert Budzakiewicz	C1_C0118
Duang Buddhasukh	C3_C0008, C3_C0009	Herman H.-Y.Sung	C2_C0107
Duangamol Nuntasri	E_E0072	Hideaki Kaneko	A_A0005
Duangjal Nacapricha	C1_C0131, C1_C0134	Hideki Nakajima	O1_O0011
	C1_C0142, C1_C0148	Hiroki Muramatsu	J1_J0008
	C1_C0172, C1_C0203	Hirun Sawangkaew	K2_K0010
	C1_C0230, C1_C0241	Hong-York Sinumnuaypol	D_D0052
	C1_C0233	Hywel A. Davies	E_E0021
Duangkamol Maensiri	B4_B0087		I
Uuangmanee La-Urautapong	U_U0059	Ian D. Williams	C2_C0107, C2_C0210
Duangporn Jamsai	O1_O0021	Ikuo Hiroto	B5_B0037
Duangratchaneekom Muenmart	C3_C0014	Ining Meesa	I_I0019
Duangrudee Wattanasirichaigoon	B5_B0059	Inthira Sripichai	D_D0037
Duangta Tongsakul	C4_C0161	Irina Smimova	E_E0081
Dudsadee Kittiyawat	B5_B0071		

Ins Klaiber	C3_C0087, C3_C0089	Jirada Wajkamol	C3_C0013
Isara Rakham	I_J0052	Jiradej Manosrol	M_M0002, B4_B0009
Isara Teerawatsakul	J2_J0012		B5_B0024, C3_C0009
Issarang Nuchprayoon	B3_B0046		H_H0007, H_H0008
Itsara Intanai	B1_B0051		H_H0009, M_M0008
Itsara Khanikaew	K2_K0011, K2_K0005		M_M0001, O2_O0025
Ittapon Chaidacho	C1_C0231	Jiranart Boonkong	G_G0031
	J	Jirapan Dutchaneepheth	E_E0071
J. Toulouse	D_D0055	Jirapan Moungruen	M_M0007
J. Kaew-On	J2_J0021	Jiraporn Chuangbunyal	C5_C0276
J. Waewsak	J2_J0021, J2_J0029	Jiraporn Homewong	C1_C0051
	J2_J0032, J2_J0036	Jirarat Tettiyakul	G_G0036
J.A.N. Parnell	B1_B0118	Jirarat Kamolsawat	E_E0099
J.T.H. Pearce	E_E0102, E_E0079	Jirasak Kongkiattikajom	B5_B0020
Jairadsa Angsuwancharakorn	C1_C00142	Jirasak Wong-Ekkabut	I_I0032
Jakaphan Rangsan	F_F0029	Jirawan Banditpuntat	C3_C0033
Jakaphun Jultsrigival	O2_O0015	Jirawan Siramanont	E_E0097
Jakob Magid	I_I0001	Jirayu Makchit	C5_C0149, C1_C0029
Jakrapan Meechai	D_D0010	Jirayu Sitanurak	C1_C0131
Jakrapong Kaewkhao	D_D0001	Jiro Nakayama	B5_B0130
Jakrawut Tansura	E_E0018	Jisnuson Svasti	B5_B0203, B6_B0033
Jaksada Thumrongvut	J1_J0028		B5_B0059, B6_B0061
James R. Connor	H_H0010		B5_B0063, B6_B0097
James R. Ketudat-Cairns	B5_B0028, B5_B0059		B5_B0107, B6_B0131
	B5_B0061		B5_B0121, B5_B0122
Jamjun Pechsiri	B1_B0167	Jitlada Chumes	B5_B0146, O1_O0021
Janejira Pubua	B3_B0011	Jitlada Sakdapipanich	C2_C0124
Janjira Salubhaya	B4_B0188	Jittima Chaodamrongsaikul	E_E0010
Janpen Intaraprasert	C2_C0102	John Korth	C4_C0035
Janpen Tangtijaroenkon	O2_O0020	John R. Holchkiss	C6_C0048
Jantana Yathuafai	C5_C0273	John W. Bieber	A_A0008
Jantrararut Tovaranonite	B1_B0017	Jompob Waewsak	D_D0026
Jantrawan Pumchusak	C4_C0150, E_E0096	Jonathan Bell	D_D0007, J2_J0001
	E_E0100	Jonathan M. Slater	A_A0001
Jaran Phumnonk	E_E0027	Jongdee To-Im	H_H0012
Jaray Jaratjaroonphon	C3_C0113	Jongjit Jantra	K2_K0013
Janya Sakayaroj	C3_C0037, C3_C0055	Jongruk Samari	C1_C0085, C1_C0088
Janya Boonjawat	E_E0075	Jose H. Hodak	D_D0013
Janyavattanavijit, C	G_G0034	Juergen Conrad	D_D0064, D_D0073
Jaroon Jakmunee	C1_C0180	Jukkrapun Nakjamsai	C3_C0089
Jarun Lomratusi	C4_C0106	Jumras Umtreukul	D_D0037
Jarunes Kraikaew	J1_J0011		C4_C0216, C4_C0228
Jarunton Boonyanuphap	F_F0056		C4_C0201, C4_C0215
Jarupat Disrattakit	D_D0045		C4_C0219, C4_C0239
Jaruwan Siritapetawee	O1_O0019		C4_C0267
Jaruwan Buakheaw	F_F0002	Junichi Ishii	C1_C0127
Jaruwan Namnongsang	F_F0034	Junyaporn Oomong	B1_B0138
Jatupol Sangsuriyan	H_H0029	Jrgen Conrad	C3_C0087
Jatupom Wittayakun	C2_C0209, C2_C0281	Juta Mookdasanit	F_F0035
Jatuporn Jaiboon	E_E0034	Jutamas Jitcharoen	B2_B0156, E_E0109
Jatuporn Wittayakun	C2_C0262, C2_C0124	Juthatip Manissom	E_E0110, E_E0112
Jeerapun Worapong	H_H0036	Jutinun Kraikr	B4_B0058
Jessadaporn Ruangmarerung	O2_O0009	Juwadee Shiwatana	E_E0077
Jinda Khemprasit	C1_C0051, E_E0086		C1_C0076, C1_C0123
Jinda Songnirluck	E_E0060		C1_C0176, C1_C0190
Jindawan Siruntaworn	G_G0025, H_H0027		K
Jing Liu	C1_C0192	K. Ruxrungham	H_H0015
Jinming Gao	H_H0005	K. Yongvanitchit	H_H0015
Jintana Hornkailat	B1_B0137	K. Aiempaenakit	D_D0043
Jintana Laopaiboon	D_D0001, E_E0024	K. Kitta	G_G0019
	C2_C0102, C2_C0104	Kadsada Sala	C2_C0253
	E_E0053	Kaew Udomsinchakom	B4_B0204
Jintana Sattayasai	B5_B0012	Kajeenart Potivejkul	F_F0034
Jintana Siripitayananon	H_H0030	Kajohnsak Vongshewara1	B1_B0162, B1_B0155

Kajomyod Yodee	D_D0056, D_D0059	Kate Grudpan	C1_C0073, C1_C0180
	E_E0089, E_E0095		C1_C0203
Kalaya Lachasongkram	G_G0006, G_G0007	Kateslin Phalatham	C1_C0011
Kallaya Dangtip	B5_B0106	Kavichat Katuengngan	E_E0043
Kallaya Pingmaung	C3_C0033	Kawin Leelawat	B5_B0133
Kamol Dasa	B1_B0194	Kawinnat Buaruang	B1_B0162, B1_B0155
Kamol Suwannakarn	H_H0011, H_H0027		B1_B0158, B1_B0161
Kamolchat Charungchitaree	E_E0075	Kedsarn Pimraksa	C4_C0121
Kamolpom Panyakard	C5_C0129	Keerati Maneesai	D_D0003
Kamoltip Boriboon	I_I0048	Keiko Kitamura	I_I0045
Kamolwan Wasintonwisutti	E_E0091	Ken Kurosaki	E_E0030
Kamontchai Trongvanichnami	C5_C0080	Kenji Sonomoto	B5_B0130
Kamonruach Kasemchit	H_H0036	Kenji Abe	H_H0027
Kamonruat Singkharaman	B5_B0109	Kenji Sugabayashi	M_M0001
Kamonthip Sereenonchai	C1_C0131, C1_C0241	Kenneth J.Haller	C2_C0107, C2_C0108
Kamonwan Tangcharoenbumrungsul	C1_C0238		C2_C0210, C2_C0155
Kampanad Bhaktikul	K2_K0013		C2_C0253
Kampanart Chayajarus	C3_C0220	Kentaro Onabe	D_D0016, D_D0017
Kampanart Huanbuta	M_M0004		D_D0018, D_D0019
Kanarat Nalampang	E_E0059	Keskanya Subbalekha	H_H0041
Kanchana Sittikankeaw	B4_B0049, B4_B0084	Keethip Anuwareephong	C3_C0177
Kanchana Kengkoom	B1_B0126	Khaemapan Boonburung	F_F0035
Kanchit Thammasiri	B4_B0199	Khajeelak Chiblaem	B5_B0121, B5_B0083
Kanda Whangchai	B1_B0192, B4_B0008	Khannitha Pudhom	O2_O0024
Kanda Seosong	C1_C0117	Khanok Rattanakanokchai	B5_B0148, B5_B0020
Kanidtha Hansongnem	C2_C0147, C2_C0165	Khanitta Somtrakoon	I_I0017
	C2_C0244	Khasipoom Thaunkhong	G_G0008
Kanil Krisnangkura	B5_B0071	Khatcharin Siriwong	C4_C0265
Kanil Asavaputananupun	C2_C0025	Kheamrutai Thamaphai	D_D0067
Kanitha Snsuksawad	C1_C0023	Khesom Nantachit	C1_C0001
Kanitha Katanyukunanon	K2_K0014	Khin Lay Kyu	B5_B0148
Kanitha Patharakitti	K2_K0016	Khomkrit Arunchaipong	B5_B0012
Kanitha Duangjit	I_I0053	Khwanthipha Pandecha	I_I0039
Kanjana Rounto	C4_C0009	Khwunstri Chuaynukool	G_G0013
Kanjana Niraphai	F_F0024	Kiatipong Kamdee	C1_C0023
Kanlana Narinsri	C2_C0102	Kieatsuda Poouthree	C1_C0278
Kanlaya Naruedomkul	A_A0009	Kiranant Ratanathammapan	D_D0070, D_D0073
Kannika Sahakaro	E_E0051	Kitja Sawangjaroen	H_H0010
Kannika Meemark	K2_K0004	Kitsana Aumjang	I_I0018
Kanoh Shigeyoshi	E_E0104	Kittapong Tang	B4_B0105
Kanokkarn Skulnee	C1_C0264	Kitti Tanmuangpak	B1_B0034
Kanoknetr Suksen	H_H0025	Kittichai Supunna	E_E0012
Kanok-On Phruksatharnnungkun	H_H0007	Kittipong Chainok	C2_C0210
Kanokpan Thammawat	B4_B0152	Kittipong Kongsomboon	H_H0011
Kanokpoj Arsakul	J1_J0034	Kittipong Longsa	C5_C0012
Kanokporn Boonsong	C1_C0186	Kittisak Chawawisit	B2_B0003
Kanokporn Burapapadth	M_M0004	Kittisak Bonboon	C1_C0090
Kanokrat Singnui	C4_C0164	Klaokwan Srisook	B5_B0031
Kanokvan Srakaew	B4_B0188	Klaus Mosbach	C3_C0208
Kanokwan Sawang	F_F0030	Klongthong Chakvattanatham	E_E0084
Kanokwan Puttisakunwong	G_G0021	Koichi Oguma	C1_C0172
Kanokwan Rungsriritton	I_I0035	Komidit Wonglimnol	E_E0099
Kansri Boonpragob	B1_B0175, B1_B0164	Komkni Hasitapan	C5_C0273
	B1_B0181, B1_B0182	Kongkarn Kijroongrojana	G_G0017
Kanya Kerdstri	C1_C0268	Kongkiat Trisuwann	C3_C0056
Kanya Kawin	B3_B0023	Kongvit Prasithnok	O1_O0002
Kanyarat Supaibulwalana	B1_B0093	Korakot Atjanasuppat	B1_B0195
Kaoru Tada	E_E0104	Korakot Navakhun	C2_C0004
Karan Bobuatlong	C4_C0215	Korapan Sawetsuwannakun	B2_B0113
Kasem Soylong	C3_C0214	Kornkanok Arysuk	B5_B0071
Kasidit Uechiewcharnkit	H_H0003	Kornkarn Kamprasert	M_M0004
Kasinee Poolpipat	B5_B0056	Kornvika Tangpong	C4_C0201
Kasinee Hemvichian	E_E0031, E_E0039	Kosum Chansri	B2_B0076, B2_B0078
Kasuma Hinawahama	E_E0027	Kowit Kitiwutthisakdi	K2_K0009
		Kraetha Keawkhong	K2_K0018

