Minitap experimental design program [3]. This statistical analysis was used to find out range of the input parameters which could significantly reduce number of experiment and gave very accurate result. The experimental results showed that the most suitable condition for spraying the Al-12%wt Si powder were oxygen flow rate 38 ft^3/hr, acetylene flow rate 27 ft^3/hr and spray distance 60 mm. This condition provided the coating with the best physical, mechanical properties and wear resistance

C0255-DENSITY FUNCTIONAL STUDYON CONFORMATIONAL STRUCTURES OF ASPARTIC ACID SPECIES IN AQUEOUS MODEL

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Abstract: Conformational structures of aspartic species and their potential energy surfaces have been determined by DFT method at the B3LYP/6-31G (d) level of theory. No stable conformers have been found for Hasp- and H2asp species because of proton transfer between amino and carboxy group. The two species were calculated in 3 water molecules system. εL [g+ a] was the most stable conformers from ten were found conformers of Hasp- species. There were βL [g+ a] and βL [g+ g-] the most stable conformers from twelve conformers of asp2-. five stable conformers γD [g- g+], δD [g- g+], αD [g+ g-], δL [g+ g-] and γL [g+ g-] from thirteen for H3asp+ (endo endo). αD [a g-] was the one of seven conformers for H3asp+ (endo exo). δD [g- g-] and αL [g-g-] were the two of eight for H3asp+ (exo endo) and γD [g- a], γD [g- g+] and αD [g- a] were three of the most stable conformers from five have been found for and H3asp+ (exo exo) species. Ramachandran maps of conformational changes for both H3asp+ (endo endo) and H3asp+ (exo exo) have no appeared because they were found all nine backbone conformations.

C0256-DETERMINATION OF TRACE AMOUNT OF ALUMINUM IN WATER BY FLOW INJECTION WITH A HOME-MADE PRECONCENTRATION SYSTEM

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Abstract: In recent years, aluminium is found to be implicating in a variety of disorders including hypochromic microcytic anaemia, renal osteodystrophy, Parkinson's dementia and Alzheimer's disease. Aluminium and its salts can be found in soil, natural water and air. Therefore the trace concentration of aluminium in water and drinking water should be determined. A home-made preconcentration (strong cation exchanger) unit was constructed and hooked up to a flow injection system for determination of lower level concentrations of aluminium. The water samples (such as tap water, mineral water and river water) were passed through the unit. The analyte was eluted and reacted with a fluorogenic ligand. The complex formed was monitored spectrofluorometry. The results obtained by the system agree with that of ICP-MS.

C0257-PREPARATION OF DENSE PALLADIUM MEMBRANE SUPPORTED ON POROUS STAINLESS STEEL AND PRELIMINARY INVESTIGATION OF ITS APPLICATION ON METHANE CONVERSION VIA DRY REFORMING

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Abstract: Dense Pd membrane supported on porous stainless steel prepared via electroless plating technique is proposed to be used as a catalytic membrane reactor to improve the conversion of methane via dry reforming. The effective surface of the prepared membrane was 20 cm^2 and its thickness was around 34 μm. Then it was evaluated its performance at 350°C, 400°C, and 450°C at pressure difference of 1 atm. It found that H_2 permeances of up to 5.9, 7.5, and 8.6 $m^3/(m^2 \cdot h \cdot atm^{0.5})$, respectively, were obtained. Its selectivity coefficients(αH_2/He) were 78,270 at 350°C, 74,923 at 400°C, and 8,604 at 450°C, respectively. Moreover, It found that the dense Pd membrane was stable at 450°C without deterioration of membrane efficiency during 72 hours.

D

D0001-ATOMIC FORCE MICROSCOPY IMAGING OF BIOLOGICAL SURFACES

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Abstract: Before the advent of the atomic force microscope (AFM), biological surface studies were limited by the power of the optical microscope, whose light would scatter nanometer-scale particles. With AFM, it has become possible to see the details of living cell, subcellular organelles, molecules, and even individual atoms. In this study, the following biological samples were prepared and then imaged using AFM in liquid in both contact and tapping modes: DNA of *Escherichia coli* bacteria (*E. coli*), lipid membrane, *Bacillus thuringiensis* (*Bt*) protein-forming pore in lipid membrane, and mosquito cells. Cell immobilization techniques and AFM probe coating processes are discussed.

D0002-EXPERIMENTAL STUDY ON CHAOTIC WATER DROP

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Abstract: In the past few year there has been a growth of interest in studying the behavior of dripping water from a faucet. Many experiments have been performed to measure the time intervals between successive drops.It is well known that the dynamical behavior of a dripping water faucet is not always regular but exhibits complex behavior including transition to chaos. These phenomena show the characteristics of chaotic system such as periodic and nonperiodic attractor, period doubling and Hopf bifurcation.The purpose of our research is to experimentally investigate the dripping dynamics using microcomputer to store and analyse the data. We observe 1T, 2T, 4T periodic motion and chaotic motion which is the characterization of nonlinear system very clearly especially the 4T motion which is very hard to find experimentally.

D0003-MUSIC FROM SET OF JULIA

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Abstract: Chaos is a motion that lies between the regular deterministic trajectories and a state of noise. Chaotic trajectories arise from motion of nonlinear dynamical systems. One of the simplest mathematical expression of chaos is the so – called Julia set, first introduced by Julia, who studied the iteration of polynomial and rational function in the early twentieth century. The behavior of systems of nonlinear dynamical equations has generated interest into their uses as note generation algorithms. In this research we compose the song using a desktop computer and a mathematical entity called the Julia set that is a simple equation better known for generating complex and beautiful images. The song we created sounds like the old style Thai song,so we use it as a sound track in the vcd about Thai dance.After having a few persons to watch this vcd, 90% of the persons suggest that this Thai style song can be put together with old Thai dance quite well. In addition we study how the amplitude and frequency of waveform of this song varied with time. This will help us to have a closer look into the song the same way we study physics and it will be helpful in composing the song in the future.

D0004-ELECTRICAL RESISTIVITY OF ALUMINUM THIN FILM ON INSULATOR PREPARED BY EVAPORATION METHOD

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Abstract: In recent year there has been an increasing application of vacuum technology for coating techniques in industrial production processes. One important area of application is metal coating on plastic web to produce conductive coating for film capacitors in electrical and electronics industry. Metal–coated plastic webs and papers also play an important role in food packing. In this research we investigate the electrical resistivity of aluminum thin film on plastic prepared by evaporation method in high vacuum system. The resistivity of aluminum at various thickness in the range of nm, is measured using the 4 – point probe technique. The relation between the resistivity and aluminum thickness is rho = 236.9 d-0.72 , where rho is the resistivity and d is the aluminum thickness. The minimum thickness of aluminum that can produce very good conductivity is 150 nm.

D0005-Quantum Dynamics of Photons Trapped in Fiber Optic Ring Resonator

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Abstract: We analyze the quantum dynamics of photon trapped in a single mode fiber optic ring resonator. The Hamiltonian of photons trapped and their interaction in term of decoherence, entanglement, parametric amplification and noise can be formed in the continuous variable EPR source i.e. ring resonator. We start from a fundamental Hamiltonian that induces from quantum noise, laser gain and loss, then the output photon density matrix is analyzed. The experimental result obtained is also presented and discussed.

D0006-Comparative Core Analysis of TRIGA Reactor Using Virgin Uranium and Reprocesssing Uranium as Nuclear Fuel

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Abstract: The 10 MW TRIGA Reactor is a reactor using the UZrH fuel with 45 wt % of uranium in UZrH, 19.7 % enrichment Both of virgin uranium and reprocessed uranium can be used as nuclear fuel for TRIGA reactor. The comparative of TRIGA core using both types of uranium were analyzed. From details on dimensions and compositions of the major components of reactor core, the 7-group neutron microscopic cross sections were prepared using GTF and GGC-5 codes. The 2- and 3-dimensional models were developed. DIF3D code including utility programs were employed to determine k_{eff}, reactivity, power distributions, neutron flux distributions, power peaking and worth of control rods. Comparing to virgin uranium core, the analysis show that the reprocessed uranium core has a little effect on core parameters. The power distributions and neutron flux distributions are almost the same for both cores. However, at the beginning of life, the reactivity of the reprocessed uranium core is reduced by 0.2 % which has little influence on safety of the reactor.

D0007-A DESIGN AND CONSTRUCTION OF FLASH EVAPORATION APPARATUS

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Abstract: The purpose of flash evaporation apparatus is dropping powdered material onto a heated boat in a vacuum system for making a compound thin film sample. The apparatus composes of two main parts .The first one is a heat source made of two copper electrical poles and 2 bases of copper for holding the boat .The heat originates from a variable transformer and a high current transformer with maximum current of 300 amperes . The second part is dropper working by passing current through an induction coil. Magnetic field from the coil results in vibration of the dropper. One out of two major parts of the dropper, made of 4 pieces of stainless and two pieces of aluminium , is in the vacuum chamber. The role of a stainless pieces is connecting between inside and outside of vacuum chamber .The remainder part of the dropper is a control circuit in which the frequency can be varied such that the maximum dropping rate is 3.38 grams per minute at the frequency of 5 Hz.

D0008-EFFECTIVE NONLINEAR COEFFICIENT OF STRONGLY NONLINEAR SPHERICAL DIELECTRIC COMPOSITES

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Abstract: The effective medium theory is applied for theoretical modeling and studying of the electric field response of strongly nonlinear dielectric composites. These composites consist of strongly nonlinear spherical dielectric inclusions randomly embedded in a strongly nonlinear dielectric host medium of different nonlinear coefficient. Then the effective nonlinear coefficient of the composites is determined by using decoupling techniques. Our results are valid for arbitrary volume packing fraction of inclusions. This work is an extension of the work of Yu and Yuen [1] using dilute inclusion packing fraction approximation. In this research we obtained the upper and lower bounds of effective nonlinear coefficient by using decoupling techniques for the whole range of inclusion packing fraction.

D0009-CRYSTALLIZATION OF THERMALLY GROWN SILICA FROM RICE HUSK.

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Abstract: Purified silica were prepared by refluxing rice husks in boiling HCl, then sintering for 1, 3 and 5 h respectively at each consecutive temperature of 400, 500, 600, 700 and 800 °C. Only samples obtained from rice husks (which were refluxed by 1N HCl for 15 min) calcined at 600, 700 and 800 °C for 5 h were found to have white ashes. The white ashes of 800 °C, 5 h were found to contain 99.33 wt% of amorphous silica, they were selected to further calcined at various higher temperatures for 10 h. XRD and Raman spectroscopy results indicated structural transitions from amorphous silica to α–quartz at 800 °C, α–quartz to α–tridymite at 1100 °C, and α–tridymite to α–cristobalite at 1200 °C. SEM micrographs also showed silica clusters became denser and smaller at higher temperature phases.

D0010-Electric-field induced piezoelectric PVDF

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Abstract: Prepared the mixture of the commercial powders of polyvinylidene fluoride (PVDF) and a solution of N-methyl-2-pyrrolidone (NMP) and used a tape casting method to form the polymer sheets. By a corona poling method, a high DC field 300 - 400 MV/m was applied to the polymer sample which were subsequently annealed at 120 °C for 20 hrs. A phase transformation of the poled polymer was checked by an X-ray diffraction (XRD) method and a piezoelectric β-phase was obtained. A dielectric property was investigated by measuring the complex capacitance as a function of frequency. It was found that at 1 kHz, the dielectric constant of the sample was 4 and the dielectric loss tangent was 0.04. It's anticipated that the phase transformation and dielectric property will be improved if the polymer is prepared in a thin film form.

D0011-A MEAN FREE PATH ANALYSIS OF SOLAR ENERGETIC PARTICLES

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Abstract: In this work, we study the mean free path of the solar energetic particles, which move along the magnetic field line before are scattered by the irregularity of the magnetic field. We use the fundamental of the Fokker-Plank equation to explain the motion of the solar energetic particles (Ruffolo 1995). We find the best mean free path by fitting analysis between the flux data of particle in time from ACE spacecraft and the transport simulation of the solar event on August 24, 2002. The mean free path of particle at high energy is longer than the low energy and arrives the Earth before the low energy because the low energy particles are often disturbed from the interplanetary medium.

D0012-THE SOLAR FLARE EVENT WITH THE CMEs EFFECT

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Abstract: The solar energetic particles (SEPs) are generated from the solar flare or the effect of coronal mass ejections (CMEs) move into the interplanetary medium. Particles in the interplanetary medium can attain more energy again by collision with the particles, which released follow the CMEs. This work, we simulated the propagation of the SEPs, which are released from the gradual flare on October 29, 2003 with the technique of the finite different method. This event has the following CMEs at 20:39 UT. We use the technique of the linear least squares fitting to fit the spacecraft data and the propagation simulation data. We found that, the effect of the CMEs affect to the profile of the particle intensity in time.

D0013-THE INFLUENCE OF INTERPLANETARY FLUCTUATIONS ON FITTING SOLAR FLARE DATA

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Abstract: The solar flare releases the solar energetic particles, which have important effects to the Earth such as disturbing radio communication, causing electric power failures. In this work, we try to find the uncertainty for each data from the Advanced Composition Explorer spacecraft (ACE) for analysis the solar energetic particle propagation. We fit the solar flare event data on August 24, 2002 with the transport simulation results (Ruffolo 1995). In this work, we analyze two types of data uncertainty. First is the data uncertainty from the spacecraft directly and second is the data uncertainty from the interplanetary fluctuation. The data fitting results with the interplanetary fluctuation uncertainty show the injection duration of each elements close to the particle distribution profile from spacecraft data more than the data fitting result with the spacecraft uncertainty, but the injection duration of both are lightly different.

D0015-ELECTRICAL AND OPTICAL PROPERTIES OF GALLIUM-DOPED ZINC OXIDE THIN FILMS PREPARED BY RF MAGNETRON SPUTTERING

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Abstract: Transparent conductive Ga-doped ZnO (GZO) thin films were deposited on soda lime glass substrates by RF magnetron sputtering using sintered ZnO targets with Ga_2O_3 content of 2, 4 and 6 wt%. The dependence of electrical and optical properties of the films on sputtering conditions and Ga_2O_3 content in the sputtering targets were investigated. It was found that the electrical resistivity, mobility and carrier concentration depend on both sputtering conditions and Ga_2O_3 content. For a given Ga doping and Ar pressure, the resistivity is minimum at RF power of 100 W. At the same condition, the resistivity and optical transmission of the films decrease with increasing Ga doping.

D0016-THE BCC-HCP TRANSITION TEMPERATURE IN TITANIUM AND ZIRCONIUM METALS USING THE CLASSICAL MOLECULAR DYNAMICS METHOD

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Abstract: We examine the vibrational properties of Titanium, Zirconium. All these metals are in-group IVB transition metals. Firstly we choose appropriate model potentials which reproduce some essential macroscopic properties. By using molecular dynamics (MD) simulations, some dynamical behaviors can be investigated. In this work, we are particularly interested in the velocity auto correlation as it leads to the phonon density of states and hence the vibrational entropy. In addition, the internal energy and the vibrational entropy of experimentally observed phases can be determined by using MD. By considering the difference in Helmholtz free energy between those phases, the temperature at the phase transition can be identified. We find agreement and discrepancies between the calculated transition temperature and the experimentally observed one.

D0017-THE SIMULATION OF WATER DROP

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Abstract: We developed a method based on quasi-molecular modeling to simulate the fall of water drop. This method uses a large number of fluid molecules or quasi molecules. Each quasi-molecule is a group of real particles that interact in a fashion entirely analogous to classical Newtonian molecular interaction. The particles dynamics equations are large systems of second-order, ordinary differential equation. We tested our method on the fall of water drop phenomena with various factors.

D0018-EFFECTS OF NEUTRON IRRADIATION ON DIAMOND PROPERTIES

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Abstract: In this research, the impurities in natural diamond and the effects of neutron irradiation on physical properties of diamond have been studied by electron spin resonance(ESR) spectrometer. The ESR spectra of natural yellowish diamond sample before neutron irradiation show that nitrogen was the impurity in diamond because three main ESR absorption peaks were obtained. These peaks arise from the coupling between the electron spin($S = 1/2$) and nuclear spin($I = 1$) of nitrogen atom, called hyperfine splitting. And after neutron irradiation, the color of diamond was monitored by the spectrophotometer and it was found that the color of diamond was changed from yellowish to dark green. The peaks of ESR spectra before and after neutron irradiation are similar. But after neutron irradiation the middle peak was higher due to the C-C bonds were broken, called dangling bonds. By calculation of the area under the peaks, the results showed that the amount of nitrogen increased after neutron irradiation.

D0019-MAGNETIC PROPERTIES AND MICROSTRUCTURE OF Co-Ti DOPED IN BARIUM FERRITE ($BaFe_{12-2x}Co_xTi_xO_{19}$)

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Abstract: The main purposes of this research are to study the magnetic properties and microstructure of Co and Ti – doped barium ferrites. Seven compositions of $BaFe_{12-2x}Co_xTi_xO_{19}$ were prepared by the ceramics method and calcining at a temperature of 1100 °C. They were then divided into three groups and sintered at different temperatures of 1200, 1300 and 1350 °C, respectively. The sintered products were analyzed by XRD and found that all specimens were of hexagonal structure. Their microstructures by SEM showed that the average grain size decreased with increasing Co and Ti contents, but it increased with the sintering temperatures. The magnetic properties of materials were analyzed by hysteresis loop

measurement. The ratio of M_{sx} /M_{s0} and the coercive field were lower as the contents of Co-Ti increased. However, the coercivity decreased as the sintering temperature increased.

D0020-MAGNETIC PROPERTIES OF Sm-Fe-B PREPARED BY MECHANICAL ALLOYING PROCESS

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Abstract: In this research work, mechanical alloying of Samarium-Iron-Boron powder with the composition of $Sm_{15}Fe_{77}B_8$ was prepared. The magnetic properties of $Sm_{15}Fe_{77}B_8$ powder was studied by x-ray diffractometer, Mössbauer spectrometer and scanning electron microscope. The x-ray diffraction analysis of $Sm_{15}Fe_{77}B_8$ powder after grinding for 48, 200, 400 and 600 hours The XRD patterns show that for grinding time of 600 hours, $Sm_{15}Fe_{77}B_8$ powder became amorphous structure. Then, the powder was annealed at temperature 750°C for 30 minutes in argon atmosphere and the XRD patterns show the peaks of α-Fe , Fe_3O_4 and magnetite ($SmFeO_3$). The analysis by Mössbauer spectroscopy show that, for grinding time of 600 hours, the magnetic property of $Sm_{15}Fe_{77}B_8$ powder was changed from ferromagnetic state to paramagnetic state at room temperature. And after the powder was annealed at a temperature of 750°C for 30 minutes, the Mössbauer spectra show the peaks of α-Fe , Fe_3O_4 and $SmFeO_3$ which satisfied with the results of XRD analysis.

D0021-A STUDY OF ALUMINIUM OXIDE THIN FILM COATINGS

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Abstract: In this work, the deposition of aluminium oxide (Al_2O_3) films produced with a pure Al source in the metallic state in an argon-oxygen gas mixture using reactive d.c. magnetron sputtering. The Al_2O_3 films were prepared on glass and stainless steel 304 substrates under difference process conditions e.g. argon flow rate and oxygen flow rate. The structure and morphology of the films were investigated by X-ray diffractometer (XRD), Raman spectrometer and Atomic Force Microscope (AFM). The XRD diffraction patterns show α -Al_2O_3 on the plane (012) at $2\theta = 25.4°$ for the argon and oxygen flow rates of 3.0 sccm and 1.2 sccm (standard cubic centimeter per minute), respectively. The formation of Al_2O_3 film is confirmed by Raman spectra.

D0022-A study of Ce as a dopant in PZT ceramics

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Abstract: The effect of Ce3+ ion on the physical properties of PZT was studied. The Pb1-xCex(Zr0.52Ti0.48)O3 was prepared via mixed oxide method and characterized by means of X-ray diffraction (XRD), scanning electron microscopy (SEM) and electron spin resonance spectroscopy (ESR) measurement. The XRD and SEM result indicate that PCIIIZT has a tetragonal crystal structure. The average grain size are in the range 3.18-5.63 μm. Ce ion in an amount not exceeding 1 mol% could enter into the crystalline structure of lead zirconate titanate The appearance of lines in the ESR spectra suggests the existence of Ce in +3 valence state. Moreover, doping with Ce3+ ion has a strong effect on the physical properties of PZT The volume shrinkage and density were found to be very low.

D0023-Laser-induced Thermal Diffusion Shock Waves

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Abstract: The study of the Ludwig-Soret effect or thermal diffusion, whose effect is the production of concentration gradient caused by a temperature gradient, has been widely studied by using Forced Rayleigh Scattering experiment (FRS)[1] However, the theoretical model of the effect in sinusoidal temperature distribution has not been derived in detail and an interesting feature, the existence of shock waves, of the model is not yet recognized. In this work, the existence of shock waves is proved theoretically and experimentally.

D0024-EFFECTS OF SUBSTRATE TEMPERATURE ON SURFACE DIFFUSION LENGTH IN A THIN FILM GROWTH MODEL

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Abstract: In molecular beam epitaxy (MBE) growth, atoms that are deposited on substrates diffuse to appropriate sites before incorporation process. The displacement that a freshly deposited atom can diffuse before being incorporated into a growing film is called surface diffusion length. In this study, a relation between surface diffusion length and a parameter controlling MBE growth, i.e. substrate temperature, was obtained. By using computer simulation based on a 1+1 dimensional MBE model, we found that the surface diffusion length increases exponentially with the increasing of substrate temperature. Moreover, effects of surface diffusion length on film surfaces are shown. It was found that films grown with long surface diffusion length have smoother surface than ones grown with smaller surface diffusion length.

D0025-Non-destructive determination of carrier concentration in heavily doped, MBEgrown, GaAs:C using photoluminescence.

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Abstract: A carrier concentration of heavily doped, MBE grown, GaAs:C were determined from photoluminescence(PL) spectra. The samples used have carrier concentration, determining by Hall measurements, of 17.10.4 . 1 × to 3.20.10.4 . 1 − × *cm*. From photoluminescence spectra, an Energy band gap) (*g E* and Fermi energy) (*F E* of the materials can be obtained. From these two energies the hole concentration of the material can be calculated the results show good agreement between hole concentration obtained by Hall measurements and hole concentration obtained from photoluminescence spectra.

D0026-A STUDY OF HETEROEPITAXY GROWTH USING A COMPUTATIONAL MODEL

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Abstract: In this work, we study a Solid-On-Solid (SOS) MBE growth model. We varied the substrate temperature and obtained surface morphologies and interface width(W) in homoepitaxy and heteroepitaxy growth. Our study shows that when the substrate temperature is low, the surface is very rough and exhibits fast growing width in homoepitaxy system. For higher temperature, the surface becomes kinetically rough that eventually turns into a layer-by-layer growth at very high substrate temperature. We then expand this model by including effects of strain caused by a lattice mismatch between the substrate and film materials in heteroepitaxy. We find islands appearing on the surface due to effects of strain and the critical value of strain that leads to island formation increases when the substrate temperature is increased.

D0027-IMPACT OF STRESS GENERATION IN DEEP SUBMICRON CMOS TECHNOLOGY ON ELECTRICAL PERFORMANCE

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Abstract: This paper describes the impact of stress generated by shallow trench isolation (STI) width and spacing on electrical performance. A higher capacitance has been found for a narrow active area width, in the rage 0.2 to 3 μm, which is mainly due to a higher compressive stress. The capacitance also increase when reduced STI depth from 400 to 250 nm, which relates to a higher tensile stress from trench bottom. In addition, the capacitance reduction for a narrower trench width is reported. This is an important result since a further down-scaling is needed to precisely control the doping concentration while the stress is expected to increase for smaller and shallower STI.

D0028-STUDY OF SAGNAC EFFECT IN FIBER OPTIC LOOP

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Abstract: Sagnac effect was discovered in 1913. This effect happens when two counter propagation beams, (one clockwise, CW, and another clockwise, CCW) arising from the same source, propagate inside an interferometer along the same closed path. At the output of the interferometer, the CW and CCW beams interfere to produce a fringe pattern. This pattern shift if a rotation rate is applied along an axis perpendicular to the plane of the path of the beam. Thus, the CW and CCW beams experience a relative phase different which is proportional to the rotation rate. Therefore, we can determine the rotation angle by the rotation rate and phase difference of CW and CCW beams. This effect plays an important role in fiber optic gyroscope (FOG). The fiber optic coil radius *R* is used in FOG instead of the interferometer. Because of the better quality, performance, resolution (0.001°/h) and the lower manufacturing cost comparing with mechanical gyroscope, this FOG was extensively used in many navigator systems for vehicle (car plane missile etc...) and many machines in factory (CNC CMM etc...)

D0029-Detection of Leptospiral bacteria by Surface Plasmon Resonance Spectroscopy

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Abstract: Conventional diagnostic method of Leptospirosis is based mainly on detection of anti-Laptospira antibodies (Ab). The antibodies are detectable within 4 – 10 days in patient serum after infection, and diagnosis is relied on the rise of antibody titer in paired serum sample taken 7-10 days apart. Howevers, serodiagnostic methods are usually delay and complicate for interpretation. Therefore, this study emphasized the use of surface plasmon resonance (SPR) to detect the leptospiral antigens (Ag) as an immuno-sensor in determination of the refractive index or the thickness of the sample adhering on the gold surface.

D0030-The transport analysis of the low energy cosmic ray particle from ULEIS instrument on ACE spacecraft.

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Abstract: The energetic particles are generated from the solar flare, which they affect to the Earth such as, the electric failure at the Earth's pole and the aurora phenomena. We often interest the high energy particle, which they can pass the Earth's magnetic field to the atmosphere with their energy are more than 1 GeV. The neutron monitor can detect those particle at the Earth. Furthermore, there is an ULEIS instrument on ACE spacecraft, which detect the low energy particle at 0.02-14 MeV/n. These particles are easy disturbed by the interplanetary medium or the shock wave. In this work, we simulate the solar energetic particle transport of Ruffolo 1995 by the Finite different method for the solar event on June 4^{th}, 1999. We find the longest helix distance of the particle along the magnetic field line, which is 0.569 +/-0.003, 0.332 +/- 0.021, 0.201 +/- 0.027, 0.137 +/- 0.198 AU, and the injection duration is about 1463, 653, 652, 483 min for C element at . 0.24, 0.48, 1.92, 4.9 MeV/n respectively. Finally, this solar event is an impulsive flare because its injection time is less than 1 hr and there is not the CMEs following.

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D0031-An Analysis of The Injection Time for the Solar Energetic Particles of the Impulsive Solar Flare Event on May 1, 2000.

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Abstract: The some of solar energetic particle or solar cosmic ray are generated from the Sun and solar flare. The effects of these particles associate with the important effects on the Earth, such as radio and communication disturbance, causing electric failures. These are causing for studying the particle acceleration mechanism near the Sun. We use the transport equation of Ruffolo 1995 to explain the motion of the solar energetic particles and fit the data form SIS; Solar Isotope Spectrometer instrument, at ~10 to 100 MeV/n on ACE; Advanced Composition Explorer for the impulsive solar event on May 1, 2000. We solve the transport equation by the technique of finite different method and compare the result with G.C.Ho. et.al (2001). They fit the data from ULEIS; Ultra-Low Energy Isotopic Spectrometer at ~0.005 to 10 MeV/n. They got the parallel mean-free path is 1.12±0.004 AU and the injection time is less than 1 hour. However, the fitting results for this work show the injection duration of particles from the Sun to the Earth for He, C, N, O, Ne and Fe. The best radial mean-free path for this event is 0.32-1.14 AU, the injection time is 6–228 min, and the averaged injection time from the Sun to the Earth is 14.3 min, which is different from the injection duration time from the spacecraft 20.56 %. The both of instrument (ULEIS and SIS), there is the overlap energy at 7-14 MeV/n for He, C, and O elements. We got the radial mean-free path is 0.67±0.133 AU, which close to G.C.Ho. et.al (2001) is 1.34±0.266 AU. The both of works give the same injection time, which is less than 1 hour.

D0032-Luminescence from copolymer of polyfluorene and anthracene light emitting device

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Abstract: Copolymer of 9,9- Di (2' - ethylhexyl) 2,7 dibromofluorene (BEH-PF) and dibromo(anthracene) were used at various compositions as an emissive polymer layer of organic light emitting devices. The device structure consists of indium tin oxide (ITO) coated glass substrate, poly(3,4-ethylenedioxythiophene/poly(styrenesulfonate) (PEDOT-PSS) layer, polymer layer and aluminium layer. Spectra of photoluminescence and electroluminescence indicate that luminescence peak of copolymer emissive layer are slightly red shift compare with the peak from BEH-PF polymer. The calculation result by density functional theory exhibits the wavelength shift consistent with the experiment result.

D0033-Electrical characteristic of monolayer film of a side chain liquid crystal copolymers studied by scanning tunneling microscopy and atomic force microscopy

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Abstract: The monolayer Langmuir-Blodgett (LB) films of a side chain liquid crystal copolymer (copl1) with an 11-methylene spacer and a composition of 50% nitrobiphenyl (NBP) and 50% methoxy ethoxy methoxy biphenyl (MEMBP) were prepared from the gas water interface. This film was subsequently being transferred onto a hydrophobic silicon wafer substrate by horizontal deposition technique. The surface morphology of monolayer film was imaged by atomic force microscope (AFM) in dynamic mode. The current-voltage (I-V) characteristics of monolayer and double layers films were characterized by using scanning tunneling microscope (STM). It should be noticed that the STM tip stays with small distance on the film surface. The electric resistance for the monolayer is smaller than that for the double layer. For measuring the conductance by AFM, the AFM tip has to contact to the film surface. Then the conductive tip was biased by external voltage and current through the tip was measured to extract I-V characteristics from molecules at the local area of the surface. The electric characteristic for the 5 layer film by using conductive AFM exhibits the antisymmetric current between forward and reverse bias.

D0034-ELECTRICAL AND OPTICAL CHARACTERISTIC IMPROVEMENT OF ORGANIC DEVICE OF 8-HYDROXYQUINOLINE ALUMINUM WITH MULTILAYER STRUCTURE

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Abstract: Electrical and optical characteristics for single layer organic devices of 8-hydroxyquinoline aluminum (Alq3) have been improved in multilayer structures by inserting a hole transport layer of N, N'-Bis(3methylphenyl)-N,N'-bis(phenyl)benzidlne (TPD) between a transparent anode of indium tin oxide (ITO) and organic layer by spin coated technique. One set of devices was also inserted LiF layer between organic layer and aluminum cathode while the other has no LiF layer. The organic thin films, LiF layer and top electrode were prepared by thermal evaporation under a pressure of 10-5 Torr. When electrical potential was applied, it was found that the electrical characteristics of devices with and without LiF layer are slightly different. The forward current of devices with LiF layer is lower than that in devices without LiF layer. While the green emission without and with LiF was observed at turn on voltage of 9.90 V and 9.27 V, respectively. It means that the inserting of LiF can also decreased the turn on voltage of device. The peak of both structures occurred at the same wavelength of 539 nm, while the photoluminescence peak exhibits at the wavelength of 530 nm. The electroluminescence light was hardly observed in the previous single layer devices but, by the improvement, much higher brightness can be emitted from the multilayer structures

D0035-FINITE-TIME SHOCK ACCELERATION AND ION SPECTRA FROM INTERPLANETARY SHOCKS

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Abstract: Observations of energetic ion acceleration at interplanetary shocks often indicate a spectral rollover at ~ 0.1 to 10 MeV nucl^{-1}. We argue that this is best explained by the limited time duration of the process, related to the age of the shock. Therefore an explanation of typical spectra of interplanetary shock-accelerated ions requires a theory of finite-time shock acceleration, which for long times (or a fast acceleration timescale) tends to the steady-state result of a power-law spectrum. We present analytic and numerical models of finite-time shock acceleration. Our models can qualitatively explain the very different spectra produced by a coronal mass ejection (CME) shock when it is near the Sun and in interplanetary space, as well as providing quantitative predictions for the spectra in interplanetary space. These reproduce a power law at low energy followed by a rollover at a critical energy, and predict a different composition dependence of the critical energy than that

obtained for other rollover mechanisms. The results can explain certain puzzling aspects of observed spectra of ions and electrons before and after the passage of an interplanetary shock.