Kriangkrai Wantong	E_E0089	M. Onur Ozbas	F_F0040
Kridsanee Muangkeaw	C1_C0260	Makoto Ogawa	E_E0090
Kriengsak Lirdprapamongkol	B5_B0083	Malee Srisodsuk	B2_B0190, B2_B0191
Krisada Piticha,	C1_C0173		B4_B0184, O2_O0028
Krisana Pootakham	C1_C0103	Malee Klinkulorb	D_D0058
Krit Koyanich	D_D0049	Malin Kvist	B4_B0168
Krit Pintthong	K2_K0004	Malinee Chutmongkonkul	B1_B0198
Kritsada Atimanon,	C3_C0075	Malinee Wongnawa	C2_C0036
Kritsana Ruxwong	G_G0021	Malwan Subsadsana	C1_C0118
Krongkan Nasee	B4_B0095	Malwan Amatatongchai	C1_C0230
Kronsakda Phakthanakanok	B5_B0148	Malwan Kutako	I_J0042
Kulvadee Trongpanich	G_G0004, G_G0005	Malyn Chulasiril	C5_C0110
	G_G0012	Mana Kaomek	B6_B0028
Kumthom Thirakhupt	I_J0026	Mananya Mahda	C1_C0134
Kunlaniit Chuaychuesai	C1_C0070	Manat Jaimesit	E_E0103
Kunlaya Somboonwiwat	B5_B0179	Manee Tantirungkij	B2_B0081
Kuntida Duangsee	B4_B0074	Maneeut Prasertthawonsin	M_M0006
Kunwaddee Rangsriwatananon	C4_C00187	Manit Sonsuk	E_E0031, E_E0039
Kusol Pootanakit	B3_B0075, B4_B0108	Manwika Boonkongkaew	J1_J0011
	B4_B0127, B4_B0180	Marc Ellis	C2_C0101
	B4_B0187	Manna Mani	B4_B0186
Kwan Arayathanitkul	K2_K0019, K2_K0018	Marlo Lutz	D_D0007, J2_J0001
	K2_K0020	Marisa Arunchaiya	D_D0068
Kwanjal Kanokmedhakul	C3_C0212, C3_C0214	Mark J. Embrechts	C1_C0217, C1_C0223
Kwanjira Kabdee	C1_C0225	Mameerat Sagamerjitt	H_H0036
Kwanprasert Panchal	B1_B0029	Marin Leitenberger	C3_C0250
Kwiseson Kim	D_D0038	Masaaki Sato	F_F0012
	L	Masahiko Abe	C2_C0054
Ladda Kanjanaserzneepokin	C1_C0060	Matana Kacha	M_M0002
Ladda Wongpayapkul	C1_C0001	Matee Buaprom	I_J0048
Ladda Wattanasiritham	G_G0027, G_G0004	Mathieu Lenoir	C3_C0261
Laddawan Pdungsap	C4_C0152	Matuos Malaisree	C1_C0192
La-Ead Pengsopa	I_J0046	Md. Shafiquzzaman	C4_C0027, C4_C0229
Lakana Hilmakoun	H_H0045	Meghan M. Caulum	E_E0076
	I_J0031, O2_O0012	Melissa B. Agustin	C1_C0186
Lalida Vachangken	B4_B0030	Metta Charoenpanich	I_J0037
Lampa Yossombat	C5_C0005	Michael McNallan	J2_J0020
Leena Suntomsuk	C1_C0203	Michael J. Whitcombe	E_E0012
Lei Ye	C3_C0208, B5_B0145	Michelle Maurs	C3_C0208
	C3_C0167	Mike Bange	C3_C0153
Leif Blow	B4_B0168, B5_B0145	Mingkhwan Muangmanee	B4_B0186
	C3_C0167	Mongkhon Panyot	B2_B0089
Likhit Khao-Ngam	C2_C0025	Mongkot Pangpet	B3_B0075
Lily Eunwilaichitr	B4_B0105, B4_B0108	Mongkon Audtho	B1_B0164, B1_B0175
	B4_B0119, B4_B0127		B3_B0068, B4_B0067
	B4_B0149, B4_B0170	Mongkon Rayanskorn,	B5_B0077
	B4_B0173, B4_B0180		C1_C0173, C1_C0182
	B4_B0187	Monpichar Srisa-Ari	C1_C0272
Linda Thiraphattaraphun	E_E0035	Monrudee Ratlerdkarn	B3_B0068, B4_B0067
Lucksagoon Ganranoo	C1_C0154	Monrudee Chaiyapo	B1_B0013, B1_B0011
Lukana Ngiwsara	B5_B0059, B5_B0061	Montakam Benjalakorn	G_G0006
	B5_B0203, B5_B0107	Montakam Tansatil	H_H0042
	B5_B0121, O1_O0021	Montree Tungjai	O2_O0026
	B5_B0083	Morntana Sangkapan	E_E0035
Luksamee Sahavisit	C2_C0147	Morntatip Yunchalaad	G_G0005
Lumpoon Ooxoon	E_E0024	Morthon Lertcanawanichakul	B2_B0003
Lursuang Mekasut	I_J0044	Morthon Ganmanee	N4_N0005
	M	Morthon Kanmanee	F_F0043
M. Babuselvam	H_H0001	Montip Lawsuriyonta	E_E0020
M. Hashizume	N1_N0011	Montira Montatong	B1_B0043
M. Ilhan Cagirgan	F_F0040	Montra Piriyapitaya	C1_C0057
M. Mani	J2_J0021, J2_J0029	Montree Sawangphruk	C4_C0216
	J2_J0032, J2_J0036	Montree Katemala	C1_C0031
		Montree Tungjai	O2_O0010

Montri Thongmoon	A_A0006	Nathaporn Promros	D_D0033
Montri Sangarpcharonekit	B1_B0189	Nathawut Choengchan	C1_C0233
Montri Yasawong	B2_B0078	Natinee Lopattananont	E_E0040
Moragot Buddhakala	O1_O0011	Natitcha Chiangkum	H_H0008
	N	Natkamol Peungsamran	E_E0085
N. Dejang	E_E0006	Natsurang Homchantara	B1_B0150, B1_B0165
N. Nankongnab	J2_J0032, J2_J0036	Natta Tansila	B1_B0161, B1_B0162
Ns Ayudhya	B4_B0154, B4_B0168	Nattachote Rugthalcharoencheep	B4_B0168, B5_B0147
Natena Praphairaksit	B1_B0138	Nattamon Koonsaeng	J1_J0019
Nampong Kongkathip	C5_C0060	Nattapong Nulaikong	C2_C0041, C2_C0054
Nampueng Piemyo	J1_J0034	Nattapong Kaensa	C2_C0232
Nannapat Thepsamran	F_F0007	Nattapong Nithi-U-Thai	C4_C0016
Nantana N. Ngernflang	D_D0042	Nattaporn Anumansirikul	D_D0045
Nantaporn Chookaew	K2_K0006	Nattawut Rungjindarnai	E_E0032, E_E0041
Nantaporn Nanta	C1_C0276	Nattaya Ngamrojanavanich	E_E0043
Nantarat Puengpong	K2_K0001	Natthaphol Chomsaeng	C3_C0191
Nantarat Suetsanit	E_E0059	Natthapol Assavacharthongchai	C3_C0037, C3_C0055
Nantant Chokethaworn	C1_C0135	Nattida Suwanakitti	O2_O0024
Nantawan Kanawapee	B4_B0087	Nattida Ragkapao	C4_C0034
Nanthawan Ya-Anant	I_I0021	Natwida Duangphui	B1_B0155
Nanthawan Sangithong	C4_C0017	Navarat Maneekae	C6_C0143
Nanthawat Wannarat	C2_C0222	Nawaporn Ittachaimanon	I_I0024
Nantiya Aggimarangsee	B1_B0200	Nawarat Muanglen	B1_B0126
Napanporn Vallapa	H_H0043	Nawarat Chunsuk	I_I0015
Napaporn Youngvises	C1_C0049, C1_C0050	Netrapit Kaewchoay	K2_K0005
	C1_C0053	Ngamnit Wongcharoen	D_D0005, D_D0041
Napasawan Hattakitpanichakul	O2_O0020	Ngampong Kongkathip	B6_B0177, C6_C0273
Napasorn Kusucharit	C5_C0080	Nichaya Praditsup	C6_C0274, C5_C0275
Napattarapong Suvannachai	C3_C0033	Nick Cercone	N4_N0005
Napharat Minsakorn	H_H0029	Nijsin Ruangrungsi	A_A0009
Narakorn Khunweeraphong	B3_B0136	Ngampong Kongkathip	B4_B0058, H_H0017
Nararat Thongsnoon	C1_C0192	Nikorn Seangsuwan	H_H0020, H_H0004
Narathip Pradidphol	C5_C0023	Nikorn Mangkomtong	H_H0016, H_H0026
Nareerat Moonjai	B4_B0188	Nikorn Panrun	C4_C0098
Narin Pisuthrattana	B4_B0171	Nilubol Kitancharoen	D_D0035, D_D0040
Narin Sirikulrat	E_E0071	Nimit Kimpraphan	D_D0051, D_D0036
Narinip Chanakul	C1_C0120	Nipan Ratchapol Srathongjai	D_D0032
Naris Mingmora	A_A0002	Nipaphat Chardenthai	O2_O0005, B1_B0116
Narisorn Kongruttanachok	H_H0039	Nipaporn Sansawat	B1_B0029
Narit Sitasawan	B1_B0015	Nipawan Adisomvorawoot	D_D0028
Nant Klompong	D_D0007	Nipawan Poramathikul	F_F0011
Narit Sitasawan	B1_B0082	Niphone Thaveechai	C1_C0023
Narong Kotchabhakdi	C1_C0043	Nipon Tungtham	D_D0023, D_D0024
Narongchai Tongyoo	B3_B0023	Nipon Thangprasert	H_H0020, H_H0017
Narongsak Puanglarp	B1_B0063, B4_B0140	Niran Vipunngueun	H_H0026, H_H0016
	B4_B0142	Nirand Pongpun	C1_C0234
Narongsak Chaichit	C2_C0218, C2_C0222	Nirawadee Shreesuvun,	B2_B0104
	C2_C0224	Nisa Kunapongsin	E_E0035
Narongsak Yotmao	D_D0040	Nisanart Navapan-Traiphot	E_E0073, E_E0092
Narongsak Puanglarp	I_I0026	Nisarat Taveeswan	E_E0004
Narongsak Srisom	K2_K0012	Nisaudah Radenahmad	H_H0010
Naruemon Setthaya	C4_C0121	Nison Sattayasai	B5_B0012, F_F0001
Naruemon Yutakom	K2_K0028	Nitat Jira-Arun	E_E0014
Narumol Kerdsa	E_E0061	Nitchatorn Sungsirin	B1_B0198
Narumol Vachirapatama	F_F0036	Nithima Khaorapapong	E_E0090
Narumon Pattayagorn	C4_C0156		
Narumon Emarat	K2_K0018		
Nason Phonphok	D_D0011		
Nataporn Nanta	I_I0026		
Natchanon Amomthammarong	C1_C0172, C1_C0241		
Natchanon Leepipaliboon	C1_C0057, C1_C0278		
	C1_C0006		
Natechanok Thamniendee	B3_B0086		
Nathamol Chindapan	G_G0029		