D0036-Universal Lab Interface

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Abstract: Development of the Universal Lab Interface is a part of Research for Development of Basic Physics Laboratory System Project.* According to Student Center concept, we develop a modern method for learning Practical Basic Physics Objectives are emphasizing the experiment process and stimulate the student with interesting modern instruments. The Universal Lab Interface is developed in order to do background check automatically while students process their experiment by hand or in the usual way. The Universal Lab Interface we designed is microprocessor base with 4 analog input, 8 CMOS/TTL input and 8 TTL output. It communicates via USB ports to student's computer and sends data to the laboratory server. The control software system designed to receive standard sensing DC voltage or current from analog sensor via analog input ports. And also can receive digital data via CMOS/TTL input ports and can send command signal via the TTL output ports. All sensors and detector e.g. force sensors, position and velocity sensors, current sensor, temperature sensors, are designed together but in the other projects. Then with the known sensors the ULI is programmed to do correction and the uncertainty can be evaluated.

D0037-SPHERICAL QUANTUM WELL

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Abstract: Particle in a potential well is a basic problem for every physics student. Solving this problem is a good example which provides some quantum characteristics of particles in bound state, especially the quantization of the physical quantities, which come from applying the boundary conditions to the particle wave. The most important case is the existence of the discrete energy level. The rectangular well is always considered for its simplicity. But it is interesting to see what will happen if the well has another shape. In this work the infinite-spherical quantum well was analyzed From symmetry of the problem, Schrödinger equation in spherical coordinate was solved. It was found that the solution had the form of spherical standing wave. The radial part of the solution is the spherical harmonic. While the radial part is the spherical Bessel function The total energy has discrete values as expected. However, since the position of node of radial wave function is depend on the value of angular momentum, the energy level depend on both principle and angular momentum quantum numbers, which differ from the rectangular case. Distribution of the particle in the well can be seen once the probability density function is obtained. Visualization of this function, generated from, the computer algebra software, is provided.

D0038-Simulation of Multiple beam interfence for a confocal Fabry Parot Interferometer

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Abstract: Today Fabry-Perot Interferometer are various of applications from astronomy, optical measurement and testing, to household security device. The Fabry-Perot Interferometer is Multiple beam interference. In this research, we do a computer simulation of interference on both spatial domain and temporal domain. The simulation result is object to verify calculation results and observed interference result while any parameters are able to adjust. In practical, to do a simulation that close to theoretical result need and exact technique of algorithm design Also, it need to include some error of practical instrument The objective of this research are to compare the result among the experiment and the theoretical calculation .

D0039-SYNCHRONOUS MULTI-SPIN-EXCHANGE MONTE CARLO SIMULATION

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Abstract: Application of the Boolean algorithm to the conserved-order-parameter Ising model simulation is presented We use the bits within a w-bit computer word to represent w spin variables on separate lattices so that one Monte Carlo step simultaneously updates spins in w different systems. Then, these independent systems will be glued to make a system w time larger. This can be done using bitwise AND, OR, XOR, NOT, and the bit shift operators provided by the programming language. We have measured an effective increase in the speed of the simulation, using 20-bit word, by a factor around 9, compare with conventional single-spin-exchange algorithm By this strategy, we can increase the simulation speed by perform parallel processing, using only standard personal computer, and provide the possibility to simulate the larger and/or more complex system

D0040-THE STUDY OF QUANTITATIVE X-RAY FLUORESCENCE ANALYSIS UNDER THE INFLUENCE OF FRACTION BINDER IN ZIRCON PELLETS

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Abstract: The accuracy of semi-quantitative analysis of zircon using Wavelength Dispersive X-Ray Fluorescence Spectrometer(WDXRFS) was investigated under a consideration of major source which caused an error in analytical result during specimen preparation process, bulk pressed pellet form in particular. Since the limitation of available amount of analyte sample has been encountered, an effect of dilution ratio of analyte sample to binder of boric acid on the analysis was studied. In addition, an influence of strong amount of zirconia in zircon on analytical results of the other minor elements was observed. It is consequently shown that the results can be improved remarkably by using standard addition method of pure SiO_2, and also adding validity of SiO_2 concentration as input data for the quantitative determination of a composition of zircon. Hence the minimum dilution sample-to-boric acid ratio of the specimen is 65:35 by weight in order to obtain reliable analytical results as well as one with an optimum ratio (95:5).

D0041-THE PROPERTIES OF ALUMINUM-DOPED ZINC OXIDE THIN FILMS PREPARED BY RF MAGNETRON SPUTTERING FROM AN EMBEDDED-ZINC ZnO(Al) TARGET

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Abstract: Recently, Al-doped Zinc Oxide, ZnO(Al) thin films have drawn a lot of attentions due to its low electrical resistivity and high optical transparency. Thus, it has been used as a window layer for $Cu(In,Ga)Se_2$ thin film solar cells. The problem of the ZnO thin films prepared by sputtering technique is that it yields low resistivity and low transparency. This can cause the decreasing in the efficiency of the solar cells. In this work, we prepared ZnO(Al) thin films by sputtering embedded-Zinc ZnO(Al) targets. The films prepared by these targets yield low resistivity with significantly increase in transparency for the wavelength greater than 1000 nm. By this technique we can solve the problem of the transparency of the films and can help increasing the efficiency of $Cu(In,Ga)Se_2$ thin film solar cells.

D0042A NUMERICAL METHOD TO OPTIMIZE FRONT-CONTACT GRIDS FOR SMALL-SIZE SOLAR CELLS

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Abstract: In order to obtain high efficiency small-size solar cells, such as CIGS based solar cells with efficiency greater than 18%, the front-contact metallized grid must be optimized to attain the appropriate grid pattern. In this work, an optimization procedure is studied by using a distributed network model of unit cells, Kirchoff's current law and diode current equation, to form a system of equations. A numerical method is used to find the efficiency for an assumed grid pattern. The optimization focuses on the width and the spacing of the two parallel arms of the fork-shape grid pattern for the best cell efficiency.

D0043-DETERMINATION OF η-PRODUCTION BY ANALYZING DATA FROM THE CLAS SPECTROMETER

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Abstract: Eta particle (η) is an unstable meson with a rest mass of 547.3 MeV/c^2. Physicists are interested in its decaying because some rare radiative decay channels of eta such as $\eta \rightarrow \pi^+\pi^-\gamma\gamma$ and $\eta \rightarrow \pi^0\pi^0\gamma\gamma$ can supply information on charge conjugation violation. In this work, $\gamma p \rightarrow \eta p$ reaction will be used to determine the number of η-production by analyzing data obtained from CLAS (CEBAF Large Acceptance Spectrometer). The events which have one-proton-signal will be selected. From detectable momentum and energy of proton and incident photon, we can calculate missing mass to identify missing particles. The peak of missing mass located in eta mass region will be selected and its background will be removed. The events corresponded to these criteria are the number of η-production. We hope that with the unique design of the CLAS, which has a large detection acceptance, high data acquisition rates and good resolutions, will provide higher statistics and more precise measurement than the previous bubble chamber experiments.

D0045-Unusual Features of the October 28, 2003 Ground Level Enhancement

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Abstract: A ground level enhancement (GLE) occurs when the intensity of solar energetic particles (SEPs) that arrive to the Earth after a solar flare is high enough to originate particle cascades in the atmosphere that increase radiation levels at Earth's surface. This enhancement is observed by ground-based cosmic ray detectors, like neutron monitors. The GLE of October 28, 2003 was unusual in a number of respects. Instead of a single, anisotropic peak from the Sunward field direction followed by an isotropic decay in intensity, this event exhibited two highly anisotropic spikes from very different directions. The earliest onset was seen by the neutron monitor station at Norilsk, Russia, which is surprising because this station at the time was viewing approximately anti-Sunward along the nominal Parker spiral direction. While that spike rapidly declined, another spike was observed by several neutron monitor stations, lasting about 60 minutes. This spike was also not from the Sunward field direction, but rather from a far South latitude. The decay of the event, on the other hand, was unusually slow. In fact, the particle intensity remained at elevated levels until the coronal mass ejection associated with the GLE arrived at Earth and swept the solar particles away.

D0046-Rotation Spectra of Viable and Non-viable *Tetraselmis* sp. Cells in AC Electric Field

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Abstract: Single cells behave non-homogeneous dielectric particles. When being place in a low conducting medium under ac electric field, cell dipole is induced. Interaction between cell dipole moment (μ) and the external field (E) creates a torque which spins the cell at an angular speed (Ω) and direction depends on field frequency. This research found different rotation spectra between viable and non-viable cells.

D0047-Temperature dependent cyclotron resonance in the hybridised electron-hole system in bipolar InAs/GaSb heterostructures

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Abstract: Cyclotron resonance measurements are performed at selected temperatures on InAs/GaSb narrow well structures. The effects of electron-hole hybridisation on cyclotron resonance are found to be strongly temperature-dependent. As the temperature increases, the cyclotron resonance spectra narrow dramatically and multiple splittings due to electron-hole hybridisations disappear. This phenomenon is believed to be associated with both the classical Coulomb interaction of electrons and the thermal excitation of carriers across the minigap. The existence of the minigap in the system is confirmed by comparison of cyclotron resonance spectra at different parallel magnetic fields.

D0048-THEORETICAL INVESTIGATION OF Li^+/Li and Li CLUSTERS INSERTION INTO SINGLE-WALLED CARBON NANOTUBES

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Abstract: Theoretical investigations on single-walled carbon nanotubes (SWNTs) have been performed using first-principles total energy calculations to explore feasibility of doping Li^+/Li through the sidewall and open-end of nanotubes. The first

model elucidates the potential energy surface between Li^+/Li and SWNTs as function of distance along a cross section by inserting Li^+/Li through the nanotube's sidewall. These investigations have revealed that Li^+/Li@tube systems could enhance the capacity of lithium batteries by using both interiors and exteriors of nanotubes. Second model, the insertion of Li atoms pass through opening mount of (6,0) single-walled carbon nanotubes have shown no insertion barrier in which the tube's mouth is passivated by hydrogen. The diffusion barrier is small inside the nanotube and Li atoms prefer to reside along the tube axis. For the larger diameter tube, (9,0), it has shown different interaction characteristic if lithium is located at tube axis.

D0049-REFRACTIVE INDEX-BASED FIBER OPTIC SENSOR FOR DETECTION OF ORGANIC CHEMICAL VAPORS

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Abstract: A new type of fiber optic sensor for detection of volatile organic chemicals was studied. The fiber optic sensor uses poly (vinyl alcohol), PVOH films cladded on the side of optical fiber as the sensing material whose refractive index changes upon an exposure to volatile organic chemicals. It is found that the refractive index of PVOH films changes differently upon exposure to different chemical vapors and this increases the output signal by the leaky-typed optic mode. The change in optical output signal is proportional to the amount of refractive index change, except when there is a chemical taken place. Also the sensor characteristics of PVOH films are different for different chemical vapors, which is useful for developing the sensor that can identify type of the chemicals detected.

D0050-RBS Characterization of Conducting Thin Films Prepared by RF Magnetron Sputtering

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Abstract: Conducting thin films have been prepared by the home-built radio frequency magnetron sputtering by copper target under argon atmosphere with background pressure of 3x10-5 mbar. The films were prepared on 25 sets of four 1x1 cm2 glass substrates. Each set were coated with the different RF power of 80, 100, 120, 150 and 180 watts and the various exposure time of 5, 8, 10, 12 and 15 minutes. Rutherford back scattering spectrometry (RBS) of the coated films were measured by 2.13 MeV He++ ions at 170 degree. The film thickness as a function of RF power and exposure time can be clearly exhibited by fitting the RBS spectra to NUSDAN simulation. The film thicknesses were found to be from 80 to 200 nm. The obtained film thicknesses and roughness were measured by atomic force microscope (AFM). The RBS spectra seem to indicate the present of copper oxide which were also examined by x-rays diffraction patterns.

D0051-RAMAN SCATTERING IN RELAXOR FERROELECTRIC Pb(Zn1/3Nb2/3)O3

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Abstract: A model relaxor ferroelectric Pb(Zn1/3Nb2/3)O3 (PZN) has been studied by micro- Raman scattering at room temperature and over a frequency range up to 1000 cm^{-1}. The experiment allowed assignment of frequencies of Raman active zone at ~270 cm^{-1}, 595 cm^{-1}, and 780 cm^{-1}. No usual soft mode has been found, in agreement with other reported.

D0052-Relativistic vision of the moving cube

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Abstract: In introductory courses on special relativity, many students have the difficulty in imagining how the object changes its appearance when it moves at appreciable fraction of the speed of light. Moreover, a whole picture of the moving object becomes more difficult to imagine if the problem involves the change of three or more dimensional forms of space and time. In order to study the distortion effect of high velocity on the appearance of the common object, we use the cube substitute any common object. The cube may be set out on any position and at any angle relative to the observer, but the relative velocity, $\beta = v/c$ is assumed to be constant corresponding to special relativity condition. By wielding the concepts of light sphere of observation and Lorentz contraction, we can calculate and display the resulting shape of the moving object appearing to the observer.

D0053-THE WAVELENGTH DISPERSIVE X-RAY FLUORESCENCE ANALYSIS IN THICK EMULSION PAINT FILM SPECIMENS.

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Abstract: A technique of quantitative analysis of multielement in thick film specimens of red emulsion paint using Wavelength Dispersive X-Ray Fluorescence Spectrometer (WDXRFS) was studied. The thick film preparation by painting on two distinct substrates i.e. acrylic plate and galvanizing steel sheet, were provided for inspecting Compton scattering effect on the analysis. In order to check an accuracy of analysis, the bulk pressed pellet specimens were prepared by the paint in form of fine powder, yielding the analytical result which was considered as reference values. Furthermore the according results from thick film specimens show the concentration of zinc in galvanizing steel substrate, which implies the finite thickness of the films. Finally, it was pinpointed that high Compton scattering caused by light elements in acrylic substrate, has an extreme influence on the incorrect result of trace elements.

D0054-PREPARATION OF THIN POLYCARBONATE FILM FOR STUDY NUCLEAR TRACK ETCHED FROM URANIUM-235

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Abstract: A study of the nuclear track in thin Polycarbonate (PC) film that was prepared by using extrusion method with 15 micrometer thickness. The PC film was attached with uranium screen and irradiated by neutron from nuclear research reactor. The irradiated film was etched in the chemical etchants by sodium hydroxide (NaOH), potassium hydroxide (KOH) and litium hydroxide (LiOH) solutions in the same condition of 6N 70°C for 1 hour. Track diameter from fission fragment of uranium-235 on PC film was 0.5 to 6.2 micrometer and track density are in the range of 9.55×10^4 to 1.19×10^5 track.cm^{-2}.The comparison of 3 types of etching solution show that the track etched with NaOH solution is the largest track.