Nitima Wongwattananukul	H_H0032	Orapun Thawomsinsurakul	C1_C0235
Nitisak Sawasjirakjin	B6_B0056	Orasa Patarapalboochai	C2_C0078
Nittaya Suklim	C1_C0206	Orasa Panchaoren	C6_C0005
Nittaya Laosat	B3_B0007	Orasa Patarapalboochai	E_E0034
Nitus Tipsothaiyana	I_J0033, J2_J0031	Orasa Anan	I_I0052, I_I0053
Nivet Chrawichitchai	A_A0010	Orasa Patarapalboochai	O1_O0019
Niwatichai Pompacharasakul	I_J0016	Oratal Sukcharoen	C3_C0249, C3_C0250
Nobutiro Nakadani	D_D0018	Oravan Sanguanruang	C3_C0255
Nonglak Saew	B5_B0183	Orawan Khamman	E_E0067
Nongluck Houngkamhang	E_E0022, E_E0023	Orawan Chountragoon	B2_B0081
Nongnuch Gumlungpat,	B1_B0193	Orawan Chachawankhanphanich	F_F0049
Nonpiya Vongsavatsot	C1_C0059	Orawon Chailapakul	C1_C0171, C1_C0189
Nooduan Muangsan	B2_B0016		C1_C0203, C1_C0205
Noojaree Prasitpan	C1_C0223, C5_C0273		C1_C0230, C1_C0200
Nootchanat Mairuae	B4_B0095		C1_C0202
Nootchanat Kunlayanarawisut	I_J0018		
Nopparit Jirunutya	J1_J0034	Orn-Anong Arquero	C1_C0197
Noppakao Ex-Uh	I_J0011	Omjira Anuksakunwong	C4_C0027
Noppol Leksawasdi	G_G0024	Onusa Nontpala	I_I0046
Nopporn Leeprechanon	J1_J0019		
Nopporn Ruijsamphan	D_D0071		
Nuanchawee Wetprasit	H_H0038	P.Sutthiwaiyakit	C1_C0213
Nuanlaor Ratanawimarnwong	C1_C0148	P.Rakkwamsuk	D_D0043
Nuangan Piboonsrinakra	C3_C0084	P.Saritprasert	E_E0063
Nuanphan Chantarasir	E_E0025	P.Singjai	E_E0063
Nuchanaporn Kullabootdee	C2_C0100	P.Buaphet	J2_J0021, J2_J0036
Nuchanart Jongrekla	C1_C0181		J2_J0029, J2_J0032
Nuchanart Na-Ranong	E_E0097	P.Panichayunon	J2_J0021
Nucharin Luangs-Ard	G_G0001	P.F.Rogi	D_D0065
Nuchjarin Kongchana	E_E0019	Pacawadee Tirawongsaroj	B4_B0108, B4_B0160
Nuchithana Poolthong	E_E0079	Pacharaporn Phupalaiboon	B2_B0081
Nungruethai Yoswathananont	C2_C0054	Pachaya Ngamlin	F_F0019
Nuntana Aroonrerk	C3_C0094, C3_C0247	Padernsak Jarayaphan	N4_N0005
Nuntawut Puttawomg	C1_C0141	Padung Laeyadsinlapa	D_D0012
Nunthawan Nowwarote	B6_B0114	Pailin Phoopat	G_G0012
Nurak Gnsdanurak	C2_C0261, C2_C0262	Pairote Jaideaw	D_D0058
Nutchanun Sompao	E_E0107	Paisan Boonchiam	O1_O0019
Nutsurang Homchantara	B1_B0158	Paisam Daungjak Na Ayutthaya	D_D0068
Nuttapon Apiratikul	C3_C0247	Paisam Sithigongul	B1_B0063, B4_B0066
Nuttapon Laorodphan	E_E0103	Patip Thiravetyan	I_I0035, I_I0041
Nuttapong Thancharoen	I_I0051	Paitoon Leksawasdi	B1_B0088
Nuttaporn Promros	D_D0041	Pajaera Patanathabutr	E_E0004
Nuttawut Kaveevivitchai	C2_C0042	Pajaree Chooprayoon	H_H0030
Nuttha Thongchul	E_E0044, H_H0043	Pajaree Thongsanit	I_I0018, I_I0039
Nuthita Chuankrerkkul	E_E0021	Pajaree Thavornmit	E_E0078
Nuttima Kositcharoenkul	F_F0049	Pajongsuk Sutarut	B1_B0063
	O	Pakawadee Suthiwaiyakit	C1_C0206
Oldroyd B.P.	B1_B0055	Pakhwan Vanichnukhrh	N1_N0007
Oliver Hofmann	C1_C0230	Pakorn Sittikelkorn	D_D0005, D_D0041
Onanong Pringsulaka	F_F0034		D_D0033, D_D0039
Onanong Chamtek	D_D0062	Pakorn Varanusuakul	C1_C0202
Onanong Naivkul	G_G0002, G_G0016	Pakwipa Poonsawad	C1_C0189
Ongard Nimpao	C3_C0084	Palangpao Kongsaeree	C2_C0100, O1_O0021
Onjila Bouprasert	C3_C0062	Pan Tongraung	C2_C0025
Onjira Aruksakunwong	C4_C0229	Panadda Boonsem	B5_B0070, B5_B0109
Onuma Noppagorn	D_D0045		B5_B0112
Opas Bunkoed	C1_C0061	Panadda Phansamaeng	E_E0086
Orachat Apichatratanaachai	B4_B0169	Panatcha Anusasananan	D_D0023, D_D0024
Oranart Matangkasombut	H_H0039	Panawan Moosophon	C3_C0214
Oranat Suttorntwatt	C1_C0010	Panee Subprasert	C1_C0196
Oranuch Nakchat	I_I0010	Panich Kanchai	D_D0013
Oraphan Anurukvorakun	C1_C0203	Panichakorn Jaiyong	C4_C0257
Orapin Komulibam	C5_C0194	Panida Un-Arn	C2_C0155
Orapin Chienthavorn	C1_C0189, C1_C0196		

Panit Shardshoongse	C1_C0130	Patidta Sastranurak	C1_C0241
Panita Decha	C4_C0229, C4_C0188	Patiya Pasakon	C1_C0134
	C4_C0027	Patiparnaporn Wongvithoonyaporn	B5_B0209, B4_B0152
Panita Chinvetkitvanich	D_D0056, E_E0095		B5_B0183
Panita Ngamchuachit	G_G0020	Patompeng Chananal	E_E0048
Panitit Hasin	C2_C0232	Patoommarn Upathum	C1_C0077
Pannee Pakkong	B4_B0040, C1_C0023	Patoomratana Tuchinda	C3_C0092
Panomwan Wangspa	B3_B0079	Patradanal Rotkaseen	E_E0099
Panomwan Panseeta	C5_C0198	Patrick S Callery	M_M0007
Panor Asvanujanon	B2_B0076	Pattana Sripalakit	H_H0044
Panote Thavarungkul	C1_C0085, C1_C0086	Pattanop Kanokratana	B4_B0127
	C1_C0088, C1_C0095	Pattarachai Lalitrojwong	A_A0007
	C1_C0059, C1_C0061	Pattarapol Chaisuntikulwal	C1_C0049
	C1_C0069, C1_C0071	Paul Evenson	D_D0026
	C1_C0192	Paul B. Savage	C2_C0042
Pantree Katawee	B1_B0004	Paul S. Gross	B5_B0139
Panthip Rattanasinganchan	B6_B0133	Paveena Khansawai	E_E0019, E_E0045
Pantipa Subhasitanont	B5_B0107, B5_B0203	Paveena Tapaneeyaworawong	F_F0046
Pantipa Nuamkhuntd	B2_B0174	Pawanrat Molai	C4_C0016
Pantipa Subhasitanont	B5_B0121	Paweenra Wadbua	O2_O0005
Panu Danwanichakul	J1_J0013	Pawinee Piyachaturawat	H_H0024, H_H0025
Panupat Chaiworn	D_D0036	Pawinee Srisukvananaran	K2_K0015
Panutut Boonpramuk	D_D0022	Pawnchan Sangkam	C1_C0148
Panuwat Pumitnsee	B3_B0132	Pawnprapa Krasae	C1_C0241
Panuwat Suppakul	G_G0001	Pedram Attarod	N1_N0010
Panvika Pannoprad	C4_C0201	Peerada Pakdeepin	C1_C0019
Paramaporn Chiewpattanakul	B4_B0026	Peeraporn Siriputtawon	D_D0041
Parawan Chuichay	C4_C0265	Peeravut Wongsawad	B1_B0192
Parawee Chaono	E_E0065	Penpan Khanrin	C3_C0009
Pareeya Udomkusonsri	C5_C0080	Penporn Sujivattanarat	B5_B0033
Parichat Theanjumpol	C1_C0279	Penporn Neamhom	H_H0044
Parichat Nareeboon	C3_C0089	Pensak Jantrawut	M_M0001
Parichat Phumkhachorn	B2_B0002	Peter A. Graf	D_D0038
Parichat Khamsam	I_I0063	Peter F. Messer	E_E0021
Panchetr Venalabhpata	C1_C0199	Phanee Sawangareetrakul	B6_B0131, B5_B0203
Parin Chavisuthangkura	B4_B0066		B6_B0121
Parinda Manorul	C4_C0015	Phanee Pidelcha	K2_K0025
Parinda Penroj	G_G0018	Phanom Kadrun	D_D0049
Pannithorn Temyarasip	I_I0029	Phaopirat Khasakeaw	C3_C0013
Parinya Seelanan	C1_C0272	Pheravut Wongsawad	B4_B0166, B1_B0013
Pamupong Artsalee	I_I0016		B4_B0008
Parvapan Bhattarakosol	H_H0011	Phichet Limsuwan	D_D0042
Pat Wongpan	D_D0029	Phikun Ralphson	E_E0045
Pataranan Chotsang	C3_C0094	Philip S. Crooke	A_A0008
Patcha Chatraphorn	D_D0006	Phimchanok Nakharat	B4_B0099
Patchanee Charoencying	C3_C0094	Phimphaka Harding	C2_C0145
Patchara Subhachirasakul	H_H0010		C2_C0003, C4_C0164
Patcharapan Siriwat	B5_B0203	Phinyatorn Suwanmala	E_E0031, E_E0039
Patcharaporn Boonyos	B5_B0112	Phiron Singhaphan	B2_B0078
Patcharaporn Wongsomboon	C1_C0181	Phisarn Khawsak	B2_B0078
Patcharawalai Klinubol	B4_B0157	Phongsak Innok	C3_C0252
Patcharee Promdonkoy	B5_B0032, B5_B0111	Phoonthawee Saetear	C1_C0131
	B5_B0196	Phoungtip Kaewtubtim	N2_N0013
Patcharee Sunthornmanch	C5_C0276	Phrapasri Loucham	C2_C0030
Patcharee Tungtrakul	G_G0027, G_G0003	Phunticha Phunpal	C3_C0254
	G_G0015, G_G0018	Plamsak Menasveta	I_I0042, B1_B0042
Patcharee Srichaoren	C1_C0011		B1_B0048, B1_B0063
Patchareenart Saparpakorn	C4_C0259		B3_B0062, B3_B0064
Patchareeyaporn Pan-Ya-Ari	B1_B0015		B3_B0086, B4_B0049
Patcharin Jantawong	I_I0046, B2_B0178		B4_B0084, B4_B0140
Patcharin Chaisuwan	C1_C0203		B4_B0142, F_F0046
Patcharin Nuansrithong	H_H0034		I_I0026
Pathom Jujun	C1_C0103	Plamsook Pongsawasdi	B4_B0045
Pathra Sakunasingh	F_F0015	Piangjan Poyer	B4_B0066
Pathumwadee Intharathep	C4_C0188	Piboon Pantu	C4_C0216

Piboon Mongkolsuk	B1_B0150, B1_B0155	Ponchai Jaruratjamon	F_F0001
	B1_B0158, B1_B0161	Pongchayont Sirikheorunnar	J1_J0013
	B1_B0162, B2_B0151	Pongjet Promvonge	J1_J0037
Piboon Mongchay	D_D0051	Pongmanee Thongbal	B4_B0186
Pichai Namprakai	J1_J0009	Pongpant Netsingha	O2_O0007
Pichai Uawruangrath	J2_J0012	Pongpun Siripong	C5_C0273, F_F0029
Pichayana Juemanee	G_G0017	Pongsak Rattanachaikunsopon	B2_B0002
Pichayothai Mahatthanapiwat	A_A0004	Pongsak Dokpong	C2_C0107, C2_C0108
Pichet Limsuwan	D_D0014, E_E0056	Pongsak Noophan	I_I0011
Pikul Kongkawl	E_E0032	Pongsakom Taloengtamrongkul	D_D0045
Pilanee Vaithanomsat	B2_B0006	Pongsakom Jantaratana	D_D0002
Pimonphan Sereewattanachai	B1_B0041	Pongsathorn Dhumtanom	B5_B0024
Pimpanittha Kunthadong	H_H0031	Pongsiri Winitchai	O2_O0009
Pimporn Leelapompisid	C5_C0132, H_H0032	Pongsri Mangkornlong	D_D0036, D_D0040
Pimtong Chitbunchong	G_G0018	Pongsuda Pongtanya	B4_B0152
Pinich Wangsomnuk	B1_B0126, B1_B0137	Pongtanawat Khemthong	C2_C0209
Piniti Ratananukul	C5_C0143, C5_C0194	Pongyut Junthong	I_I0033
	C5_C0198	Poohrawind Sanitt	B5_B0070
Pinphet Choochongdij	I_I0010	Poontarp Cheepsunthorn	B4_B0095
Pinsuda Viravathana	E_E0016, I_I0011	Pornchai Maneeratpairoj	N2_N0001
Pinsupha Petrakasukul	E_E0059	Pornpan Watchasanyakorn	C4_C0157
Pintip Ruenwongsa	K2_K0013, K2_K0021	Pornpan Pungpo	C4_C0266, I_I0053
Pintip Jantharatep	C5_C0012		C4_C0096, C4_C0259
Pipat Chooto	C1_C0084, C1_C0126		I_I0052
	C1_C0130	Pompana Buaphet	J2_J0001, D_D0025
Pipat Pichestapong	C1_C0225, J1_J0011	Pompat Sam-Ang	C5_C0275
Pipat Khongpracha	C4_C0239	Pompen Khaiman	E_E0098
Pipop Arunjindawan	J1_J0035	Pornpimol Muangthal	C1_C0011
Pisal Sirgate	G_G0022	Pornpimol Boonchai	C1_C0071
Pisit Tangkijvanich	H_H0019, H_H0027	Pornpimol Sritongkham	B4_B0119
Pisit Jantarasawan	E_E0046, M_M0001	Pornpimon Thiptara	B5_B0122
Pisutti Dararutana	E_E0071	Pornpimon Kanjanavas	B2_B0078
Pitak Youmee	C2_C0030	Pornpun Phimol	C1_C0086, C1_C0095
Pitak Loaratanakul	E_E0073	Pornrat Wattanakasitwich	K2_K0030
Pitchasak Chankuson	D_D0053	Pornsatit Sookchoo	C4_C0152
Piti Treesukol	C4_C0267	Pornsik Kongjaeng	D_D0016
Piti Panichayunon	D_D0008, D_D0025	Pornswan Wasant	B5_B0061
Piti Amparyup	B4_B0038, B5_B0039	Pornthep Sompornpisut	B5_B0148, C4_C0074
	B5_B0139, B5_B0037		C4_C0188, C4_C0027
	B5_B0208		
Pitsanu Khorboot	I_I0030	Pornthip Liewtrakul	K2_K0006
Pitt Supaphol	E_E0098	Pornthip Pomsuriya	F_F0026
Pittaya Sruamsiri	F_F0012	Porntip Seema	O1_O0003
Piyachat Chaluar	G_G0023	Porntip Tantivong	K2_K0005
Piyada Suwandumitkul	C1_C0202	Prabhop Dansethakul	K2_K0025
Piyada Jittangprasert	C1_C0203, C1_C0142	Prachak Chantree	E_E0110, E_E0112
Piyada Theerakulpisut	B4_B0087	Prachoom Khamput	J1_J0005, J1_J0022
Piyada Saenghirun	O2_O0028		J1_J0004
Piyanan Leekaew	B3_B0060	Prachumpom Kongsaeree	B5_B0033, B5_B0097
Piyanate Chuychai	D_D0010, D_D0027		B5_B0146
Piyanee Phatsanaphin	C1_C0263	Prachya Kongtawelert	H_H0002
Piyancol Noiduang	G_G0030	Pradil Nuthanara	E_E0088
Piyanan Harnpichanchai	B4_B0180, B4_B0108	Pradudnate Katewong	C3_C0033
Piyaporn Suanchan	E_E0040	Praewpilin Kangvansura	C2_C0175
Piyaporn Srisom	H_H0012, C5_C0276	Pragrom Prayoorat	B1_B0005
Piyarat Itharat	B1_B0165	Prakaywan Tachaprasertporn	E_E0026
Piyarat Bharmanee	D_D0007, J2_J0026	Pramot Satasuvon	J2_J0026, D_D0067
Piyarat Trakuljivisuth	E_E0054	Pramote Pomsuriya	F_F0026
Piyarat Govitrapong	H_H0022	Pranee Nandhasri	H_H0003
Piyarat Moonsa	C4_C0082	Pranida Kigpituck	H_H0024
Piyawan Boonmako	B4_B0099	Pranom Chantananotha	B1_B0019, B1_B0050
Piyawat Komolmil	H_H0019		B1_B0123, B1_B0125
Ploy Leungphairojana	E_E0004		B4_B0087
Pluang Suwanmanee	B1_B0167	Pranom Dacheungkhoa	H_H0037
Polkit Sangvanich	B5_B0122	Pranom Churnreang	I_I0004

Pranorn Puchadapirom	O2_O0012	Rachanida Panjaka	H_H0030
Praon Nanakorn	E_E0087	Rachaniruk Preechaphol	B4_B0084 ,B4_B0140
Prapajit Kaikaew	C1_C0242	Rachata Phokrachang	J2_J0007
Prapassom Damrongkool	B3_B0007, B4_B0030	Rachsak Sakdanuphab	E_E0095
Prapassorn Chalsal	C1_C0225	Radchada Bunteem	C2_C0079 ,C2_C0178
Prapat Cheuthai	J2_J0027	Raewat Laopaiboon	D_D0001 , E_E0024
Prapimpar Supmuang	C4_C0159		C2_C0102 ,C2_C0104
Prapin Wilairat	C1_C0131, C1_C0142		E_E0053
	C1_C0148, C1_C0148	Raina Wanbayor	C4_C0026
	C1_C0203, C1_C0241	Rakchart Traiphol	C4_C0021 , C4_C0015
	C1_C0233		C4_C0016 ,C4_C0017
Prasart Phonimdaeng	O2_O0005		C4_C0020 ,E_E0022
Prasat Kittakoop	B1_B0195		E_E0023
Prasert Kengkan	D_D0052, D_D0067	Rakrudee Samthima	B5_B0072 ,B5_B0073
Prasert Pavaasant	I_I0042	Ramida Watanapokasin	E_E0056 ,B5_B0056
Prasit Purachat	C1_C0138		C3_C0248
Prasit Tharavichitkul	C1_C0103	Ranee Suwanpruk	I_I0030
Prasit Buraparuangsang	C3_C0167	Rangson Katsulath	E_E0064
Prasong Kessaratikoon	I_I0019, D_D0020	Ranoo Khamhorn	I_I0052
	D_D0021	Rasamee Chaisuksant	C1_C0010 ,C1_C0070
Prasong Tungprasit	K2_K0004		C2_C0079
Pratchya Narmwong	E_E0103	Rasamee Supasri	G_G0015
Prathan Prachopchok	D_D0041, D_D0005	Ratadej Chanwirat	C1_C0206
	D_D0033, D_D0039	Ratana Sampantachit	B6_B0141
Pravit Asarvanonda	B4_B0157	Ratana Rujiravant	E_E0033 , E_E0066
Praweena Maneerattanarungroj	B1_B0043	Ratana Banjerdpongchai	H_H0002
Prawit Nuengmatcha	C1_C0066	Ratanaporn Chaiyapongpipat	I_I0041
Prayoon Songsirintthigul	O1_O0018, O1_O0011	Ratanasuda Wanunyupalin	C2_C0036
Preecha Thiampanya	C3_C0125	Ratapol Somprasert	B1_B0001
Preecha Phuwapralsrisan	F_F0029, F_F0030	Ratapol Promnoy	D_D0057
	O2_O0013, O2_O0014	Ratapol Sukamsaie	F_F0010
Preeda Sansri	F_F0009	Ratchada Teparak	E_E0017
Preeyanan Buasod	C1_C0070	Ratchadaporn Puntharod	C2_C0107 ,C2_C0108
Presyanut Duanglaor	C3_C0193	Ratchapak Chitaree	K2_K0018
Premruethai Supungul	B6_B0197	Rathanawan Magaraphan	E_E0066
Premsak Puangploy	C1_C0246	Ratriol Pareepart	C1_C0269
Prepramee Pattanamahakul	G_G0019	Ratsami Lekphrom	C3_C0212
Prisnar Sirlacha	B2_B0006	Rattanabhorn Junthip	H_H0007
Proespichaya Kanatharana	C1_C0085, C1_C0088	Rattanan Tuangudomsap	C3_C0183
	C1_C0088, C1_C0095	Rattanaporn Pichedrujirot	K2_K0018
	C1_C0059, C1_C0061	Ratthasari Amarit	D_D0059
	C1_C0069, C1_C0071	Rattikam Khankrua	E_E0080
	C1_C0192, C1_C0043	Rattikorn Yinnirun	E_E0067
Prompong Pienpinijtharn	C4_C0170	Rattiya Chueysong	C1_C0064
Pruetinan Changhin	C3_C0179	Rawat Jaisutti	D_D0062
Puchanee Lamulsuk	C3_C0248	Ray L. Withers	O1_O0022
Puchong Wararattananurak	C1_C0126, C1_C0130	Rayakorn Nokkaew	C3_C0032
Puey Ounjai	B6_B0159	Reinhold Carle	F_F0012
Punlop Kuntyong	C3_C0075 ,C3_C0084	Renu Vejaratipmol	B1_B0193
Puntip Toghaw	A_A0005	Reshma Sharma	C1_C0058
Punya Temcharoen	O2_O0012	Richard L Deming	C4_C0082
Purnendu K. Dasgupta	C1_C0233	Rinnada Promsin	B4_B0153
Putcharin Chittiteeranon	B4_B0045	Ritthironk See-Lee	B4_B0067
Putsatee Pariyanonth	B1_B0198	Robert Molloy	E_E0028
Puttaruksa Varanusupakul	C1_C0227	Robert McElhinny	A_A0006
Puttinan Meepowpan	H_H0031 ,B1_B0195	Robert Azerad	C3_C0153
	Q	Robert Molloy	H_H0030 ,H_H0031
Qingdi Zhou	O1_O0022	Rodjana Burakham	E_E0059
	R	Roger Pyle	C1_C0073 ,C1_C0044
R Soner Silme	F_F0040	Roger F. Uglow	D_D0026
R Koul	K2_K0006	Romanee Sanguadeekul	C1_C0053
Rachadaporn Benchawatthananon	B1_B0027	Romchat Chutoprapat	G_G0001, G_G0035
Rachanee Rujiwadodom	D_D0034	Romvan Chusila	M_M0002
		Ronald Beckett	C2_C0204 ,C4_C0028
			C1_C0058