D0055-Perturbative Calculation of Quasi-normal Modes of Schwarzschild Black Holes

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Abstract: We discuss a systematic method of analytically calculating the asymptotic form of quasi-normal frequencies of a four-dimensional Schwarzschild black hole by expanding around the zero order approximation to the wave equation proposed by Motl and Neitzke. We obtain an explicit expression for the first-order correction and arbitrary spin. Our results are in agreement with the results from WKB and numerical analyses in the cases of scalar and gravitational waves.

D0058-Molecular Modeling of *Bacillus thuringiensis* Cry4Aa and Cry4Ba Proteins

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Abstract: The gram-positive endospore-forming bacterium *Bacillus thuringiensis* synthesizes specific larvicidal protein Cry4Aa and Cry4Ba which are highly active against mosquito-larvae of the genus Aedes, Anopheles, and Culex. Currently, the precise mechanism of toxicity of Cry toxin is not completely understood. To gain molecular structural knowledge of two proteins Cry4Aa and Cry4Ba, Angsuthanasombat, *et al*[1] generated plausible 3D models for the activated forms of these two toxins by homology modeling. Although the predicted structures of these two proteins were generated, they might have lower-energy conformations. In this study, the simulated annealing(global energy minimum search algorithm) results of before-and-after-simulated annealing structures between Cry4Aa and Cry4Ba were studied and compared.

D0059-THE EFFECT OF HEAT TREATMENT ON MECHANICAL PROPERTIES OF COLD WORK TOOL STEEL

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Abstract: The use of the cool work tool steel must consider their hardness and residual stress. These properties are affected by the heat treatment during the manufacturing process. This research concentrates in the effect of the heat treatment on mechanical properties of the cold work tool steel. The experiment was done with the sample heating at 300 °C , 400 °C , 500

°C and 600 °C under vacuum. The results show that the highest hardness(61 HRC)occuurs at 500 °C and the lowest hardness(48 HRC)occuurs at 600 °C. Although these temperatures yeild a different hardness, the same residual stress of 359 N mm^{-2} are obtained. However, types of residual stress are different. Heat at 500 °C represents a compressive stress while heat at 600 °C represents a tensile stress. In conclusion, the most suitable temperature used in heat treatment process is 500 °C because it yeilds both the best hardness and the less residual stress.

D0060-Growth of Molybdenum Trioxide Nanowhiskers by Vapor Transport Method

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Abstract: Molybdenum trioxide nanowhiskers have been grown by vapor transport method. A molybdenum trioxide pellet from hydrolic pressed powder was put into a tubular furnace and heated to 750°C. Silicon (100) substrates were placed for 10 minutes at the positions of 650°C, 650°C, and 600°C. From scanning electron microscopy results, the whiskers on the substrates at 650°C and 650°C were wider than a micrometer. The whiskers on the substrate at 600°C had many sizes but most of them were nanowhiskers, smaller than micrometer in size.

D0061-Synthesis of ZnO Nanowire by RF Sputtering

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Abstract: ZnO nanowires were synthesized by rf sputtering on copper, silicon and alumina substrates. The sputtering time was 60 min, in argon atmosphere pressure of 40 mtorr. The ZnO nanowires were characterized by Scanning Electron Microscopy (SEM), Energy-Dispersive Spectrometry (EDS), and Transmission Electron microscopy (TEM) for morphology, composition and crystal structure, respectively. From these results, it is confirmed that ZnO nanowires on copper substrate are single crystalline hexagonal structure with diameter ranging from 10-150 nm, and the length of several micrometer. The morphology of ZnO nanowire is also influenced by the type of the substrate.

D0062-Fräunhofer Pattern of Josephson Critical Current in Bi-2212 Cross-Whiskers Junction

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Abstract: The magnetic-field dependence of critical current density across a Josephson junction is being studied on Bi-2212 cross-whiskers. The cross-whiskers junction was fabricated by perpendicularly crossing two whiskers, which were then heated at 850 °C for 30 min. In superconducting state, the critical current density was a periodic and its amplitude depended on the magnetic flux density corresponding to the Fräunhofer pattern.

D0063-DC magnetron sputtering for coating substrate that is used in scanning electron microscope

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ABSTRACT: The objective of this project was to develop the DC magnetron sputtering for coating a substrate that is used in scanning electron microscope. The system had been designed and constructed consists of three major parts: (1) vacuum system, (2) a cathode in circular shape inside which a permanent magnet, and (3) a high voltage switching power supply. The target of the device was gold of thickness 2 mm and diameter 50 mm. This system was used to prepare the films that were coated onto glass substrates. The condition of coating; the pressure range of argon 3 x 10^{-2} to 4 x 10^{-2} Torr, operating voltage 350 to 450 V, and deposition time 30 s to 120 s. Consequently, the films had bright color, and thickness 32 nm to 269.9 nm.

D0064-STUDIES ON THE ELECTRICAL AND OPTICAL PROPERTIES OF SnO_2:F THIN FILMS PREPARED BY INTERMITTENT SPRAY PYROLYSIS METHOD

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Abstract: SnO_2:F thin films were prepared by intermittent spray pyrolysis method from homemade setup. $SnCl_4.5H_2O$ was used as the precursor of Sn and F doping from NH_4F. The electrical and optical studies on the as prepared films were carried out at room temperature. The sheet resistance and resistivity decrease with increasing doping concentration to minimum of 29.2 Ω/ and 1.3×10^{-3} Ω-cm for 10 wt%, but increased thereafter. The Hall mobility is found to decrease whereas the carrier concentration is found to increase with the increase in fluorine doping levels. Optical transmittance percentage in the IR region decreases in the doped films. For the films doped with F 10 wt.%, the lowest percentage of transmittance values in IR region was also elucidated.

D0065-Structure and Electrical Resistivity of $PrBa_2(Cu_{0.80}Ga_{0.20})_3O_{7-\delta}$.

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Abstract: We have fabricated metal (M) doped buffer-layer materials, $PrBa_2(Cu_{0.80}Ga_{0.20})_3O_7$ called Ga-doped PBCO, for $YBa_2Cu_3O_{7-\delta}$, (YBCO) superconductor-insulator-superconductor (SIS) Josephson junctions. The x-ray data diffraction analysis was performed in conjunction with neutron diffraction data analysis. The data indicate no significant second phase at 20% doping level and the structure and lattice parameters of Ga-doped match with those of YBCO. At 77 K the electrical resistivity of this material is several orders in magnitude higher than that of the $PrBa_2Cu_3O_7$. For these reasons Ga-doped PBCO may serve as improved buffer-layer materials for superconducting electronic circuits and devices.

D0066-Construction of a LIF System Utilizing CCD-Array

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Abstract: In this experiment a laser induced fluorescence (LIF) system was constructed utilizing a large pixel CCD-Array as a light detection device. The CCD spectrometer consists of a 2-inch reflection grating and 2048-pixel CCD-Array of the pixel size 14x200 _ m. A general single slit and a convex lens was used to form a CCD-spectrometer enclosed in a light tight box. The signal output from the CCDArraywas synchronized and digitized using an external digitizer. In our experiment we used the IQ300 16-bit 500kHz digitizer to capture the CCD-signal train from the CCD-spectrometer. The CCD-spectrometer system calibration was carried out by measuring the spectrum of some standard spectral lamps. The CCD-spectrometer worked well as a general purpose CCD-spectrometer, and also as part of the LIF system where a nitrogen laser was used as an excitation light source. The microcomputer was interfaced with both laser and the digitizer for control, synchronization, and data acquisition. The spectrum of some samples of interest were also demonstrated to show the LIF system performance.

D0067-LIF Spectroscopy of Teak Chuleeporn Wongtawatnugool and Samran Lacharojana*

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Abstract: It is well known that laser beam can induce a fluorescence spectrum off the illuminated materials. In this experiment the laser induced fluorescence (LIF) system was used to study the fluorescence spectrum of teak wood. A nitrogen laser at 337.1 nm wavelength, 4 ns pulse width at peak power of 75 kW was used as a light source. The results were presented in comparison to the spectra obtain from some noble metal such as silver and gold excited by the same system.

D0068-INSTANT NOODLES MONOSODIUM GLUTAMATE MEASUREMENT USING LASER INDUCE FLUORESCENCE TECHNIQUE

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Abstract: The main purpose of this study was to investigate the presence of Monosodium Glutamate (MSG) in instant noodles commercially obtained in the market. Naturally, different elements would be sensitive to an excitation at different wavelength. Laser light could be used as an excitation radiation to activate any sample of interest. In this experiment we introduced laser induced fluorescence (LIF) technique to be use to indicate the presence of MSG in an instant noodle by comparing the fluorescence spectrum obtained off pure MSG and ones off the noodles available in the market. It was found that part of the fluorescence spectrum of plain noodles had the similar intensity profile as off the MSG. This was also true for the case of the seasoning ingredient that come with the instant noodle. There were also some peak, of not yet identified, in the fluorescence spectrum of which need to be further studied. It was clear from this experiment that there are MSG or materials of similar molecular structure present in all samples under studied.

D0070-DENTAL CARIES AS SEEN BY LASER INDUCED FLUORESCENCE

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Abstract: There are several methods for identifying dental caries such as vision inspection, radiography , and mechanicaly explore. Those mentioned procedures usually give different conclusions, from different dentists. In order to standardize dental caries, the Laser Induced Fluorescence (LIF) method was suggested. By studying the fluorescent spectrum of the teeth, comparing between sound and caries teeth which activated by Nitrogen laser beam. We was found that the fluorescent spectra of sound and caries teeth show significantly different spectrum profiles in the range of 540-400 nanometre of fluorescent spectrum.

D0071-THE EFFECT OF TIME CONSTANT ON AC RESISTANCE BRIDGE TEMPERATURE CONTROL SYSTEM

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Abstract: An ac resistance bridge temperature control system uses a thermister as a temperature sensor device. The output voltage from the system ac-bridge depends on the difference between the thermister resistance and setting resistance multiplied by output gain of the resistance bridge setting. For high resolution temperature control, it is necessary to take all environmental effects of the system into account. This work studied the effect of time constant of the heating circuit on the system performance. In the experiment, the Stanford Research SIM 921 ac resistance bridge together with the SIM mainframe SIM900 interfaced with microcomputer system for data acquisition and control using Quick Basic program. The recorded data was analyzed statistically and the control temperature graph was plotted. Ac resistance bridge model SIM 921 gives maximum voltage output at 1 volt. In the experiment the SIM 921 output was fed directly to drive a power transistor to supply a heating current to a heating coil at maximum current of 0.2 Ampere. The SIM 921 output gain was set to 0.05 volt/ohms and varied time constant as 0.3, 1, 3, 10, 30, 100, and 300 second for temperature control of 50oC. It was found from the experiment that at lower time constant the controlled temperature was widely swung and varied rapidly. As approaching bigger time constant setting, the controlled temperature was much more stable. The estimated steadiness of temperature control at 300 seconds time constant was about 5[illegible].0 mK. This work will play an important role in the suggestion of the environmental effect on the controlled temperature especially ones that need to be better than 5.0 mK.

D0072-Lidar Application to Cloud Distribution

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Abstract: The light scattering intensity of light passing through a boundary depends largely on the difference in the density of the media. In this experiment the laser beam was sent directly upward to the sky by YAG-Pumped dye laser at the wavelength of 500 nM. The strong back scattering off the cloud was collected by 20-inch telescope parabolic reflector. The back scattered beam were focused onto the Hamamatsu R3164-10 photomultiplier tube (PMT). The light signal from the PMT was amplified by the pre-amplifier (PA) and then directly connected to the multichannel scaler (MCS) unit. The MCS unit is a high-speed counter and counts the incoming PMT pulses in a given time window and transmitted to a computer to collect data. It was found in the experiment that the back scattered photons increase when the laser beam is traveled through the cloud. It was therefore possible to calculate the position of the cloud. It was possible also to find cloud distribution in the sky at night by scanning the laser beam and the receiving optic across the sky. The system was designed to cope with such task by xy-motion step motor controlled 30x30 inches mirror. In the case of 5 nS sample time setting will be equivalent to around 24 km. laser path.

D0073-High Voltage Pulse Optical Switch

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Abstract: An optical switch was constructed by activating an active dielectric substance with a high voltage pulse. When the dielectric such as nitrobenzene is activated by high uniform electric field, it behaves like a uniaxial crystal of which the polarization of the light passes through the medium will be rotated. In this experiment, the He-Ne laser is used as a light source sending the beam through two parallel oppositely charged plates inserted in a glass cell containing nitrobenzene. The sample cell was placed between crossed polarizer and analyzer. No light was transmitted by the analyzer while the EHT was off. When the EHT was on, the liquid behaved like an uniaxial crystal and the light was transmitted . It was found from the experiment that the transmitted intensity depends depend on the supplied EHT as expected. Switching characteristic property of an optical switching system must be studied carefully in order to use such a system for controlling laser pulse amplitude and timing of the laser beam applied to a laser pulse applications.

D0074-Fluorescence of Gemstone under Nitrogen Laser

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Abstract: Many gemstones show fluorescence under ultraviolet radiation. The fluorescence may modify color appearance of fluorescent gemstone and can be used to assist gem identification. In this experiment, the nitrogen laser was used to irradiate two types of gemstone and also to irradiate two pieces of gemstones of the same kind obtained from the same location. The LIF spectrum of these gemstones were significantly difference under nitrogen laser beam irradiation. The fluorescent spectra obtained shew that different gems have different spectra, and the two gems from the same location have the same peak in two range of 630 to 670 nanometres and 320 to 340 nanometres but have different intensity. The different intensity may due to the physical characteristic such as different color. Further detailed study on LIF of gemstone shall be continued.

D0076-AN IMPROVEMENT OF AN AC SUSCEPTIBILITY MEASURING SYSTEM

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Abstract: This paper presents an improvement of an AC susceptibility measuring system in order to increase system efficiency and sensitivity by using the vacuum system and the closed-cycle cryogenics refrigeration (CCR). The self-constructed probe based on the mutual induction of coupling coils was designed and suited for a cryostat that could generate magnetic field in the range of 0.5-5.0 Gauss. All instruments were controlled, monitored as well as graphical displayed via a computer inconjunction with a software instruction Agilent VEE pro version 6.0. $YBa_2Cu_3O_{7-x}$ superconductors were used to characterize the measuring system in the temperature range of 20-300 K under the pressure of 1.4×10^{-2} mbar. Testing results showed that while lowering the sample temperature down, the complex susceptibility of the sample changed abruptly just above the critical temperature of about 90 K indicating the perfect diamagnetism of the sample and the energy loss in its superconducting state. Furthermore, the measuring system satisfactorily performed with an estimated sensitivity by about 4×10^{-7} Gauss-cm^3.

D0077-Laser Spectral Analysis by Fabry-Perot Interferometer

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Abstract: The Febry-Perot interferometer principle is multiple beam interference. The interference fringes are clearer and shaper than other single beam interferometers. It is now widely applied ranging from astronomy to household security devices. An interesting application is in the field of optical measurement and testing especially in an optical spectrum analyzer. It is an important method to study light sources such as lasers. In this research, a confocal Fabry-Perot

interferometer is used. The system consists of two confocal mirror. One mirror is controlled by piezotransducer. The interference pattern is detected by a photo diode and a graphical display via DSO The aims of the research are the search for the accurate wavelength measurement, which is expected to be in order of 0.1 nm, and the associated experimental uncertainty.

D0078-MATHEMATICAL MODELING FOR TEA NITROGEN LASER

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Abstract: The mathematical model of electrical discharge circuit of Transversely Excited Atmospheric nitrogen laser (TEA nitrogen laser) was used for predicting electrical discharges. The TEA N_2 laser was developed using 2 typed of capacitors The aluminum foil and high voltage ceramic doorknob capacitor were used in this purpose. In this work, two electrodes of laser channel were made from stainless steel with length of 15 cm and spacing of 2 mm. Nitrogen gas was excited by high voltage pulse discharge technique from Blumlein circuit The results show that the prediocted value had high relation to the experimental results. The output energy was measure by pyroelectric probe. The average output energy was in the range153-191μJ at 10-14 kV supply In addition, the optical efficiency was determined to be 0.02-0.03 % of electrical input energy.