Roongroje Ratana-Chpas	C1_C0019 ,C1_C0169	Sakdiphon Thiansern	C1_C0081
Ruangsak Trakunphuthirak	A_A0007	Sakmontri Nachaiwiang	F_F0037
Ruangsin Wataresk	C1_C0081 ,C4_C0082	Sakol Panyim	B1_B0129 , B3_B0136
Ruben O. Doris	H_H0021		B5_B0032 , B6_B0077
Ruchanok Cheotlacha	B4_B0160 ,B4_B0163		B6_B0130 , B5_B0196
Rudee Surarit	B5_B0083	Saksit Chanthai	C1_C0047 , C1_C0072
Rudeerat Suntako	E_E0073 , E_E0092		C1_C0120 , C1_C0118
Rungaroon Pimpunu	C1_C0182	Sakuntam Sanoripim	D_D0017 , D_D0016
Rungdaow Dumsri	D_D0008		D_D0018
Rungnapha Leelatanawit	B4_B0140	Salukjit Thanee	I_I0034
Rungnapha Chotongdee	B5_B0020	Salin Chutinimitkul	H_H0021 , H_H0011
Rungnapha Leelatanawit	B4_B0084		H_H0019
Rungnapha Tipakontikul	E_E0001 ,E_E0002	Samaisukh Sophasan	H_H0024 ,H_H0025
Rungnapha Suttsri	I_I0042	Samam Kaewyiyuth	K2_K0015
Rungrach Wangspa	B3_B0079	Samart Kongtaweefer	E_E0055
Rungrat Jitvaropas	B5_B0139	Samart Shianmon	J1_J0035
Rungroj Maolanon	D_D0068	Samlee Mankhetkorn	O2_O0010 , O2_O0023
Rungrol Cherdtrakulkit	K2_K0025 ,O2_O0017	Samom Hirunpraditkoon	B4_B0169
Rutaiwan Tohtong	B5_B0133	Samran Prabpais	C2_C0100
Rutchadaporn Sriprang	B4_B0170 , B4_B0105	Samroeng Krachodnok	C2_C0107 ,C2_C0108
	B4_B0108 , B4_B0149	Sanan Subhadhrasakul	C3_C0111
	B4_B0173 , B4_B0160	Sangla Polnok	H_H0044
Ruthairat Nimthong	C4_C0093	Sangobtip Pongstabodee	I_I0044
Ryuji Katayama	D_D0017 , D_D0018	Sa-Nguansak Thanapompoonpong	C1_C0279
	D_D0019 , H_H0015	Sanong Ekgasit	E_E0052 , C1_C0238
			C4_C0156 , C4_C0157
			C4_C0159 , C4_C0161
			C4_C0170 ,E_E0070
S.Suthivaiyakit	C1_C0213		C4_C0162
S.Phutwat	D_D0043		C5_C0080
S.Dumrongrattana	D_D0043	Santi Kaewmokul	F_F0029 ,F_F0030
S.Wirojanupatump	E_E0008	Santi Tip-Pyang	O2_O0013 ,O2_O0014
S.Jiansirisomboon	E_E0008		C5_C0052
S. Furui	G_G0019	Santiya Kerdphochaa	
S. Nakapadungrat	N1_N0011	Sanya Meesim	B1_B0161
S. Phethuayluk	J2_J0029 , J2_J0036	Sanya Tedthong	C1_C0270
S. Phethuayluk	J2_J0032	Saovanee Kovuttkulangsie	E_E0032 ,E_E0041
S. Ravangvong	J2_J0029		E_E0043
S. Ravikumar	H_H0001	Saovaratjanee Jantawang	E_E0108
S. Wannarukwian	N1_N0012	Saowakon Wattanchant	G_G0013
Sa-Ad Treepongkaruna	B5_B0133	Saowanit Thongsai	C2_C0145
Sa-Ad Riyajan	E_E0010	Saowanit Chobbum	B5_B0018
Sabine Mika	C3_C0087	Saowanit Saithong	C4_C0093
Saengrawee Suttiparinayant	C5_C0110	Saowapak Teerasong-	C1_C0134
Saithawat Chamsart	I_I0003	Saowarux Fuangswadi	C2_C0042
Sahattaya Rattanamongkonkul	A_A0008	Saranyu Khammuang	B5_B0073 ,B5_B0072
Sarfon Vlinthanthat	O1_O0006	Sarasate Eiamtanasesate	B1_B0129
Sejjai Charmsethikul	C1_C0206	Saravut Dejmamee	C1_C0019 ,C1_C0169
Salpin Chaiyanan	B4_B0171	Saravut Tantivat	K2_K0004
Seisamom Lumlong	E_E0036 , E_E0037	Sarawadee Kosrisakul	C1_C0200
Seisunee Liawruangrath	C1_C0022 ,C1_C0139	Sarawut Pomsirichotkul	E_E0098
	C1_C0144 ,C5_C0045	Sarayut Radapong	O2_O0001
	C5_C0048 , C1_C0029	Sarintha Kittcharoenkan	G_G0030
	C1_C0077 , C1_C0090	Sarote Boonseng	C4_C0099
	C1_C0122 , C5_C0149	Sarra Rafrafi	C1_C0053
	H_H0012 , C5_C0276	Sanun Chittavarichprapa	C2_C0079
	C1_C0184 , C6_C0046	Sanunya Promkotra	I_I0051
Seisuree Prateepthongkum	C3_C0092	Sarunyaporn Maksup	B4_B0098
Saiwarun Chaiwanichsiri	G_G0020 , G_G0006	Sarute Ummartyotin	C2_C0054
Sakchal Satienperakul	C1_C0090	Sasithon Petkon	B4_B0140
Sakda Yainoy	B4_B0154	Sasithorn Muncharoen	C1_C0134
Sakda Daduang	B5_B0080	Sasuree Jaruit	F_F0001
Sakda Yainol	B5_B0145	Sathaporn Direkbusarakom	F_F0043
Sakda Jongkeawvattana	C1_C0136	Sathon Vijnawannaluk	N1_N0007 , N1_N0008
Sakda Suknil	C1_C0236		D_D0017
Sakda Daduang	F_F0053	Satima Saranark	E_E0074

Satreerat K.Hodak	D_D0073 , D_D0070	Sinporn Jungsuttiwong	C4_C0266
	D_D0072	Sinporn Larpiattaworn	E_E0049 , E_E0018
Savitri Gadavanij	K1_K0023	Sinporn Chantaroj	H_H0038
Sawanya Jarput	E_E0022 , E_E0023	Sinporn Boonpa	E_E0016
Sayan Prakobpatch	B3_B0064	Siriprapa Intaphan	A_A0003
Sayan Phokate	D_D0013	Sirirat Phalsansuthichol	C1_C0169
Seewapong Chamratpan	B1_B0057	Sirirat Fa-Aroonsawat	B3_B0115
	B1_B0208	Siritan Jiamsinlert	J1_J0024 , E_E0077
Seik Wang Ng	C2_C0253		E_E0078
Senee Kruanetr	C1_C0122	Siriwan Kaewdee	C4_C0039
Sergei Nazarenko	H_H0005	Siriwan Onjun	E_E0062
Seri Donnua	F_F0051	Sirwan Phattanarudee	E_E0082 , E_E0084
Seriwat Saminpanya	N2_N0001	Sirwara Tosayanon	D_D0045
Serm Surapinit	O2_O0014	Siriwat Sansuk	C4_C0180
Shamaporn Niwasabutra	B1_B0021	Sinwit Buajarem	I_I0024
Shanop Shuangshoti	H_H0041	Siriwoot Sookkhee	B2_B0089
Shigetaka Wada	E_E0077	Sinya Thammachat	B5_B0110
Shinsuke Yamanaka	E_E0030	Siriyaporn Thaleongwuttiwong	C3_C0254
Sho Sakurai	B1_B0041	Sirorat Tungsatitporn	E_E0058
Shojo Motomizu	C1_C0233	Siseerot Ketkaew	J1_J0010
Shuichir Tanoue	J1_J0008	Sita Predanon	C3_C0040 , C3_C0056
Shuteewan Rajviroongit	C4_C0057 , C3_C0211	Sittichai Pinkanjanarod	J1_J0034
Shunichi Hayashi	E_E0104	Sittichai Anuphap-Udom	J2_J0015
Shunji Sugano	E_E0104	Sittidhesch Sombund	O2_O0013
Siam Popuechai	B4_B0030 , B3_B0007	Sittichai Kulawong	C2_C0262
	C1_C0060	Sittichai Seangatrith	J1_J0028
Sikkhamondhol, C	G_G0034	Sittichai Wirojanupatump	E_E0005 , E_E0007
Sineenat Utto	C2_C0195	Sittikom Theerakawong	B4_B0171
Sineenat Siri	O2_O0005	Sittipong Ruktamatakul	A_A0001
Sirada Maphanta	H_H0044	Sittipong Amnuaypanich	E_E0019 , E_E0042
Siranul Lamseejan	F_F0059	Sittiporn Pammen	E_E0045
Sirapat Pratontep	D_D0068 , D_D0062	Sittiruk Roytakul	B1_B0160
	E_E0076		B4_B0053 , B4_B0094
Siraporn Ryporn	C1_C0279		B4_B0096 , B4_B0098
Siraprepa Thaitaworn	C2_C0226	Sittisichok Soontornopas	K2_K0002
Sirasa Phoomkeaw	D_D0059	Sittiwat Lertsiri	H_H0036
Sirawut Klinbunga	B1_B0042 , B1_B0048	Sivapong Sungpradit	H_H0018
	B3_B0062 , B3_B0064	Siwadol Sateanpattanakul	A_A0004
	B3_B0085 , B4_B0047	Siwapom Longyant	B1_B0063 , B4_B0066
	B4_B00496 , B4_B0084	Siwaporn Meejoo	E_E0054 , C4_C0065
	B4_B0140	Smartachai Santawanpas	B5_B0025
Sirichok Jungthawan	D_D0038	Smith Elamsa-Ard	J1_J0037
Sirichom Thungkao	I_I0003	Soamwadee Chaiarnansuajit	E_E0064
Sirikan Nawapan	B4_B0040	Sopiphong Chatraphorn	D_D0028 , D_D0056
Sirikan Pasook	C3_C0062		E_E0080 , E_E0095
Sirikan Pernsamat	C1_C0142	Solaya Suksa-Ard	B4_B0184
Sirkant Praseritlux	B1_B0042	Sombat Rukpratapanorn	B4_B0066
Sirkwan Sunithunyaroj	C1_C0158	Sombat Kongwithaya	B4_B0101
Sirkwan Leehokseng	G_G0028	Somboon Subwongchareon	B5_B0133
Siriluck Attrapadung	H_H0006	Somboon Sahasitwiwat	D_D0046 , D_D0059
^ Siriluk Ruangrungrote	N1_N0006	Somchai Lapanantnoppakhun	C1_C0154
Siriluk Meesuwun	H_H0045	Somchai Boonpangrak	C3_C0208
Sirimanus Sangngam	B1_B0194	Somchai Issaravanich	H_H0026
Sirinart Lacharoenjanaphand	C1_C0270	Somchai Chumpolkulwong	O1_O0011 , O1_O0018
Sirinnya Suwansomboon	C1_C0234	Somchai Mananunsap	B3_B0136
Sirinuch Loiha	C2_C0282	Somchai Boonpangrak	C3_C0163
Siripastr Jayanta	C1_C0057	Somchai Thongtem	E_E0012
Siripat Suteerapataranon	C1_C0058 , C1_C0060	Somchai Issaravanich	H_H0016 , H_H0017
Siripat Pratontep	K2_K0029		H_H0020
Siriporn Keeratichamroen	B5_B0059	Somchai Awakairt	H_H0038
Siriporn Jungsuttiwong	C4_C0106	Somchai Lapanantnoppakhun	C1_C0180
Siriporn Lamplattaworn	E_E0065	Somdej Kanokmedhakul	C3_C0212 , C3_C0214
Siriporn Sittipraneed	B4_B0036 , B5_B0039	Somjai Peragularuck	F_F0055
Siriporn Keeratichamroen	B5_B0061	Somjai Sripoke	F_F0034
Siriporn Pongsomboon	B5_B0208	Somjintana Taveepanich	C3_C0153