D0079-Study on Structure-Morphology-Properties Inter-Relationships of Poly(ethylene napthalate) (PEN) and Poly(trimethylene terephthalate) (PTT) Blends by using Small Angle Neutron Scattering Technique

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Abstract: Small Angle Neutron Scattering (SANS) is a widely used technique to investigate microstructures of materials with dimensions between nm to μm. SANS is a non-destructive method providing information about the size, shape and orientation of some component of the sample averaged over all grains of different sizes with high statistical accuracy. SANS using neutrons as the probing particle has the advantage of being sensitive to light elements, in particular hydrogen and deuterium which remains invisible in Transmission Electron Microscopy (TEM) and Small Angle X-ray scattering (SAXS). Moreover, the SANS technique is very sensitive to the phase (size and structure) of the blend polymer. In this work, Poly(ethylene napthalate) (PEN) and Poly(trimethylene terephthalate) (PTT) Blends were studied and SANS technique will be used to investigate the phase behavior and the morphology of the blends.

D0080-QUANTITATIVE ANALYSIS OF SILICON BY $^{30}Si(n, \gamma)^{31}Si$ Reaction

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Abstract: The problem of silicon determination by $^{28}Si(n,p)^{28}Al$ reaction is the interference from $^{27}Al(n, \gamma)^{28}Al$ reaction. One solution of this problem is to use $^{30}Si(n,\gamma)^{31}Si$. From this study, it was found that this method is suitable for the sample with high silicon content.

D0081-DETERMINATION OF RADIOACTIVITY OF NEUTRON IRRADIATED TOPAZ

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Abstract: Natural topaz has clear color. Its natural clear color will turn blue, when irradiated with neutron and increase in value. In the process of topaz coloring by using neutron from nuclear research reactor, the nuclear reaction will produce radioisotopes. Thus, to reach a safety level, which is less than 2 nCi/gram (European standard) before selling, neutron-irradiated topaz shall be stored in place for a period of time in order to reduce its radioactivity. The storage time of radioisotopes is dependant on trace elements in topaz and its original sources. This study was done by measuring radioactivity with HPGe detector The result of qualitative and quantitative study found that neutron irradiated topaz consist of Sc-46, Mn-54,Co-60, Cs-134 and Ta-182 as trace element and have radioactivity between0.55-0.69nCi/gram, which are in standard limit

D0082-Preliminary Study on Color changing in Neutron Irradiated Diamond by Heating

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Abstract: The ojective of this prelimnary work is to study color changing in low quality diamonds after irradiated by high energy neutrons from nuclear research reactor. The samples has been irradiated for 60 hours, and recording of color has been carried every 12 hours. After irradiation, the selected samples were heated at 600 °C. The results of the prelimnary study show that the color of diamond has turned into yellowish green. For longer irradiation time, color of diamonds will be turned into dark green. After heated, color of the iraddiated diamonds has turned into yellow.

D0083-Analysis of Sandstone and Laterite using Nuclear Analytical Techniques

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Abstract: Sandstone and laterite samples from different regions in the north-east of Thailand were analyzed by X-ray fluorescence and neutron activation analysis techniques. From the relation of the ratio of iron to scandium with iron to lantanum, it was found that the samples can be classified into three groups according to the sampling region. This information will be useful in the archaeology study.

D0084-DETERMINATION OF TANTALUM IN TANTALITE ORE BY X-RAY FLUORESECENCE ANALYSIS OF THICK SAMPLE

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Abstract: The analysis of tantalum in tantalite ore by tube excited X-ray fluorescence with thick sample and standardless calculation method was performed. The result shows high accuracy with the error of 5% and the analysis time of this method is shorter than the neutron activation analysis method. This method can be applied for the analytical service of ore sample to the public sector by the Office of Atoms for Peace.

D0085-VARIATION OF PLASMA ELETRONS TEMPERATURE MEASURED OF A SMALL PLASMA FOCUS DEVICE FROM X-RAY WITH CHARGE ENERGY

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Abstract: A small plasma focus device with a 3.3 kJ energy operating at 15 kV is a source of intense x-ray. Plasma focus produces a pulse of plasma in a time of 3-4 μs. Therefore, plasma electron temperature can not be measured directly. From the x-ray generated, the temperature of electron in the plasma can be deduced. X-rays generated are multi-wavelength. X-ray yield and x-ray energy from the plasma focus depend on the design and operation parameters of the plasma focus device such as pressure, operating gas, shape, size and material of anode cathode and insulator even the stored energy. This research uses time resolved x-ray measurement. Five channels PIN-diode is used as a x-ray spectrometer. Argon gas is used and the measurement of x-ray with varying charging energy to plasma focus device is made. From the x-ray measurement, the electron temperature in plasma focus is found to vary with charging energy of a small plasma focus.

D0086-PENTAQUARK ANTIDECUPLET WAVE FUNCTIONS BY USING YAMANOUCHI BASIS FUNCTION

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Abstract: A pentaquark particle is an exotic hadron, consisting of four quarks and an antiquark. The existence of pentaquark particles has just been confirmed by several experimental groups since last year. It is not straightforward to construct the wave function (which plays a crucial role for any theoretical calculation) of pentaquark states since the symmetry of the five-particle system is rather complicated. In this work we construct the wave function of pentaquark antidecuplet states by analyzing the permutation symmetries of the four quarks in the techniques of the permutation group and SU(m) group, and the Yamanouchi basis.

D0087-The Study of Thermodynamic Properties of D-Wave Superconductors under a Magnetic Field

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Abstract: This paper presents the study of the thermodynamic properties of d-wave superconductors under a magnetic field on the basis of BCS gap equation together with the Zeeman effect phenomenon. It is found that at near the critical temperature the energy gap increases with increasing magnetic field and decreases with increasing ω_D / T_C , but the critical field and the specific heat difference between the superconducting and normal phases at Tc decrease with increasing magnetic field and ω_D / T_C .

D0088-STRUCTURE DYNAMIC OF AQUEOUS CRY4Ba PROTEIN AS STUDY BY MD SIMULATION

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Abstract: The structural dynamic of the Cry4Ba in aqueous solution was investigated using the molecular dynamics simulation method Energy minimization of the system was performed prior to the simulations. The system was then subjected to 200 ps of positional restrained MD simulations and was carried out for 4 ns with unrestrained MD simulations. The properties of hydration water around Cry4Ba and trend of Cry4Ba elasticity was studied. The solvent accessible surface area (SASA), the root mean square (RMS) of position displacement, total energy and H-bond number were analyzed. It was found that relative SASA of the hydrophobic part has a tendency to increase and the number of hydrogen bonds between water molecules has a tendency to increase as well. The values of the RMSD at each domain were increasing throughout the simulations, indicating that the structure of proteins has a tendency to change. All of the results clearly demonstrate that water may assist in the preliminary process of membrane insertion and pore formation in mosquito-larval gut cell membrane by the Cry4Ba.

D0089-ATWOOD'S MACHINE IN AN ACCELERATING FRAME WITH PC INTERFACE

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Abstract: The use of Atwood's machine to determine the accelerations in an accelerating frame is described. The experimental apparatus categorized as two parts: (1) Atwood's machine, and (2) microcontroller and electronic circuits. Now, microcontroller played an important role in physic experiments. Whit this device we were able to obtain the accurate measurements. Meanwhile,both parts of apparatuses were used together, the electrical signals were performed. Because of this, the data transfered to a microcomputer. These data were calculated by the visual basic program, and get the accelerations at the final. The average error of the accelerations, which compared with the theoretical calculation, is less than 2.36%.

D0090-Studies of Magnetic Thin Films Prepared by Thermal Evaporation

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Abstract: Cobalt films were fabricated by thermal evaporation on silicon and glass substrates. Electron microscope revealed that the film surface on silicon was smoother than that on glass. The cobalt on silicon exhibited anisotropic magnetoresistance (AMR) by showing 0.01-0.08% resistance change in 2.2 kOe magnetic field. Changing the angle between the field and the current (θ) also gave rise to the change in electrical resistance (R_θ). The results agreed with AMR equation since the plot between R_θ and $\cos^2\theta$ could be linearly fitted.

D0091-SOME PROPERTIES OF CADMIUM TELLURIDE THIN FILMS GROWN BY THERMAL EVAPORATION

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Abstract: CdTe thin films with different thickness have been deposited by thermal evaporation in vacuum on glass substrate without heating substrate. From XRD analysis, CdTe thin films are polycrystalline belonging to cubic structure with a preferential orientation of (111) plane. The peak intensity of XRD increases as the film thickness increases. Energy gap values of the as-deposited films with different thickness were evaluated from the optical transmission spectra. The dark

resistivity value of films decreases when the films thickness increases. It may indicate that the thicker films contribute a larger grain size and lower active defects.

D0093-A STUDY OF SOME PHYSICAL PROPERTIES OF GEM TEKTITES FROM THAILAND

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Abstract: Thirty samples of tektites from Thailand were investigated for the longitudinal sound velocity (V_l) and transverse sound velocity (V_t) with a technique of echo method. The average results are 6,074 ± 78 m/s for V_l and 3,695 ± 52 m/s for V_t. The specific gravity foe each sample was obtained by hydrostatic method with the use of an electronic balance. The average specific gravity or density (ρ) result is 2.42 g/cm^3. The V_l, V_t and ρ values from this study were used to calculate the Young's modulus (E) and shere modulus (μ) which are 80 ± 2 GPa and 33 ± 1 GPa, respectively. The E and μ values of this study are very close to those of Soga and Anderson (1967). The refractive index (R.I.) for each sample was measured by a refractometer obtaining in the range of 1.50-1.51. These values are similar to those of derived from the equation of Durrani (1971) (R.I. 1.49-1.50). The chemical composition (major elements) of sample was analyzed by an energy dispersive X-ray fluorescence spectrometer (EDXRF). The sample have the composition corresponding to Muong Nong tektites which have the parent materials of soil, loess, and rive sediments according to Chassidon and Koeberl (1995).

D0094-NEUTRON SCATTERING STUDY OF PHONON DYNAMICS IN (1-x)Pb(Zn1/3Nb2/3)O3-xPbTiO3 CRYSTALS

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Abstract: It is now a well-recognized fact that the dynamical properties of relaxor ferroelectrics are determined by the presence of polar nanoregions (PNR's). In this work, we will present a comprehensive picture of the formation, temperature evolution and dynamics of these regions in (1-x)Pb(Zn1/3Nb2/3)O3-xPbTiO3 (PZN-x%PT) single crystals with x = 0-15%. The neutron probe was used to detect the internal relaxational dynamics, directly in the form of a central peak) 0 (= ω h , or indirectly through their interaction with transverse phonons. A comprehensive analysis of our results allows identification of four phases in the evolution of the PNR's with decreasing temperature.

E

E0001-EFFECT OF POLYMER COATING ON VARIOUS PAPERS TO COLOR PRINT QUALITIES OF INKJET

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Abstract: Effect of polymer coating on various papers to the color print qualities of inkjet was studied by using a polyvinyl alcohol as a coating solution. The aqueous concentration of 10% by weight was stirred in distilled water at 60°C, giving the viscosity of 20 centipoises, and coated on the surface of 4 white paper types; wood-free, gloss-art, card and art-card papers, with a film thickness of 4 microns. A standard test form of IT8.7/3 was then printed on the polymer coated and non-coated papers using an inkjet printer with water-based ink. The results showed that the printing ink was better absorbed, easier dried, less penetrated and less spread on the polymer coated paper. The comparison of color print qualities showed that all 4 types of polymer coated papers had higher color density and color saturation, wider color gamut, more sharpness, and smaller dot size.

E0002-PREPARATION OF SOME ZIRCONATE AND TITANATE COMPOUNDS BY SOL-GEL TECHNIQUE

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Abstract: Physical and Chemical properties of preparation of Lead Zirconate Titanate (PZT) by Sol-Gel technique were studied. Lead(II) acetate trihydrate, Zirconium(IV)normalpropoxide and Titanium(IV) isopropoxide bis(acetylacetonate) were used as the starting materials, and 2,2-Dimethyl-1,3-propanediol, 1,1,1-Tris(hydroxymethyl)propane, Ethanolamine, and Ethylenediamine as cross-linking ligands. The mole ratio of Pb : Zr : Ti : cross-linking ligand was 1:0.52:0.48:3, 1:0.52:0.48:3 1:0.52:0.48:8, and 1:0.52:0.48:2, respectively. The compounds were determined by Fourier Transform Infrared Spectroscopy (FT-IR), Nuclear Magnetic Resonance Spectroscopy (NMR), Scanning Electron Microscope (SEM), and X-ray Diffraction analysis (XRD). It was found that the PZT sols have different molecular structures. The main products of PZT sol-gel were annealed at 700 ^{o}C for 30 minutes. The pale-yellow powder of PZT (150-245 nm) with ferroelectric properties was probably obtained.

E0003-EFFECT OF ENR ON MECHANICAL PROPERTIES AND MORPHOLOGY OF NR/CSM RUBBER BLENDS

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Abstract: This study sought to develop new rubber blends using natural rubber (NR) and cholrosulfonated polyethylene (CSM). Blends were prepared by means of a two-roll mill for various ratios (80/20 - 20/80 NR/CSM). Sulfur vulcanization was performed in a compression mold. Tensile properties and aging resistance were determined according to ASTM standards. NR-rich blends showed promising mechanical properties. Tensile strength of the 80/20 blend was slightly higher than that calculated from the rule of mixture, while the 70/30 blend showed slightly negative deviation from additivity (<10%). Stuktol 60 NS used as compatibilizer slightly increased mechanical properties of the blends. Changes in tensile properties after thermal aging of NR-rich blends were less than 30%, and the 80/20 blend became worse than the 70/30 blend. Addition of epoxidized natural rubber (ENR) to the 70/30 blend increased compatibility of the blends. The morphological examinations with scanning electron microscopy indicated that ENR decreased particle size of CSM.

E0004-State of Cure Measuring Device : Principle, Development and Implementation

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Abstract: State of cure measuring device was developed using a programmable data logger as a platform. Principle of state of cure calculation is based on chemical kinetic of sulfur-rubber reaction. State of cure is one of the most important controlling points of rubber product and needed to be closely watched. The measuring unit was design to be portable and modular. It was found that the measurement and calculation were accurate comparing with calculation

using Excel. The meter can be implemented easily on production line to quality control or using in research and development such as finding blow point.

E0005-Effects of Uniaxial Stress on Dielectric Properties of PZT and 0.95PZT-0.05BT Ceramics

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Abstract: Effects of uniaxial stress on the dielectric properties of PZT and 0.95PZT-0.05BT ceramics are investigated. The ceramics are prepared by a conventional mixed-oxide method. Phase formation behavior is studied by an x-ray diffraction method. The dielectric properties of PZT and 0.95PZT-0.05BT ceramics are observed under the uniaxial stress at low and high-stress levels using a compressometer. The results show that the dielectric constant of the PZT and 0.95PZT-0.05BT ceramics increases slightly with increasing applied stress while the dielectric loss tangent increases significantly.

E0006-Effect of Poling Conditions on Hysteresis Properties of 0.1PMN-0.9PZT Ceramic

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Abstract: PMN-PZT ceramic composite with formula $0.1Pb(Mg_{1/3}Nb_{2/3})O_3$-$0.9Pb(Zr_{0.52}Ti_{0.48})O_3$ or 0.1PMN-0.9PZT is prepared by a conventional mixed-oxide method. .The Phase formation behaviour of these ceramics is studied by an x-ray diffraction method. The effect of poling conditions on hysteresis properties of the ceramics poled at different DC electric fields is studied. The hysteresis properties of the ceramics are measured by a Sawyer-Tower circuit. It is found that the shape of the hysteresis loops does not change significantly with the poling field. However, the remanent polarization (P_r) and spontaneous polarization (P_s) values increase with increasing the poling field while the coercive field (E_c) remains constant.

E0007-Effect of Milling Time on Phase Formation and Particle Size Distribution of Lead Titanate Powders

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Abstract: Lead titanate ($PbTiO_3$ or PT) nano-powders have been synthesized by a mixed oxides method. A rapid vibro-milling technique was employed, with the formation of perovskite PT phase investigated as a condition of milling time by XRD. The particle size distribution of the calcined PT powders was determined by laser diffraction technique, and the morphology and phase composition determined via SEM and EDX. It has been found that the single-phase PT powders are successfully obtained when the milling time was more than 1 h after calcination at 600 °C, dwell time 2 h and heating/cooling rate 5°Cmin^{-1}. Futhermore, we have succeeded in producing quite narrow and homogeneously disperse of particle size distribution curve by an appropriate choice of the milling time. Finally, SEM studies also display that the nano-sized PT powders have a size of around 17-109 nm.

E0008-Determination of the hydraulic permeability of chitosan/polyethylene glycol blend membranes

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Abstract: Chitosan/Polyethylene glycol blend membranes were prepared by dissolving chitosan (2.0 wt %) in acetic acid solution then adding 0.75, 0.85 and 1.0 wt.% polyethylene glycol (PEG, MW 10,000 Da). After drying, the membranes were
crosslinked with sulfuric acid. Thickness of the membranes ranged from 60 to 80 μm. The hydraulic permeability (Lp) was determined from the slope of pure water flux versus pressure. The water flux was measured using dead-end stirred cell. The Lp of chitosan/PEG blend membranes shows that the membrane with 0.75 wt.% PEG is a nanofiltration or reverse osmosis membrane while the membranes with 0.85 and 1.0 wt.% PEG are ultrafiltration membranes.

E0009-Effect of Uniaxial Stress on Hysteresis Properties of Lead Zirconate Titanate Ceramic

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Abstract: Lead zirconate titanate ceramic ($Pb(Zr_{0.52}Ti_{0.48})O_3$ or PZT) is a ferroelectric ceramic, that has been widely used in actuators and transducers applications. However, in these applications the ceramic is often under the influence of the compressive stress. Therefore, this study is carried out to investigate the uniaxial stress dependence of hysteresis properties of PZT ceramic by measuring the ferroelectric parameters, i.e. remanent polarization (P_r), spontaneous polarization (P_s) and coercive field (E_c) as a function of stress. It is found that the uniaxial stress shows marked effects on the hysteresis properties of PZT by significantly reducing the values of remanent polarization (P_r), spontaneous polarization (P_s) when the uniaxial stress increases, while the coercive field is decreased only slightly.

E0010-SAMPLE PREPARATION AND NTC PROPERTY TESTING OF $Mn_{0.2}Ni_{0.8}Fe_2O_4$ FOR TEMPERATURE MEASUREMENT AND CONTROL SENSOR

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Abstract: The bulk sample with the composition of $Mn_{0.2}Ni_{0.8}Fe_2O_4$ were prepared. The negative of temperature coefficient of the resistance of the sample was measured. The system with computer was designed and constructed for showing the application of temperature measurement and control of the prepared sample in the range of 25 to 900 °C and 0 to -50 °C, successfully.

E0011-Fabrication and Characterization of Dental Porcelain Nanocomposite from Thailand's Raw Materials

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Abstract: Composition, microstructure and mechanical properties relationships of dental porcelain have been investigated. Appropriated composition, frit-firing and sintering conditions for the fabrication of low-fusing dental porcelain were determined. It is seen that the most promising composition ratio of feldspar/quartz/borax/kaolinite/soda ash for dental porcelain fritting applications is 65/17/12.4.2 (wt%). The optimum firing temperature of 1350°C is identified for frit preparation and appropriated sintering temperature of 980°C in vacuum furnace. By employing a scanning electron microscopy (SEM) together with an energy dispersive X-ray spectroscopy (EDX) techniques, a continuous glassy matrix phase together with dispersed mullite and leucite crystalline phases, particle size 50-200 nm were found. Moreover, measured values of hardness and flexural strength were also higher than those of the dental porcelain specification.

E0012-SILICON PURIFICATION BY ZONE REFINING TECHNIQUE

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Abstract: Zone Refining Technique is an effective method used to purify a material
by slowly pull a vassel containing the melting material through the temperature
gradient . Most of the impurities will diffuse to the melting part leaving the solidified part more purifier. In this research, the MG-grade silicon powder of purity 97 % was melt at 1420 °C in a graphite crucible ($1x1x8\ cm^3$) which was slowly pulled with different pulling rate of 20, 10 and 7 mm/h. The structure and impurities of the obtained samples were analyzed by X-ray diffraction (XRD), X-ray fluorescence
(XRF) and ICP-AES respectively. From the experiment SiO_2 was found on the surface of sample. The results from XRD showed that the main structure of Si did not change and SiC peaks were found due to the diffusion of C from the graphite container into the silicon matrix. Fe, Ca, Ti , Zn, Ni, As, Mn and Cr were found to be the majority impurities in the sample by using XRF.The results from ICP-AES showed that most of the impurities were reduced in the zone refined region and it was obvious that these impurities diffused to the melting part which was solidified latter.

E0013-Study the Properties of Concentrated Latex Sludge for using as a Fertilization

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Abstract: The sludged samples were collected from three rubber concentrated factories in Songkhla and Pattani, Thailand. Measure the physical properties of sludged samples such as pH, Density, Total Solids Content, Volatile Solids Content, Moisture content. The nutrient elements component in sludge, for instance N, P, K, Mg, Zn and Ca. were also analysed. The sludge was extracted with de-ionized water. Some elements could be leached and dissolved

in water. Magnesium (Mg) was found to be the most soluble in water at about 3.90 % wet weight whereas the solubility of N, K, Zn, P and Ca were 0.26, 0.25, 0.16, 0.08 and 0.01 % wet weight, respectively. The eluent from sludge extraction was analyzed for BOD_5 and COD using Azide Modification Method and Open Reflux Method. The proportion value of BOD_5 and COD was more than 0.5. This shown that the eluent of sludge extraction was biodegradable materials.

E0014-IMPROVING COMPRESSIVE STRENGTH OF AMORPHOUS SILICA FROM GLUTINOUS RICE HUSKS ADDITION PORTLAND CEMENT

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Abstract: Thailand produces and exports large amount of rice. Our country ranks top five in world production. Rice husks, major agricultural waste, are produced in large quantities as by-product of rice milling in rice-producing. Rice husks are fibrous materials with high silica content which is employed for producing Portland cement, and other silicon compounds. The chemical pre-treatment with 0.5 N HCl and the thermal treatment at 600 ^{0}C for soaking time 2 hours were applied for preparing amorphous silica. The percentage of silica in produced amorphous silica was 97 % by weight from gravimetric method. For testing compressive strength of mortar of Portland cement mixed with produced silica, the compressive strength of specimens increased with increased amount of produced silica. The maximum amount of added silica was 10 % by weight. Moreover the values of compressive strength in mixed specimens were 325 – 365 ksc.

E0015-Measurement of Planar Electromechanical Coupling Coefficient (k_p) of Lead Magnesium Niobate - Lead Zirconate Titanate Ceramics By Resonance Method

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Abstract: PMN-PZT ceramic composites with formula xPb($Mg_{1/3}Nb_{2/3}$)O_3 - (1-x)Pb($Zr_{0.52}Ti_{0.48}$)O_3 (when x = 0, 0.1, 0.3, 0.5 ,0.7, 0.9 and 1) are prepared by a conventional mixed-oxide method. Planar electromechanical coupling coefficient (k_p) of the ceramics which are poled with a DC electric field at 30 kV/cm is measured by using a resonance method. It was found that values of k_p increase with increasing an amount PZT in the xPMN - (1-x)PZT ceramics as a result of morphotropic phase boundary (MPB), which is between x = 0.1 and 0.3.

E0016-SYNTHESIS OF METAL-CONTAINING POLYURETHANE-UREAS FROM 4,4'-DIHYDROXYSALTRIEN METAL COMPLEXES

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Abstract: Polyurethane-ureas containing 4,4'-dihydroxysaltrien metal complexes in polymer chain have been synthesized. 4,4'-Dihydroxysaltrien metal complexes were synthesized from the reaction between 2,4-dihydroxybenzaldehyde, triethylenetetramine and metal acetates, where the metals are Zn and Ni. The metal complexes were then subjected to polymerization reaction with prepolymers, namely tolylene 2,4-diisocyanate terminated poly(1,4-butanediol) prepolymer (PB900), MW 900 g/mol and tolylene 2,4-diisocyanate terminated poly(propylene glycol) (PP1000), MW 1000 g/mol. The progress of polymerization reaction was monitored using infrared spectroscopy. The polymer property investigated was their thermal stability which was studied by thermogravimetric analysis (TGA).

E0017-Synthesis of Silicon Carbide – Aluminium Tetroxycarbide Nanofibers from Pencil Rod by Current Heating Technique

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Abstract: Silicon carbide – aluminium tetroxycarbide nanofibers were fabricated from EE pencil rod (Steadtler; Germany) by current heating technique under an argon gas atmosphere. The scanning electron microscope (SEM)

images show that the synthesized nanofibers were found to have two types (1) regular type of 80-300 nm in diameters. (2) bead type of 600-1200 nm in the bead diameters and the nanofibers connecting these beads diameters ranging from 200-600 nm. The crystal structure of the nanofibers was also studies by X-ray diffractometry (XRD) technique. The synthesized nanofibers were consisted of cubic silicon carbide (SiC) and orthorhombic aluminium tetroxycarbide (Al_4O_4C).

E0018-Crystallization of LDPE-LLDPE blend under INJECTION MOLDING CONDITION

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Abstract: Crystallization of LDPE and LLDPE blends under injection molding condition was investigated. LDPE (MI 5) and LLDPE (MI 2) were blended in ratio and injection molded into specimen under 3 molding conditions designated as reference, higher back pressure, and lower melt temperature condition. Thermal properties of molded specimen were studied using DSC, and mechanical properties were determined according to ASTM D638. From DSC results, it indicated that LLDPE and LDPE separated into two phases during crystallization in mold. LLDPE would crystallize first as they had higher crystallization temperature than LDPE, and these crystals possibly interfered crystallization mechanism of LDPE, causing wider melting temperature of LDPE. Increasing back pressure emphasized the phase separation, while decreasing molding temperature did not change phase separation significantly. As a result from solid-liquid phase separation in molding condition, synergetic tensile properties of polymer blends could be yielded.

E0019-New-Constructed Ancient Thai Glass

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Abstract: Antique glass can be generally found as one of the architectural components in several heritage places of Thailand, have been widely used for decorating. There are two kinds, *Ancient Thai Glass* and *Ancient China Glass* or *Burma Glass*. The Ancient Thai Glass found in the central region of Thailand, can be classified into two types, Ayutthaya and Ratanakosin. The another one is the Ancient China Glass or Burma Glass which has been widely used for decorating, particularly in the conventional Lanna style. By comparing with the Ancient Thai Glass, the Ancient China Glass which is generally heavier, contains thinner body with thicker plate. They were the same optical properties. The archeological resources showed that the body of the Ancient Thai Glass was made from silica and lead compound, which was the same properties of a high refractive index glass, high refraction or reflection, heavy but flexible. Their structures are divided into three layer, glass body, binder and metal plate. There are many colors, red, green, yellow, blue and white; under the tropical sun, they gave out an artistic harmony of framboyance and serenity. The Ancient Thai Glass has now disappeared and broken, must be restored to preserve for the future generation. Only thick glass (modern glass) which is difficult to cut is now available.

E0020-Effects of Formalin and Hydrochloric Acid on Properties of Poly (vinyl alcohol) Sponge

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Abstract: Th s research studied about the effects of the ratios of formalin to hydrochloric acid that were used as reacting agent and catalyst in poly (vinyl alcohol) sponge synthesis. In the synthetic process, the ratios of formalin to hydrochloric acid used were 1:1, 2:1, and 3:1 respectively and they were mixed at 60 °C. The mechanical and physical properties of the synthetic sponge were compared with those of the commercial sponge. On comparing, it was found that at ail ratios of formalin to hydrochloric acid, water absorption and abrasive resistance of synthetic sponge were better than those of commercial sponge and they trended to increased as the ratios decreased. Moreover, in its wet state the synthetic sponge was softer and had a higher elongation than the commercial sponge.

E0021-EFFECTS OF SOLID CONTENT, pH AND DEFLOCCULANT ON VISCOSITY AND THIXOTROPY OF THAI KAOLINS

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Abstract: Rheological properties of three Thai kaolins (Ranong, Narathiwat and Lampang) have different chemical and mineral compositions were studied. The viscosity and thixotropy of suspensions were measured as a function of solid content, pH and loading of sodium silicate. From rheological measurements, it was found that viscosity and thixotropy increased with the clay solid content. The highest of viscosity of Ranong, Narathiwat and Lampang clays showed at pH 6, 6 and 4 respectively. However, thixotropy of three clays tends to increase with decreased pH. When sodium silicate was added as a deflocculant, the viscosity and thixotropy were gradually decreased. The deflocculant demand of Ranong, Narathiwat and Lampang clays are 0.25%, 1.25% and 0.125% (w/w) respectively.

E0022-ISOELETRIC POINT DETERMINATION OF THAI KAOLINS

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Abstracts The heteropolar model of the kaolinite particle has been used to determine the properties of colloidal dispersions of clay minerals. Rheological measurements have been made as a function of pH and sodium chloride concentration of Thai kaolins (Ranong, Narathiwat and Lampang). The results are interpreted in terms of the heteropolar model of kaolinite and edge surface isoelectric points are estimated from common intersection points of Bingham yield stress-pH curves at different ionic strengths. From the experiments, it was found that the isoelectric points of Ranong, Narathiwat and Lampang vary from pH 3.5, 5.6 and 4 respectively.

E0023-EFFECT OF Pr DOPING ON THE SUPERCONDUCTIVITY OF Bi2Sr2CaCu2OY (Bi2212)

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Abstract: Structural and properties of Bi2Sr2Ca1-XPrXCu2OY (x = 0, 0.005, 0.01, 0.02, 0.1, 0.2, 0.4 and 0.6) high temperature superconductors were prepared by the standard solid state reaction method. The mixed powders were calcined at 800 °C for 24 h and sintered at 845 °C for 120 h. Before the end of sintering process, flowing oxygen was introduced into the heating chamber to get fully oxygenated samples. The XRD patterns indicated that the BSCCO has a major phase of Bi2212. The superconducting transition temperature (Tc) determined by the four-point probe technique revealed that Tc decreased as the doping concentration was increased. This is due to the fact that the Pr valence is greater than 3+ and thus results in a decrease in hole concentrations in the Cu-O2 layers.

E0024-THE IDENTIFICATION ON THE COMPONENTS OF CLAY MINERALS IN CLAY SAMPLES UTILIZED FOR CONVENTIONAL CERAMICS WORK BY X-RAY DIFFRACTION TECHNIQUE

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Abstract: In order to establish the relationship between the type of clay components and their physical properties, the qualitative identifications of clay minerals in white clays from lampang and Ranong, and ball clay from Surat-Thani using X–Ray Diffraction (XRD) technique were studied. Prior to XRD analysis, non-clay minerals, quartz and Fe-oxide, were separated from clay minerals by dispersing the bulk clay samples with distilled water and leaving non-clays to settle for 60 minutes. Each sample was treated by glycolation for identification of swelling clay and by heating at 400 ^{0}C and 550 ^{0}C for the destruction of kaolinite. The XRD results show that the white clay from Lampang consists principally of kaolinite, illite and expansive clay, montmorillonite, whereas that from Ranong only consists of a kaolin group, i.e., kaolinite and metahalloysite. As a consequence, the white clay from Ranong has more strength and less crack after drying. The ball clay from Surat-Thani consists more varieties of 2:1 clay minerals including illite, montmorillonite, vermiculite and sepiolite, resulting in high plasticity and swelling when wet and shrinkage upon drying.