Somkane Piromrak	D_D0002	Steve Mitroy	B4_B0186
Somkiat Kongkun	C3_C0256	Suchada Sukrong	B4_B0058
Somkiet Srijaranai	C1_C0051 , C4_C0160	Suchada Vearasilp	C1_C0279
Somkiat Boonasa	J1_J0009	Suchada Chalsawadi	B2_B0172, B2_B0178
Somkiat Phomphisutthimas	K2_K0017		C1_C0276, I_I0025
Somkiat Piyatiratitvorakul	F_F0051		I_I0046, O2_O0027
Somphong Chatraphorn	D_D0056	Suchada Issaraporn	J2_J0020
Somphop Morada	C1_C0105	Suchapa Netpradit	J2_J0031
Sompoch Gomolmanee	F_F0013	Suched Samuhasaneetoo	G_G0023
Sompong Thammasinrak	B5_B0060	Suchin Udomsomporn	D_D0020 , D_D0021
Sompong Doolgindachabaporn	F_F0001		I_I0019
Sompong Thammesirak	F_F0053	Suchonma Udomlertpreecha	B5_B0208
Sompong Lawilas	M_M0004	Suchonwat Wongwilkhlt	F_F0004
Sompop Rungsupa	I_I0014 , N4_N0005	Suda Saowakhon	B4_B0009
Somporn Chantara	I_I0016	Suda Kiatkamjornwong	E_E0075 , E_E0082
Somporn Prasertsongskun	I_I0043		E_E0084 , E_E0087
Somporn Sirisumrannukul	J1_J0019		E_E0097 , H_H0043
Somporn Tiyarsi	C2_C0025	Sudalag Kohengkul	B5_B0202
Somporn Chantara	C1_C0043	Sudaporn Tangkawant	C4_C0039
Somporn Maneetoon	D_D0058	Sudarat Damrongwatanapokin	H_H0011 , H_H0021
Somrit Unai	K2_K0014	Sudarat Pookboonmee	E_E0044
Somruethai Kidsanguan	B5_B0069	Sudarat Suanjit	I_I0003
Somrudee Onto	B3_B0007	Sudarat Chadisuthi	I_I0032
Somrudee Kaewkaw	A_A0003	Sudarat Watkuolham	C3_C0252
Somruthai Tunma	C4_C0150	Sudjai Sanguanruang	K2_K0028
Somsak Maneerattanakul	D_D0048	Suganya Soontaros	B4_B0045
Somsak Wongwan	O2_O0007	Sugunya Wongpoomchai	C1_C0173 , C1_C0136
Somsak Ruchirawat	C3_C0151		C1_C0141
Somsak Pianwanit	C4_C0027	Sugunya Mongkol	D_D0031
Somsak Maneerattanakul	D_D0047	Sujint Anguravirutti	F_F0059
Somsak Ruchirawat	O2_O0017	Sujitra Youngme	C4_C0258 , C2_C0218
Somying Leelasubcharoen	C2_C0224		C2_C0222
Somyote Suthivalyakit	C3_C0087 , C3_C0089	Sukanda Jiansirisomboon	E_E0005, E_E0006
	C3_C0091		E_E0007
Songchan Puthong	C3_C0038	Sukanya Petchsinvej	D_D0046
Songwut Suramitr	C4_C0266	Sukchai Sompengpun	K2_K0004 , I_I0010
Songyos Pramjit	C3_C0018	Sukhontip Thaomola	C5_C0174
Soontaranee Tongyai	B5_B0177	Sukhuma Puangmali	C1_C0243
Soonthorn Somsual	G_G0029	Sukit Limpijumnong	D_D0038
Soosuk Rooblem	E_E0001 , E_E0002	Sukitcha Puangthong	C1_C0234
Sopa Klinchan	B4_B0169	Sukit Kungwankunakom	C1_C0158
Sopa Sirangumpal	K2_K0004 , I_I0010	Sukkaneste Tungasmita	D_D0018
Sophida Sukprasert	B5_B0080	Sukon Phanichphant	C1_C0022
Sophon Kaeothip	B5_B0122	Suksaman Sangyoka	I_I0040
Sophon Phuangphanbut	C2_C0025	Suksan Chuboon	B1_B0011
Sorapat Samerkai	G_G0020	Sulthai Pongpatanasiri	F_F0014
Srapong Janhom	C4_C0028	Sumaree Boonma	C5_C0080
Srapong Povasupree	E_E0015 , E_E0017	Sumate Tantratien	G_G0035
Srapong Janhom	C2_C0204	Sumitra Boonburmung	F_F0035
Sorasak Danworaphong	D_D0012 , C4_C0164	Sumitra Jarosrojkul	E_E0103
Sorasake Kulamai	I_I0046	Sumitra Charoijochkul	J1_J0023 , J1_J0024
Sorawit Powtongsook	F_F0043 , F_F0046	Sumon Masuthon	B1_B0050
	F_F0051 , I_I0042	Sumontip Bunnag	B1_B0043 , B4_B0074
Sompranart Sathapornvajana	C3_C0114		B4_B0087
Sorrapob Potisook	I_I0016	Sumpars Khunsook	B2_B0002
Sorrayut Ratanapojnard	K2_K0013	Sumpun Wongnawa	C2_C0036 , C2_C0078
Souwalak Phongpaichit	C3_C0037	Sunan Sung-Ong	K2_K0028 , K2_K0015
	C3_C0040 , C3_C0055	Sunanta Wangkam	C1_C0173 , C1_C0185
	C3_C0056		H_H0012 , C1_C0133
Srisompom Preeprame	O2_O0001		C1_C0135 , C1_C0136
Sivikorn Dit-Udom-Po	D_D0048		C1_C0182 , C3_C0251
	D_D0047	Sunanta Ratanapo	B5_B0114
Sriwipa Puyati	C4_C0017	Sunata Googsantae	B1_B0193
Stephen Elliott	B1_B0092	Sunchai Payungpom	H_H0021 , H_H0019
Stephen G Pyne	C5_C0048		H_H0033

Sunee Chansakaow	C5_C0129 , C5_C0132 H_H0032 , O2_O0015	Suphawut Benjakul Supraewpan Lohalaksanadech	D_D0021 G_G0022
Sunee Kertbundit	B1_B0129	Supranee Muenpueng	G_G0033
Sunida Tiamyuyen	O2_O0008	Supranee Lao-Ubol	E_E0062
Sunida Plangsungnum	D_D0045	Supreya Trivijitkasem,	D_D0034 , D_D0049
Sunisa Akkarasamiyo	C3_C0075	Supuk Mahadtanapuk	B4_B0166
Sunisa Siripongvutikorn	G_G0013	Surachai Arikla	C2_C0261
Sunit Suksumram	C5_C0143 , C5_C0194 C5_C0198	Surachai Limpakdee	C4_C0085
Sunsanee Yoojun	B5_B0106	Surachai Kaewboonruang	B2_B0178 , O2_O0027
Sunsanee Phasook	B2_B0078	Surachai Pompakakul	O2_O0024
Suntiparp Siriwattanaphaiboon	K2_K0010	Surachate Krishsangchote	D_D0048 , D_D0047
Supa Hannongbuas	C4_C0259	Suracher Burut-Archanai	B6_B0044 , B5_B0035
Supab Choopun	D_D0035 , D_D0040 D_D0051 , D_D0036	Surajet Jangrod	B6_B0103
Supachai Ngamsinlapasathian	E_E0015	Surang Nuchprayoon	B4_B0171
Supagone Katalikamkul	D_D0008	Surang Suthirawut	H_H0018
Supagorn Rugmai	C4_C0035 , O1_O0002 O1_O0003	Surang Nuchprayoon	B2_B0006
Supakij Suttirueungwong	E_E0080 , E_E0081 J1_J0035	Surangrat Srisuratanan	B3_B0120
Supakit Kowudthitham	H_H0042	Surapol Kongtim	H_H0011
Supakorn Boonyuen	C2_C00101 , I_I0024	Surapol Natakanitkul	O2_O0012
Supalax Srijarana	C1_C0047 , C1_C0051 C1_C0073 , C1_C0044	Surapol Pintiglang	C1_C0181
Supaluk Prachayasisitkul	C3_C0151 , O2_O0017	Surapun Yimman	B6_B0148
Supanee Limsawan	E_E0055	Surasak Laloknam	J1_J0025
Supannika Kittilikitsak	F_F0017	Surasak Laloknam	B5_B0103
Supap Bunkird	H_H0030	Surasak Watanesk	C4_C0082
Supapan Snsukkho	C1_C0225	Surassawatee Jamikorn	C1_C0217
Supaporn Dawan	C1_C0086 , C1_C0095	Surat Sedpho	D_D0035
Supaporn Kantawong	B4_B0166	Surawat Jariyawat	H_H0024 , H_H0025
Supaporn Itsarividom	B5_B0177	Surawit Simarugumpai	K2_K0004
Supaporn Pengpong	C1_C0158	Sureerat Tang	B6_B0197
Supaporn Noppakundiligrat	E_E0087	Sureerat Chullasai	F_F0055
Supaporn Sutitum	G_G0021	Surin Thepsawal	B4_B0101
Suparat Reungmaneepattoon	G_G0034 , G_G0009	Suriyan Sutthiprapar	C5_C0274
Supasitp Fuengfung	K2_K0020	Suriyan Cha-Urn	B4_B0053
Supason Wanichweecharungruang	B4_B0157 , C3_C0179 C3_C0183 , C3_C0191	Suriyan Cha-Urn	B4_B0094 , B4_B0096
Supason Pattanaargson	C4_C0168	Suriyan Tunkijanukij	B4_B0117
Supatchalee Supjarean	O2_O0009	Suriyong Pongpiboonkul	D_D0070
Supatra Jinawath	J1_J0023	Susumu Yoshikawa	E_E0015
Supawadee Pechcoth	B1_B0091	Sutatip Sripaisamplipat	E_E0068 , E_E0085
Supawadee Namuangrek	C4_C0216	Sutee Udomchotphruet	E_E0094 , C2_C0237
Supawadee Poompuang	B4_B0117	Suteerut Kongchey	O2_O0014
Supawan Tirawanichakul	D_D0053	Suthat Fucharoen	C2_C0030
Supawan Tantyanon	H_H0028	Suthee Petcharavut	O1_O0021
Supawut Benjakul	D_D0020	Suthida Traibut	D_D0058
Supha Sirinam	D_D0073	Suthida Rattanaburee	B2_B0191
Suphachai Samuppito	F_F0059	Suthum Sniomsak	C3_C0063
Suphachai Boonrod	I_I0022	Sutipa Tanapongpipat	B4_B0105 , B4_B0106
Suphapan Satchawan	C1_C0197	Sutkheth Nakasathien	B4_B0170 , B4_B0173
Suphaporn Phongmanee	B2_B0174	Suttawan Imurai	B4_B0180
Supharart Sangsawong	C1_C0176	Sutthathorn Suwannaratana	B4_B0117 , F_F0054
Suphatida Aumtong	I_I0001	Suttipan Pavasupree	E_E0102
Supisara Kongprachya	C1_C0049	Suttlak Suktalsip	B1_B0092
Supittha Chaiwongfun	B1_B0001	Suvit Punnachalya	E_E0018
Supon Sumran	D_D0066	Suvit Boonprong	G_G0035
Supon Ananta	E_E0067	Suwabun Chirachanchai	J1_J0025
Supom Nuchadomrong	B5_B0012 , F_F0001	Suwakorn Janta	B5_B0114
Supot Hannongbuac	C4_C0265 , C4_C0074 C4_C0166 , C4_C0229	Suwanna Saysin	C3_C0191
Supphadate Sujinapram	C4_C0027 D_D0011		C1_C0081
			C5_C0276