E0025-ATOMIC FORCE MICROSCOPIC INVESTIGATION ON SURFACE MORPHOLOGY OF NR/NBR BLEND FILM

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Abstract: The morphology of NR/NBR blends was investigated using Tapping mode–AFM, in order to observe the surface morphology of blend films at various blend ratios. The observed structures showed matrix-dispersed formation at all compositions. The ratios up to 50 % weight, NBR formed nodular structure in NR matrix. Phase inversion was observed at blend ratio 5/95 and 25/75. The height and phase data revealed the correlated information, the nodular areas showed the high domains in any case of NR or NBR formed nodules, whereas the phase could differentiate the phase moduli. The increase in phase degree related to the higher modulus domain. The investigation of phase moduli using Rubber Process Analyzer (RPA) confirmed the formation of morphology structure of blends. The surface roughness was found to increase as the blend ratio closed to unity (50/50). The surface stiffness can also be confirmed by such technique.

E0026-TWO-STAGE SURFACE GRAFTING OF HIGH DENSITY POLYETHYLENE FIBER FOR REINFORCEMENT OF EPOXY RESIN

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Abstract: Polyethylene (PE) fiber was functionalized and grafted by 2-stage method. Functionalization was carried out with a peroxy compound, $K_2S_2O_8$. Grafting with acrylamide (AAm) and acrylic acid (AAc) was carried out by ceric ion technique. Adhesion between PE and epoxy resin was studied with pull out test. Both AAm and AAc were found to improve adhesion significantly. An improvement of about 3.5 and 4.8 folds, respectively, over that of the original PE fiber was found. Composite reinforced with chopped AAc-modified PE fibers displayed up to 18, 1.8 and 1.5 folds improvement in impact strength, flexural modulus and strength, respectively, compared with unreinforced epoxy resin.

E0027-A study to improve adhesion between surface grafted polyethylene and epoxy resin

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Abstract: This study was aimed to improve the adhesion between polyethylene (PE) surface and epoxy resin. PE was grafted with two types of water soluble vinyl monomers. These were acrylamide (AAm) and acrylic acid (AA). Grafting was carried out using 2-stage method. Hydroxylation by thermal decomposition of potassium persulfate ($K_2S_2O_8$) was first carried out to create hydroxyl groups on PE surface. The second stage is grafting of the monomers onto functionalised surface. The grafting reaction was carried out in aqueous solution by ceric ion technique. Peel test was used to evaluate the interfacial adhesion between PE film and epoxy resin. The peel strength of PE film grafted with AA (PE-g-AA) was found to be over 2 times greater than that of PE film grafted with AAm (PE-g-AAm). However, when PE-g-AAm film was immersed in water at room temperature before assembling with epoxy resin, the peel strength was found to increase by 8 times. An improvement of about 40 times in peel strength was observed when using hot water of 80 °C. This significant improvement is likely to be due to an increase in chain mobility in swelled polyacrylamide. Such higher chain mobility would promote more chemical bonding between the grafted polyacrylamide and epoxy resin.

E0028-Crosslinked polyolefins through the introduction of vinyl silane

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Abstract: In this study, the silane-grafting and water-crosslinking of polyolefins was investigated. The studied materials include ethylene-octene copolymer (EOR) and low-density polyethylene (LDPE) and together with their corresponding blends. The polymers were first grafted with vinyl trimethoxysilane (VTMS) in a twin-screw extruder using dicumyl peroxide (DCP) as an initiator. The grafted polymers were subsequently crosslinked in the presence of

water. The influences of grafting formulation, blend compositions and time of crosslinking process on grafting efficiency, degree and rate of crosslinking are reported. The properties of crosslinked products are also included.

E0029-SUITABLE CURRENT FOR THE PREPARATION OF ALUMINIUM – 12 wt% SILICON ARC-SPRAYED COATINGS

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Abstract: Thermal spraying is one of the surface technologies where particles are rapidly melted, accelerated, impacted and solidified onto substrate. Therefore, the coating layer is formed. [1] One of the popularly industrial used thermal spraying techniques is arc spraying. This technique can prevent distortion and dislocation from heating the substrates due to no direct heating from flame as occurred in the other spraying techniques. However, there are many spray parameters such as spray current, spray distance, and spray voltage. These parameters directly affect physical properties, microstructure and other properties of the coating. To obtain the best coating which has suitable properties for further applications, suitable spray parameters must be used. The purpose of this research was to select the suitable current for the preparation of aluminium-12 wt% silicon from wire spraying. The current used was in the range of 70-350 ampere. Then microstructure, percentage of porosity, hardness and wear rate of the coatings were analyzed. The results showed that using the spray current of 300 ampere gave the highest coating hardness and relatively high wear resistance.

E0030-THE PROCESSING OF PZT CERAMIC TAPE CASTING

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Abstract: Tape casting method is an utilize ceramic production providing an unlimited length and varies thickness as well as reduce the sintering temperature. The introduced applications are actuator, sensor and transducer. This method is to realize about the ratio between ceramic powders and slip that effect on viscosity, density, roughness and homogeneity. Furthermore, sintering condition is the one of important steps for tape casting process. As controlling crack and bended on ceramic surface. The present work aims to study the suitable composition in powder and slip. In addition to desire the constructive sintering that concluded heating/cooling rates, sintering temperatures and soaking times.

E0031-THE PREPARATION OF BARIUM IRON NIOBATE ($BaFe_{0.5}Nb_{0.5}O_3$) CERAMICS BY SOLID – STATE REACTION TECHNIQUE

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Abstract: New perovskite-type material, Barium Iron Niobate ($BaFe_{0.5}Nb_{0.5}O_3$: BFN) can exhibit very high values of dielectric permittivity in wide temperature range.[1-5] This ceramic was useful for high voltage capacitor. In this research, BFN ceramic was synthesized by the solid state reaction technique and calcined at 800 - 1200°C for 4 hrs with 5°C/min heating and cooling rate. The phases of calcined powders were investigated by X-ray diffraction technique (XRD). The XRD patterns showed that pure cubic BFN phase could be achieved at 1200°C. After calcination, the powder was then pressed into disc shape. The discs were sintered at 1250 - 1400°C for 4 hrs with 5°C/min heating and cooling rate. The result showed that the density of BFN ceramics increases with increasing sintering temperature from 1250 to about 1330°C. Then the density gradually decreased until the sintering temperature was up to 1400°C. The highest density was about 6.40 g/mL at 1340°C sintering temperature.

E0032-THE PREPARATION OF 0.9PZT – 0.1BFN POWDER BY SOLID-STATE REACTION TECHNIQUE

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Abstract: Lead zirconate titanate (PZT) exhibits piezoelectric and ferroelectric behaviors. It has dielectric permittivity about 1200 at room temperature.[1] On the other hand, Barium Iron Niobate (BFN) has very high values of dielectric permittivity about 30000 at room temperature.[2-5] To improve the dielectric permitivity of the PZT, therefore, PZT-BFN composites are interested. In this study, the 0.9PZT-0.1BFN composite system was synthesized by the solid state

reaction and calcined at 800-1200°C for 2 hrs with a heating/cooling rate of 5°C/min. The powder processing optimisation was done in order to find out the best quality powder for further ceramic preparation. Phases of calcined powders were investigated by X-ray diffraction technique (XRD). The XRD patterns showed that a pure perovskite phase was occurred ~ 1000°C

E0033-A Study on Electrical Properties of Zinc Oxide Modified with Metal Oxides.

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Abstract: In this study, Zinc oxide was used as base material which was 97% in weight and the rest was modifies metal oxides. The modifier metal oxides were divided into two groupes. Firstly, Zinc oxide was modified with aluminum oxides and magenese oxide. Secondly, Zinc oxide modified with aluminium oxide and chromium oxide. The oxide powders were mixed and pressed into a disc shape, then sintered at 1300 °C for 1 hour. The current and voltage characteristic were examined. It was found that the nonlinear coefficient (α) were 14-16 for aluminium oxide and manganese oxide and 7-8 for aluminium oxide and chromium oxide

E0034-Phase Formation and Microstructure of Low Firing $0.98BaTiO_3$-$0.02Ba(Mg_{1/3}Nb_{2/3})O_3$ Ceramics with Bi_2O_3/Li_2CO_3-PbO Fluxing Agents

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Abstract: The effect of Bi_2O_3/Li_2CO_3-PbO as fluxing agents on phase formation and microstructure of $0.98BaTiO_3$-$0.02Ba(Mg_{1/3}Nb_{2/3})O_3$ ceramics prepared via mixed oxide method have been studied. The XRD results showed that at the highest amount of fluxing agents added to the ceramic(batch C) at room temperature gave cubic phase of BT. This phase changed to tetragonal BT phase when reducing the amount of fluxing agents. Moreover, the trace of second phase, $Bi_4Ti_3O_{12}$, was also detected. SEM micrographs show that the grain size of the ceramicswas decreased as increasing amount of fluxing agents. Dielectric data shows the highest value about 10000 at room temperature for B sample which is the optimum condition in this study

E0035-PREPARATION OF HYBRID COMPOSITES BETWEEN PZT AND EPOXY RESIN

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Abstract: In the recent years, composites materials which consist of piezoceramic and polymer were widely used in several applications, such as hydrophones and ultrasonic transducers (1) etc. Lead zirconate titanate or PZT, one of ferroelectric materials which are well-known that exhibits good piezoelectric properties. Since PZT shows high density and acoustic impedance when compared with water and human tissue (2). In this work, hybrid composites between PZT and epoxy resin was fabricated by dice and fill technique. The composite materials were examined the physical, dielectric and piezoelectric properties, respectively.

E0036-EFFECT OF CODOPANTS ON THE PROPERTIES OF LEAD ZIRCONATE TITANATE CERAMICS

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Abstract: Lead zirconate titanate (PZT) ceramics were modified by adding dopants- manganese oxide and neodynium oxide. The conventional mixed oxide method was employed for preparing the sample powder. The physical properties such as shrinkage and density are studied. Phase formation and microstructure of PZT ceramics were examined by X-ray diffraction technique and Scanning Electron Microscopy, respectively. Moreover, the dielectric and piezoelectric properties of the modified PZT ceramics were also investigated. It can be concluded that the value of maximum dielectric contant and dielectric loss are in the range of 739-11582 and 0.037-0.075, respectively.

E0037-EFFECT OF ELECTRICAL POLING ON MECHNICAL PROPERTIES IN PMN-PZT CERAMICS

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Abstract: Ferroelectric ceramics such as Lead-Magnesium-Niobate (PMN) and Lead-Zirconate-Titanate (PZT) are widely used in many electronic industries. However, these ceramics have different advantages and disadvantages. PMN has a high piezoelectric coupling coefficient, therefore, it can be used in wide temperature range including room

temperature. Moreover, PMN has a small hysteresis loop and low energy loss compared to PZT. PMN also has lower electromechanical coupling coefficient than PZT, the application of PMN is therefore not well successful. On the other hand, PZT has been widely used in many industries due to its high electromechanical coupling coefficient. But, PZT still has high energy loss and high Curie temperature (> 400°C) which is not so convenient for any applications. To gather the advantages and compromise other disadvantages of these ceramics, composite systems of ferroelectric PMN-PZT ceramics have been interested. Also, stresses occur during the use of electronic materials will always cause mechanical degradation. The mechanical properties of these materials which has not yet been well studied, is therefore important and necessary. This research aims to fabricate and study the effect of electrical poling on mechanical properties of different mole ratio PMN-PZT ceramics. The research emphasizes on hardness testing by simple techniques which are Vickers [1-4] and Knoop indentation techniques. Fracture toughness is also calculated from indentation crack lengths.

E0038-THE EFFECT OF HEATING RATE ON THE ELECTRICAL PROPERTIES ON MnO_2 DOPED $Pb(Zr,Ti)O_3$ TAPE CERAMICS

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Abstract: Lead zirconate titanate, $Pb(Zr_{0.52}Ti_{0.48})O_3$, which is the famous composition for piezoelectric and dielectric devices. Cause of combination between tetragonal and rhombohedral phases at morphotopic phase boundary (MPB) that provides excellent electrical properties. However, PZT tape casting have two majors problems. There are PbO volatility during sintering and high dielectric dissipation factor. Previous papers have reported dielectric loss of MnO_2 doped in PZT is reduced. The aim of the present study was to prepare PZT ceramics by tape casting method and to find the effect of heating rate on the electrical properties.

E0039-Mechanical properties of $(Pb_{0.90}Ba_{0.1})ZrO_3$ ceramics

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Abstract: Mechanical properties of $(Pb_{0.90}Ba_{0.1})ZrO_3$(PBZ10) ceramics were studied. The PBZ10 powder was prepared by a mixed-oxide method. Grain size of the samples is 1 m. The H_v, H_k, Y and K_{IC} values are 4.43 Gpa, 4.48 Gpa, 140.1 Gpa, and 1.79 MPa $m^{0.5}$ respectively. The results were compared with the previous work. The result were compared with the previous work the calcined powder to improve the compaction behavior. The powders were pressed at 40 MPa into cylindrical pellets with 15 mm in diameter and 2 mm in thickness. The pellets were then sintered at 1200 °C for 3 h with a heating rate of 5°C/min. In order to minimize the loss of lead due to vaporization, the PbO atmosphere for the calcination and the sintering was maintained using $PbZrO_3$ as the spacer power. Phase of PBZ10 was investigated by XRD. The density of the sintered samples was measured by Archimedes' method with distilled water as the fluid medium. The mechanical properties of the ceramics was studied by Vicker and Knoop microhardness testers. Indentations were applied on the polished surfaces of PZ ceramics. Applied loads were in the applied on the polished surfaces of PZ10 ceramics. Applied loads were in the range of 200-1000 g with an indentation period of 15 s. Vickers hardness, Knoop hardness of the samples were calculated. Microstructure of the etched samples was again studied by SEM.

E0040-INFLUENCE OF SODIUM OXIDE CONTENT ON THE STRUCTURAL CHANGES OF IDUSTRIAL SODA-LIME-SILICA GLASS

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Abstract: The changes of glass structure in multicomponent (industrial) soda-lime-silica glass containing 11-19 mol% Na_2O melted under air atmosphere in an electric furnace at 1450 °C for 8 h were studied. The oxygen partial pressure; $p(O_2)$ was measured during melting process and then the structural change of glass were investigated in three values such as the calculated basicity; Λ_{cal}, the ratio of NBO to tetrahedral cations; NBO/T and the state of oxide (-II) species; $\alpha_{oxide\,(-II)}$. It was found that the increased Na_2O content causes the glass to be in the oxidized state, unstable state and to become highly basic. As well as the degree of disconnectivity in the network, slightly increased. These changes are

expected that the glass melt trends to be the reactive solvent for redox reacting of polyvalent elements when increasing the Na_2O content.

E0041-STUDY OF ADHESIVE-FREE BONDING OF SHOE MID-SOLING AND OUT-SOLING MATERIALS AIMING FOR THE IMPROVED MANUFACTURING METHOD AND THE NEW MATERIALS COMPOUNDING

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Abstract: Bonding between shoe mid sole (foam) and out-sole (rubber) without adhesive was investigated in order to reduce manufacturing steps in the present shoe-sole production line. Bonding without adhesive was achieved through crosslinking by UV curing, at which Trimethylolpropane mercapto propionate was used as curing agent and 2,4,6-Trimethyl benzoyldiphenylphosphine oxide was used as photoinitiator. Using a commercial mid-sole and out-sole specification, rubber and foam compounds were formulated to meet the specification and effect of adding UV curing agents into compounds was verified. Bonding by UV curing and thermal curing was employed and determined their bonding strength by T-peel test, which test results indicated that UV curing could bond foam to rubber.