Suwanna Vejabhikul	C5_C0132 , O2_C0007	Teraboon Polanakaroon	C1_C0184
	O2_C0015	Thada Tangsuk	C4_C0156
Suwanna Niemsant	B2_B0018	Thana Arunwattanachok	C2_C0178
Suwanna Saysin	C6_C0046	Thanakorn Naenna	B5_B0143 , B5_B0147
Suwat Pabchanda	C1_C0105 , C4_C0002	Thanaphol Bonboonkaset	H_H0035
Suwat Jantha	C1_C0031	Thanapong Krsethadumrongdat	B4_B0094
Suwat Pabchanda	C2_C0102 , C2_C0104	Thanapong Chuachun	E_E0088
	E_E0053	Thanaporn Laothanachareon	E_E0109
Suwimol Chinkangsadarn	B1_B0022	Thanaporn Tejangkura	B4_B0119
Suwimol Narantad	C4_C0162	Thanawan Danvanichkul	B4_B0066
Suwimon Ruengsri	C5_C0052	Thanee Suklin	C1_C0172
Suwipa Saen-Oon	C4_C0265	Thanh N. Truong	B1_B0128
Suwit Pechuayluk	D_D0025	Thanida Srihawong	C4_C0267
Suwit Madsaw	E_E0027	Thanida Chaiyapoom	B5_B0177
Suwit Phethuawiluk	J2_J0001	Thanit Pranenararat	D_D0058
Suwit Wuthisuthimethavee	B5_B0208	Thanomsin Distapom	C3_C0098
Sybille Neidhart	F_F0012	Thanu Marayong	C5_C0198
	T	Thanusit Burinprakhon	B1_B0013
T.Veerapraditsin	B2_B0113	Thanyalak Yongkongkaew	D_D0069
T. Yaibok	J2_J0036	Thanyapat Thiantongin	B4_B0166
Tada Nakorloy	E_E0055	Thanyarat Sawatsuk	C4_C0039
Takashi Aoki	B6_B0037	Thanyarat Udommanaeathanakit	C1_C0123
Takeshi Zendo	B5_B0130	Thararat Supasri	C4_C0188
Taksawan Thongaram	B4_B0149 , B4_B0170	Tharathip Sreesattabud	B5_B0056 , B5_B0141
Tanakan Ongkeaw	E_E0055	Tharinee Saleepochn	B5_B0202
Tanakorn Osochan	C4_C0015 , D_D0058	Thavorn Supaprom	E_E0006
	D_D0064 , E_E0022	Thawai Donsakul	C1_C0213
	K2_K0029	Thawatchai Phaecharuad	B4_B0204 , H_H0037
Tanapan Phattamarnon	B1_B0167	Thaweesak Songserm	B1_B0207 , B1_B0205
Tanapon Tansakul	D_D0069	Thaweesak Chieochansin	B1_B0206
Tanasom Tunsanngkam	H_H0016 , H_H0017	Thaweevat Khuangthip	M_M0004
	H_H0020 , H_H0026	Theerachai Bongkam	B3_B0060
Tanatchaporn Utairungsee	B4_B0105	Theeraphan Machan	H_H0011 , H_H0019
Tanatom Tongsumrith	I_I0033	Theeraphon Piacham	D_D0030
Tanawat Tittabutr	E_E0047	Theerapol Thurakutseres	E_E0101
Tanawut Tantumongcotwat	B5_B0143 , H_H0035	Theerasak Luechapongthip	C5_C0048 , C5_C0276
Tanawut Chailungkam	K2_K0012	Thidarat Sukrangpang	C5_C0046
Tanikan Thongchai	E_E0049	Thidarat Kunawong	B5_B0145 , C3_C0163
Tanin Nanok1,2,	C4_C0216	Thidarat Chotkhun	C3_C0167
Tanin Nutaro	D_D0060	Thidarat Wangkam	C2_C0003
Tanin Nutaro1	D_D0061	Thidarat Supasai	I_I0025
Tanitha Chatsuwan	H_H0018	Thiranee Khumlumiert	B2_B0089
Tanu Marayong	B1_B0021	Thirasuda Prasert	C2_C0207
Tanwanwan Duangthongyou	C2_C0237	Thitikone Kuntama	B1_B0017
Tapanee Hongralanaworakit	M_M0003	Thitikorn Chanyetham	D_D0041 , D_D0005
Tapawittra Pongpawe	B1_B0205	Thitikorn Boonkoom	D_D0033 , D_D0038
Tamtip Rattana	I_I0003	Thitima Lhinhatrakool	E_E0057
Tasanal Punjansing	B1_B0208	Thitima Bhusnorn	C3_C0091
Tasanee Jamjanya	B5_B0080	Thitima Rukchaisinkul	C1_C0131
Tassanee Eamkamon	B4_B0140 , I_I0026	Thitirai Gaewdang	C3_C0252 , C3_C0254
Tavida Lohana	G_G0012	Thitnun Monpholph	D_D0065 , D_D0033
Tavisakdi Ramingwong	N1_N0004	Thitiporn Petudom	D_D0039 , D_D0041
Tawatchai Kangkarnano	C1_C0126	Thitrat Insalee	C4_C0168
Taweesak Janduang	C4_C0110	Thitrat Mantin	E_E0100
Tawesin Navarat	C3_C0018	Thitiyaporn Prayoonmahisorn	K2_K0026
Tawun Remsungnen	C4_C0160 , C4_C0240	Thittha Phongern	C1_C0203
Teamchai Buaboi	I_I0048	Thongchai Suanwang	B2_B0190
Teera Tanachavijit	E_E0091		I_I0018
Teerakiat Kerdcharoen	D_D0088 , C4_C0015		E_E0056
	E_E0022 , E_E0076		
	K2_K0014 , K2_K0029		
Teeranan Nongnual	C4_C0240		
Teerasak Kamwanna	D_D0015		
Tepkanya Promkatkeaw	K2_K0015		

Thummaruk Suksrichavalit	B6_B0143 , C3_C0163	Urai Tengjaroenkul	I_J0054
Thumnoon Nhujak	O2_C0017	Uraiwan Changsuluk	C2_C0165
Thunyaporn Kiranantawat	C1_C0272 , C1_C0278	Uraiwan Petlum	D_D0023
Thunyathorn Thongloontus	I_J0010	Uraporn Sardsud	F_F0024
Thussanee Chuel	C2_C0101	Usa Onthong	I_J0052 , I_J0053
Tinakorn Srisaadka	C3_C0254	Usavadee Thavara	B3_B0068 , B4_B0057
Tinnagon Keawin	C1_C0136		C1_C0278 , I_J0025
Tinnakorn Tiensing	C3_C0211	Uthairat Na-Nakom	B3_B0132
	C1_C0231 , C1_C0243	Uthaiwan Incharoen	C1_C0235
	C1_C0245 , C1_C0246	Utumporn Srisatidharakul	H_H0033
Tipachai Vatanavicharn	B6_B0197	Uwe Befuss	C3_C0087 , C3_C0089
Tipaporn Srihanratana	C4_C0279		
Ipparat Khudno	E_E0014		V
Tippawan Puttasontiphot	A_A0008	V Pierron-Bohnes	D_D0065
Tippawan Yasanga	B1_B0065	Vacharee Somsook	F_F0004
Tippawan Singtripop	B1_B0034 , B1_B0041	Vachiraporn Pukuthong	B1_B0001
	B1_B0085	Valeska Ting	O1_O0022
Tippawan Tehkhunmag	C1_C0236	Vanida Chairulpraseri	C5_C0012
Tipwimon Chumphukawin	N1_N0004	Vantipa Roardrangka	K2_K0001
Tirayut Vilavan	C4_C0265 , C3_C0098	Varaporn Tanrattanakul	E_E0056
	C3_C0114 , C3_C0137	Varawut Tangpasuthadol	E_E0075 , E_E0097
	C3_C0140		H_H0043 , H_H0028
Titipun Thongtem	E_E0012	Varunya Jeerawipoonwun	K2_K0010
Tiwa Pakkotom	N1_N0010	Vasan Poengsungnoen	B2_B0151
Todsapon Pothisamutiyolin	C1_C0112	Vatcharin Rukachaisinikul	C3_C0018, C3_C0037
Toemsak Srikrin	C4_C0015 , C4_C0016		C3_C0040, C3_C0055
	D_D0046 , D_D0059		C3_C0056
	E_E0022	Veerapong Chewpraditkul	D_D0001
Tokichi Miyakawa	H_H0006	Veerasak Udomchoke	I_J0029
Tokuhan Kimura	D_D0018	Verawat Champræeda	B4_B0105, B4_B0108
Tom McCreedy	C1_C0050		B4_B0119 , B4_B0180
Torrarin Chairuangsi	E_E0102 , E_E0103	Vichai Reutrakul	C3_C0113 , C4_C0099
	E_E0079	Vichien Rimphanitchayakut	B6_B0197
Tosawat Seetawan	E_E0107 , E_E0108	Vijitra Leardkamolkarn	O2_O0008
	E_E0111 , E_E0030	Vikit Pnnrub	I_J0004
	D_D0030	Vimalmas Limpipat	M_M0007
Toshihiko Imato	C1_C0205	Vinich Promarak	C3_C0013 , C3_C0014
Toshiro Yamada	E_E0104	Vinzenz M. Unger	B6_B0159
Tsunemune Uhiyu	J1_J0008	Vipa Surojanametakul	G_G0027 , G_G0015
Tsutomu Ishikawa	C3_C0038		G_G0016 , G_G0003
Tuangporn Suthiphongchai	B6_B0133	Viphanee Chinchamnan	B1_B0128
Tuangporn Rojanawong	F_F0006 , F_F0008	Virak Visudtiphole	B4_B0047
Tunnoon Charaslertrangsi	H_H0025	Virapong Prachayasitkul	B6_B0143 , C3_C0163
Tunyaporn Sirirat	G_G0033		B4_B0154 , B4_B0168
Tuspon Thanpitcha	E_E0033		B6_B0145 , B6_B0147
			C3_C0151 , C3_C0163
			C3_C0167 , C3_C0208
U. Kum-Arb	H_H0015		H_H0035 , K2_K0025
U. Sanguapong	F_F0016		O2_O0017
Ubonrat Sinpatrawan	G_G0001 , G_G0021	Visit Vao-Soongnern	C4_C0034 , C4_C0035
Ubonta Sommart	C3_C0055		E_E0029 , O1_O0002
Ubonthip Nimmannit	M_M0007		O1_O0003
Udom Kokpal	F_F0032	Vitaya Amornkitbamrung	D_D0071
Udom Rungruangsri	H_H0007 , H_H0008	Vitaya Punsuvon	I_J0034
Ukadel Boonyaprakob	B3_B0060	Vitchuporn Juntrasri	B4_B0152
Ukkadate Moonart	E_E0042	Vithaya Ruangpomvisut	C4_C0007 , C2_C0004
Ukrit Rattanachamsri	B4_B0170 , B4_B0173		C4_C0026 , I_J0027
Umnat Mevatee	B1_B0194	Vittaya Punsuvon	C3_C0032
Umpol Jairuk	K2_K0019	Volker Rossbach	E_E0004
Umpawan Boonkong	B1_B0027	Voranuch Somsongkul	C1_C0223
Unchada Phuapaiboon	K2_K0029	Voravee P. Hoven	H_H0043
Unchlee Suksangpanya	C2_C0221	Voravee P. Hoven	E_E0044
Upsom Boonyang	E_E0068	Voravit Cheevaporn	I_J0013
Uracha Ruktanonchai	C4_C0065	Vorawit Banphavichit	C3_C0140
Urai Tengjaroenkul	I_J0015	Vudhichai Parasuk	C1_C0238 , C4_C0188
			C4_C0027

W	W	W	W
W Pschl	D_D0065	Watana Orio	D_D0017
W.Pfeiler	D_D0065	Watcharapong Saetae	E_E0050
W. Chairat	N1_N0012	Watcharee Netsingha	O2_O0007
Wachirapunt Puntgrawee	E_E0094	Watcharin Noothong	J1_J0037
Wae-Asae Waehamad	E_E0040	Watson Jindacum	C1_C0185
Walajorn Prisanaroon Ouajai	E_E0091	Wattana Tanmling	B1_B0125
Walaiak Wikittlak	M_M0001	Wattanasak Sawedtasakrawpan	E_E0018
Wanaruk Saipunkaew	B1_B0092	Waya Sengpracha	E_E0013
Wanatchara Impath	B3_B0079	Weena Sittirakan	C1_C0245
Wanchai Subsinggha	J1_J0002	Weena Chutimanitskul	O2_O0017
Wanchan Noppanit	F_F0032	Weenawan Somphon	O1_O0022
Wandee Wattanachaiyingcharoen	B1_B0055	Weerachai Phutdhawong	C3_C0008 , J_J0037
Wandee Onreabroy	D_D0037 , E_E0055	Weeradech Kiratitanavit	C3_C0033 , E_E0013
Wanida Wonsawat	C1_C0171	Weera Wongkham	B1_B0194 , B1_B0195
Wanisa Salaemee	B3_B0163	Weerapong Chewpraditkul	D_D0022
Wanlapa Aeungmaitrepirom	C1_C0119	Weerawan Sithlomgul	B4_B0066
Wanna Wimolwattanapun	C1_C0270	Weerawan Waiyawat	C1_C0148
Wannakarn Nitayarerk	C1_C0006	Weon Ritusso	H_H0003
Wannapa Yuanboonlm	C2_C0025	Werasak Surareungchai	B4_B0119
Wannapong Triampo	I_I0032 , D_D0044	Wesley B. Jones	D_D0038
	I_I0031	Wetchasart Poliyam	B1_B0161 , B1_B0182
Wannee Srinuttrakul	C1_C0031 , J1_J0011	Wichai Kositratana	F_F0049
	E_E0031	Wichai Lat	I_I0048
Wannipa Suksawat	B3_B0007	Wichai Srisukha	B1_B0088
Wanpen Rattanarungsi	C1_C0069	Wichai Kositratana	B4_B0184
Wanpen Pongyearn	H_H0039	Wichai Pormthanakasem	H_H0039
Wansiri Pitakkeatkul	C1_C0144	Wichean Piwbang	C2_C0104 , E_E0053
Wansuk Senanan	B3_B0132 , B3_B0135	Wichian Magloot	B1_B0206 , B1_B0207
Wantana Mongkolvisut	C3_C0097	Wichukorn Phuthong	J1_J0034
Wantana Klysubun	C4_C0035 , O1_O0002	Wijitrat Dungchai	C1_C0171
	O1_O0003 , O1_O0019	Wikit Phinrub	B1_B0167
Wanthana Phimsuwan	I_I0020	Wilai Chomchai	E_E0083
Wanwarang Pathaichindachote	B5_B0077 , B6_B0111	Wilai Noonpakdee	B5_B0130
Wanwimol Mekboonsonglarp	H_H0029	Wilairat Wongthep	E_E0037
Wanwisa Sudpraser	B4_B0040	Wilairat Cheewasedtham	F_F0055 , I_I0043
Wanwisa Srinuanchai	C5_C0132	Wilawan Phakthong	C1_C0077
Wanwisa Pattanasiriwisawa	O1_O0019	Wilawan Somchue	C1_C0190
Waradoot Chutrong	C1_C0068	Wilawan Sakdee	B1_B0017
Waralak Pimdee	C2_C0210	Wilart Rundorn	H_H0010
Warangkana Soksom	C1_C0047	Wilart Pompimon	O2_O0010
Waraporn Nolkong	B1_B0176	Wilasinee Hanpongpun	E_E0078
Warepom Methawiriyasilp	O2_O0027 , B2_B0172	Wilatsana Posn	G_G0017
Warapom Sirinawin	C1_C0126	Wilawan Mahabusarakarn	C3_C0063
Warsak Thavonnan	B6_B0209	William H. Daly	H_H0028
Warasrin Sornlek	B4_B0173	William H. Matthaeus	D_D0029 , D_D0010
Waratchaya Tamanit	E_E0014		D_D0027
Warawut Tiyapongpattana	C1_C0142 , C1_C0148	Wimol Naksata	E_E0026
Warayuth Sajomsang	H_H0028	Wimol Sirisri Pormtaveeaval	B4_B0171
Warel Veerasal	C1_C0260 , C1_C0263	Wimon Chanchaem	H_H0038
Warinthorn Chavasiri	F_F0032	Wimonrat Trakampruk	E_E0003 , E_E0046
Warunee Varanyanond	G_G0015 , G_G0027		E_E0047 , I_I0002
	F_F0035 , G_G0003	Wimonrut Thongphuton	D_D0013
	G_G0016	Win Chaeychomson	G_G0025 , F_F0027
Warunee Srisongkram	J1_J0002	Wini Oungpibal	C1_C0144
Warunee Thanapane	O2_O0009	Winit Cholprasert	O2_O0023 , O2_O0026
Wasan Sirisungworawong	C1_C0029 , C1_C0184	Winita Punyodom	E_E0026 , H_H0031
Wasana Cheusook	B1_B0182	Winya Dungkaew	C2_C0155
Wasana Pinyochon	H_H0021	Winyoo Sangthong	C4_C0228
Wasin Wongwilai	C1_C0180	Wipa Chunglatupornchai	B3_B0115
Wasinee Pongprayoon	B4_B0053	Wipapan Pongcharoen	C3_C0037
Wasinee Phonsri	C2_C0145	Wipaphorn Jaikua	O2_O0004
Wasna Jaturonrusmee	K2_K0016	Wiparat Bootsayatrus	B1_B0004
Wassana Parawach	H_H0003	Wiparat Khunghar	I_I0052
Wasu Pathom-Aree	B2_B0054		

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Wiphaphan Ubon	I_J0043	Yongsak Smtana-Anant	C3_C0177 , C3_C0179
Wipob Suttana	O2_O0026	Yongwimon Lenbury	C2_C0178
Wirach Taweepeeda	E_E0050		A_A0001 , A_A0005
Wirach Wongphathanakul	C1_C0117		A_A0008
Wiranee Sriveng	H_H0029	Yongyut Laosiritaworn	E_E0067
Wiraporn Maithong	D_D0009	Yongyuth Tundulawessa	C3_C0062
Wirat Sangkawisit	C1_C0047	Yonyut Rojanasakul	M_M0007
Wirat Niwatananun	C6_C0132	Yosapong Temsiripong	F_F0027
Wirawan Muchchanart	B4_B0117	Yoshikazu Suzuki	E_E0015
Wiriya Suwannet	D_D0062	Yoshio Sato	N2_N0002 , N2_N0014
Wiroj Limtrakarn	J1_J0014 , J1_J0033	Yoshiyuki Iemoto	J1_J0008
Wirot Kesonbua	B1_B0123	Yun Liu	O1_O0022
Wirote Pranithanchai	C3_C0111	Yun-Klaim Yap	B1_B0129
Wirunya Keawwattana	E_E0056	Yupa Mongkolsook	C5_C0274
Wirut Wongpakdee	C2_C0025	Yupa Mongkolsook	C5_C0275
Wisnu Thongchai	C6_C0045 , C5_C0046	Yupa Thunyasinkul	C4_C0093
	C5_C0276	Yupakanit Puangwerakul	B2_B0010 , B4_B0090
Wisatre Kongcharoensoontorn	B1_B0004 , O2_O0004		G_G0026
Witale Jiwramonaikul	C2_C0101	Yupaporn Samneenoi	C1_C0241 , C1_C0142
Witayaporn Pornchuti	B4_B0199	Yutana Pongpiriyadacha	H_H0034
Witham Pansinwirote	E_E0041	Yuttasak Chammui	C1_C0135
Wittanee Hetrekul	D_D0037	Yuthana Tirawanichakul	D_D0053
Wittaya Ngeonlae	E_E0088 , C1_C0119	Yuwadee Aunthasoot	F_F0051
Wiwapom Soodsawang	C4_C0109		
Wolfgang Arit	E_E0081		
Wolfgang Moller	C3_C0087		
Wolfgang Kraus	C3_C0089		
Wongsiri	B1_B0056		
Wonput Hongsachart	B2_B0151		
Woradee Lurchachaiwong	H_H0033		
Woraluk Mansawat	C3_C0137		
Woranan Nakbanpote	I_I0035 , I_I0041		
Woranul Suwanwisul	C2_C0108		
Woraphong Khawprapan	E_E0096		
Worapong Usawakesmanee	G_G0017		
Worawan Bhanthumnnavin	C3_C0137 , C3_C0140		
	C3_C0177		
Worawan Malithong	C1_C0142		
Worawan Bhanthumnnavin	C2_C0178		
Worayut Thayavival	C1_C0199		
Worapong Theimsorn	E_E0103		
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Wutthilun Raksajit	H_H0029		
Wutinian Rekmangkhon	C1_C0119		
Wutinian Kongtud	O2_O0009		
Wutinun Raksajit	B5_B0035 , B4_B0101		
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Wuttipong Singsung	C1_C0133		
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Y. Chikagawa	G_G0019		
Yaneé Pongpaibul	C1_C0103		
Yaneenart Suwanwong	B4_B0168		
Yanyong Loïha	E_E0036		
Yaowapha Jirakiatkul	F_F0036		
Yaowarat Sinsathikul	A_A0003		
Yasuaki Enaga	C1_C0203		
Yindee Kitayananit	H_H0045		
Yingsak Kraljinit	B2_B0178		
Yodchai Porhon	E_E0111		
Yodsakorn Unkhom	E_E0069		

Exhibitor List STT.32

#	Exhibitor Name	Country
1	AGILENT TECHNOLOGY (THAILAND) CO., LTD.	Thailand
2	ANALYIK-JENA (THAILAND) CO., LTD.	Thailand
3	APPLICATION DEFINE CO., LTD.	Thailand
4	ARCHEMICA INTERNATIONAL CO., LTD.	Thailand
5	BANGKOK ADVANCED TECHNOLOGY CO., LTD.	Thailand
6	BANGKOK HIGH LAB CO., LTD.	Thailand
7	BANG TRADING 1992 CO., LTD.	Thailand
8	BARA SCIENTIFIC CO., LTD.	Thailand
9	BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.	Thailand
10	BIO ACTIVE CO., LTD.	Thailand
11	CHARNIN ENERGY CO., LTD.	Thailand
12	C.E.COMBINATION CO., LTD.	Thailand
13	C.E.INSTRUMENT (THAILAND) CO., LTD.	Thailand
14	CHARAN ASSOCIATES CO., LTD.	Thailand
15	CoAx GROUP CORPORATION	Thailand
16	DESIGN ALTERNATIVE CO., LTD.	Thailand
17	DIETHELM LIMITED	Thailand
18	GAME & TOY	Thailand
19	GREEN BANYAN CO., LTD.	Thailand
20	HARIKUL GROUP CO., LTD.	Thailand
21	ITS (THAILAND) CO., LTD.	Thailand
22	JEBSEN & JEBSEN MARKETING (T) CO., LTD.	Thailand
23	KINETICS CORPORATION LTD.	Thailand
24	LECO INSTRUMENT (THAILAND) CO., LTD.	Thailand
25	LIGAN SCIENTIFIC CO., LTD.	Thailand
26	LIO LAB LTD., PART.	Thailand
27	LOGOT MARKETING CO., LTD.	Thailand
28	MAJOR SCIENTIFIC PRODUCTS	Thailand
29	MATHEMATICS ASSEMBLY (математикаслви)	Thailand
30	MEDITOP CO., LTD.	Thailand
31	METHROM SIAM CO., LTD.	Thailand
32	METTLER-TOLEDO (THAILAND) LTD.	Thailand
33	MINOR COOPERATION CO., LTD.	Thailand
34	MIS SOFTTECH CO., LTD.	Thailand
35	MULTI EDUCATION CO., LTD.	Thailand

#	Exhibitor Name	Country
36	NANMEE BOOK CO., LTD.	Thailand
37	OFFICIAL EQUIPMENT MANUFACTHARING CO., LTD.	Thailand
38	OSKON CO., LTD.	Thailand
39	PHADA EDUCATION CO., LTD.	Thailand
40	PERFECT VISION MULTIMEDIA CO., LTD.	Thailand
41	PERKINELMER LTD.	Thailand
42	PETRO - INSTRUMENTS CORP., LTD.	Thailand
43	P.INTERTRADE EQUIPMENT CO., LTD.	Thailand
44	PCL HOLDING CO., LTD.	Thailand
45	PONDPOL INSTRUMENT CO., LTD.	Thailand
46	SAENGVITH 2000 CO., LTD.	Thailand
47	SAGOLLA VIDIO CO., LTD.	Thailand
48	SE-EDUCATION PUBLIC CO., LTD.	Thailand
49	SCIENCE AND TECHNOLOGY TRADE ASSOCIATION	Thailand
50	SCIENCE TECH CO., LTD.	Thailand
51	SCIENTIFIC PROMOTION CO., LTD.	Thailand
52	SIAMESE INSTRUMENT CO., LTD.	Thailand
53	SITHIPORN ASSOCIATES CO., LTD.	Thailand
54	THAI UNIQUE CO., LTD.	Thailand
55	THAIPOLY MEDIC CO., LTD.	Thailand
56	THANES DEVELOPMENT CO., LTD.	Thailand
57	T.S.T. TECHNOLOGY CO., LTD.	Thailand
58	VERTICAL CHROMATOGRAPHY CO., LTD.	Thailand
59	WORLDWILD TRADE THAI CO., LTD.	Thailand