, UV curing

E0042-PREPARATION OF BENZOTHIAZOLE DERIVATIVE BASED CHELATING RESIN

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Abstract: Chelating resin is widely used for metal ion separation and preconcentration. A new chelating resin was prepared by covalently linking ethyl 2-benzothiazolylacetate (BA) with amino polystyrene-divinylbenzene resin (NH2-PS-DVB). The latter was prepared by nitration of polystyrene-divinylbenzene resin (PS-DVB) followed by reduction with tin(II) chloride. All derivative resin were characterized by Attenuated Total Reflection Infrared Spectroscopy technique (ATR-IR).

E0043-Preparation derivatives azobenzene Langmuir-Blodgett films of PS and its copolymer with 20% Methacrylic acid and its optical properties

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Abstract: The main objective of this work is to prepare and characterize an optical response of a multilayer film of a side chain azobenzene polymer and copolymer. The azobenzene group possesses a unique optical property which is known as *trans-cis* isomerization. The optical property of the film can be modulated by irradiating the material with light at appropriate wavelength. In this work, a monolayer formation of azopolymer having a different amount of the azobenzene in the side chain is fabricated at the gas-water interface. The multilayer films were constructed by horizontal deposition of the monolayer onto hydrophobic quartz substrate. The UV-Vis absorption spectra indicate that the transferred film is uniform. The multilayer film can undergo *tran-cis-trans* isomerization when a UV light at 385 nm was applied to the sample. A lost of an ordered multilayer structure was observed upon an irradiation of the film with the UV light.

E0044-Controlled crystallization of ZnS:Mn2+ nanocrystal by polyelectrolytes

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Abstract: The objective of this work is to develop a nanometer size inorganic based light emitting devices. A synthesis of Mn-doped ZnS (ZnS:Mn2+) nanocrystal metarial1 was carried out by a liquid phase coprecipitation. Poly(4-strylene sulfonicacid-co-maleic acid) (PSS-MA) was used as a polyelectrolyte which was feed directly into the reaction medium to control a crystallization process. A condition of the experiment was adjusted so that a growth of ZnS:Mn2+ was limited to a nanocrystallized size. The crystallized size was determined by X-ray diffraction where an average crystallite size was about 2.0 nm. The photoluminescence (PL) intensity of ZnS:Mn2+ nanocrystals show an orange emission peak at 595 nm which characterize for the 4T1 → 6A1 transition of Mn2+ ion in a crystalline ZnS-matrix. The enhance PL intensity was also responsible by a presence of polyelectrolyte as a surface passivating agent. The preliminary study on the electroluminescence of a multilayer device which consist of indium tin oxide (ITO) coated glass substrate, a single layer of ZnS:Mn2+ nanocrystals+Poly(N-vinylpyroridone)(PVP) and Alumnium layer shows that a typical I-V curve for the diode was observed.

E0045-SYNTHESIS AND PROPERTIES OF POLY(VINYL ALCOHOL) SPONGE

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Abstract: The synthesis of poly(vinyl alcohol) sponge (PVA sponge) was conducted in order to study the effect of ingredient ratios on its physical appearance and properties compared with a commercial PVA sponge. The properties studied were water absorptivity, tensile properties and abrasion resistance. On the comparising of synthetic and commercial sponges, it was found that the appearance and some properties of the synthetic sponge were better than those of commercial sponge. In its dry state, the synthetic sponge was more rigid and had more tensile resistance than the commercial sponge. In its wet state, the synthetic sponge was softer, had a higher abrasion resistance and a higher elongation at break than the commercial sponge. From the effect of varying the ratio of poly(vinyl alcohol) to starch, it can be concluded that the PVA sponges which had the best physical appearance and the best properties were obtained when the ratio of poly(vinyl alcohol) to starch was 4:1.

E0046-HYDROGENATION OF CYCLOOCTENE CATALYSED BY COBALT COMPOUNDS SUPPORTED ON POLYSTYRENE

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Abstract: In this work, hydrogenation of cyclooctene was performed using cobalt compounds supported on polystyrene. The synthesized catalysts were characterized using FT-IR, XRF, AAS and TGA. The parameters affected the hydrogenation including types of cobalt complex and ligands both Schiff base and non-Schiff base ligands, types of solvent, temperature and hydrogen pressure. From the results, it was found that cobalt containing Schiff base aminopyridine ligand supported on polystyrene ($P\text{-}L_2\text{-}CoCl_2$) shows highest activity at the condition tested: 3 hours, 60°C, hydrogen pressure 9 atm. in methanol solvent.

E0047-STUDY OF SYNTHESIS OF POLYSTYRENE HOMOPOLYMER AND POLYSTYRENE-POLY(*ISO*-BUTYL ACRYLATE) BLOCK COPOLYMER USING NITROXIDE-MEDIATED POLYMERIZATION

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Abstract: This research aims to study the utilization of 2,2,6,6-tetramethylpiperidinyloxy (TEMPO) as the nitroxide-mediated polymerization (NMP) for preparation of polystyrene homopolymer and polystyrene-poly(*iso*-butyl acrylate) block copolymer. The NMP concept is based on the capture of propagating radicals by nitroxides, resulting in the formation of dormant species having thermally labile alkoxyamines. The dormant species can be fragmented at high temperature, and the released polymeric radicals then react with monomers or comonomers before recombining with the nitroxides, allowing the preparation of polymer with narrow molecular weight distribution. It was found in this study that the reaction time and the amount of initiator as well as TEMPO affected on the percentage yield and molecular weight of the polystyrene homopolymer, which is the TEMPO-terminated polystyrene (PS-TEMPO). For the preparation of the block copolymer, the PS-TEMPO was firstly carried out then *iso*-butyl acrylate was added. It was found that the composition of the block copolymer significantly depended on the reaction time and the initial amount of PS-TEMPO as well as *iso*-butyl acrylate monomers used.

E0048-THE EFFECT OF DOMESTICALLY PRODUCED BLAST-FURNACE SLAG ON COMPRESSIVE STRENGTH OF CEMENT PASTES

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Abstract: This paper reports the effect of ground granulated blast-furnace slag (GGBS) on compressive strength of cement paste at 0, 10, 20, 30 and 50% by weight after curing in water for 1, 7, 14 and 28 days as a preliminary investigation into the use of domestically produced blast-furnace slag as a construction material. Blast-furnace slag collected as waste from an iron making factory was prepared before use by grinding to a fineness close to that of Portland Cement. The grinding time required was 24 hours. It was found that GGBS is amorphous and compose mainly of silica (SiO_2), alumina (Al_2O_3), calcium (CaO) and magnesium (MgO) with the highest being silica at 55.04%. Compressive strength results show that compressive strength of paste containing GGBS was found to reduced marginally when GGBS is incorporated at 10% thereafter a significant reduction in the strength was observed.

E0049-PRODUCTION OF FIBERBOARD FROM WASTE PAPERS REINFORCED WITH EPOXY RESIN

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Abstract: In the present days, waste paper is one of the environment problems, which there are many efforts trying to regain their values by recycling these waste paper. One solution is to recycle the waste paper in form of fiberboard which can replace wood. It does not only increase values of these waste papers added, but also helps to preserve forests. Therefore, the objective of this study was to prepare the fiberboard from waste newspaper by grounding them into fiber pulp and then using epoxy resin to binder these fibers into a panel. Effect of epoxy resin content was investigated by varying the amount of the resin from 0 to 50 percent by weight of paper pulp. Properties of prepared fiberboard, such as water absorption, thickness swelling, bending strength, and tensile strength were determined. It was found that the optimized mixture ratio of the epoxy resin to the fiber pulp that achieved the best properties was 30:70 by weight.

E0050-The Phase Evolution Study of $(Bi_{0.5}Na_{0.5})TiO_3$-$Bi_4Ti_3O_{12}$ System by X-ray Diffraction Technique

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Abstract: Bismuth Sodium Titanate: $(Bi_{0.5}Na_{0.5})TiO_3$ (BNT) is one of the promising candidate for lead-free piezoelectric materials.[1-4] However, the piezoelectric properties of BNT are still in need to be developed. This work has been concentrating on preparing bismuth sodium titanate-bismuth titanate ceramic-composite materials of the composition $(1-x)(Bi_{0.5}Na_{0.5})TiO_3$-$xBi_4Ti_3O_{12}$ where x = 4 by conventional ceramic method. The $(Bi_{0.5}Na_{0.5})TiO_3$ (BNT) and $Bi_4Ti_3O_{12}$ (BIT) ceramic powders were produced separately via calcination and then the composite mixtures were mixed and sintered in order to produce the ceramics. The calcined temperature of 800°C is employed for forming high purity BNT and BIT powders. The ceramic materials of composition 60mol%BNT–40mol%BIT were sintered from 1000°C to 1100°C. The phase identifications of the BNT-BIT ceramics were performed using X-ray diffraction technique (XRD). It was found that the phases consisting in all ceramic samples sintered at 1000°C to 1100°C are tetragonal $Na_{0.5}Bi_{4.5}Ti_4O_{15}$, rhombohedral BNT and orthorhombic BIT. The density of the ceramic sample increased with increasing sintering temperature. The maximum density of the ceramic from this 60mol%BNT–40mol%BIT system was about 6.68 g cm^3.

E0051-EFFECT OF MILLING TIME ON PROPERTIES OF PMN CERAMICS

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Abstract: Effect of milling time on properties of lead Magnesium Niobate ($Pb(Mg_{1/3}Nb_{2/3})O_3$; PMN) ceramics were investigated. The PMN ceramics samples were produced by milling $MgNb_2O_6$ and PbO together for 24, 48, 72 and 96 hrs. Various distribution mixture powders were calcined at 750 °C for 2 hrs at 10 °C/min. After that the powders were pressed to pellet and sintered at 1275 °C for 2 hrs at 10 °C/min. It was found that PMN ceramics prepared from PMN24 powders by sintering at 1275 °C for 2 hrs and at the rate of 10 °C/min obtained highest dielectric properties.

E0052-EFFECT OF MILLING TIME ON CALCINATION CONDITION OF PMN POWDER

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Abstract: Two series of columbite ($MgNb_2O_6$ or MN) powders were produced. MN1 from calcining MgO with Nb_2O_5, and MN2 from $(MgCO_3)_4Mg(OH)_2{\cdot}5(H_2O)$ with Nb_2O_5. MN samples were then mixed with PbO in ethanol and milled together in a zirconia ball mill for 24, 48, 72 and 96 hours. The results show that the particle size of both MN1 and PbO, and MN2 and PbO particles decreased with increasing milling time. DTA curves show that the effect of milling time is more dominant in MN1 sample where the area covering exorthermic peaks decreased with increasing milling time compared tho those of MN2 samples where there were no significant changes in the exorthermic peaks. The optimum calcination temperature for complete reaction of PMN1 powder was found to be greater than 750°C fo r 24 and 48 hours milled samples but at lower temperature at 700°C for longer milled samples i.e. 72 and 96 hours samples. For PMN2 powder the optimum calcination temperature was found to be at 700°C for all milling conditions.

E0053-DISSOLUTION BEHAVIOUR OF CALCIUM-SULFATE CEMENT IN THE SBF AND SALINE SOLUTION

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Abstract: Calcium-sulfate (CS) cement is a resorbable bone substitute material. However, the main problems associated with the use of CS have been its relatively rapid rate of resorption, together with occasional unpredictable clinical responses. As there have been only few studies on the *in vitro* dissolution behaviour of the cement system, this work was aimed to investigate the resorption behaviour of CS cements from α-CSH and β-CSH in saline and SBF solutions. The effects of the dynamic and the static aging protocols on the cement samples were also investigated. The results demonstrated that during 10 days of aging, the use of different test media was not contributing a significant difference in the dissolution rate of CS cements, both from α- and β-CSH. By comparison, the dynamic weight losses are significantly higher than the static ones. Apatite, calcite, anhydrite CS, and unknown phases were found in the precipitates from both dynamic and static systems. The observations suggest that the dissolution mechanisms of CS cement in saline and in SBF seem different. In saline, CS cement simply dissolves into calcium ion and sulfate ion. On the other hand, in the SBF the process may involve both dissolution and reaction.

E0054-FABRICATION OF ALUMINA-TITANIUM CARBIDE COMPOSITES BY PRESSURELESS SINTERING

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Abstract: The Pressureless Sintering technique was applied to a system of Al2O3-TiC composites that have been used as excellent cutting tool materials in many industries. Al2O3-TiC composites with various amounts of TiC, 10 to 50 wt %, were prepared and sintered at 1900oC for 2h. The effects of the amount of TiC on physical and mechanical properties of composites were examined. The phase formation and microstructure of composites were characterized using X-ray diffraction (XRD) and Scanning electron microscopy (SEM) techniques. The results showed that sintering at 1900 °C with a heating rate of 20 °C/min made product possible to obtain 96 % of the theoretical density. The density and Vicker hardness were improved with the addition of TiC particles dispersed in Al2O3 matrix. Al2O3 doped with 47% TiC displayed the highest value of density and Vicker hardness. The volume shrinkage during sintering was large and porosity was high for composites having small amount of TiC.

E0055-Thermal insulation property of hibiscus fiber

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Abstract: The thermal insulation property of hibiscus fiber was studied in order to replace synthesis fiber with natural fiber. The hibicous fiber was treated by solution and then made it into the sheet form. The thermal conductivity of the hibiscus fiberous sheet is 0.044-0.048 W/m.K which closes to the commercial insulator. The result shown the hibiscus fiberous insulator is extremely potential to instead of the synthesis fiberous insulator .

E0056-Effect of Sintering Temperature on Physical and Electrical Properties of Lanthanum and Manganese doped Lead Titanate Ceramics

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Abstract: In this work effect, of sintering temperature on physical and electrical properties of lead titanate ceramics doped with lanthanum and manganese was studied. The samples were prepared by solid-state reaction method. The physical and electrical properties of the samples was found to depend on the sintering temperature. The best properties of samples was found in the sample sintered at 1200 °C.

E0057-SYNTHESIS OF POLYURETHANES CONTAINING SCHIFF BASE METAL COMPLEXES OF NICKEL AND MANGANESE

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Abstract: Metal-containing polyurethanes have been synthesized by the reaction between Schiff base metal complexes and isocyanate-terminated prepolymers with dibutyltin dilaurate as a catalyst. The metal complexes employed were synthesized from nickel or manganese acetate, 2,4-dihydroxybenzaldehyde and 1,2-diaminocyclohexane. The isocyanate-terminated prepolymers used were tolylene 2,4-diisocyanate terminated poly(1,4-butanediol) (PB), MW 900 and tolylene 2,4-diisocyanate terminated poly(propylene glycol) (PP), MW 1000. The progress of polymerization reaction was investigated using IR spectroscopy. Thermal stability was studied by thermogravimetric analysis. Metal-containing polyurethane-ureas have been synthesized by the reaction between *m*-xylylenediamine, metal complexes and isocyanate-terminated prepolymers. Thermal stability of polyurethane-ureas was compared with that of metal-containing polyurethanes.

E0058-SYNTHESIS OF POLYURETHANES CONTAINING TETRADENTATE SCHIFF BASE METAL COMPLEXES

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Abstract: Tetradentate Schiff base zinc and copper complexes (ZnL and CuL) have been synthesized by the reaction between 2,4-dihydroxybenzaldehyde, zinc or copper acetate and 1,2-diaminocyclohexane. These metal complexes were characterized by IR spectroscopy, ^{1}H NMR spectroscopy and elemental analysis. Metal-containing polyurethanes have been synthesized by polymerization between ZnL or CuL and different prepolymers using dibutyltin dilaurate as a catalyst. The employed prepolymers were tolylene 2,4-diisocyanate terminated poly(1,4-butanediol) prepolymer, MW 900 (PB900) and tolylene 2,4-diisocyanate terminated poly(propylene glycol) prepolymer, MW 1,000 (PP1000). The progress of polymerization reaction was followed using IR spectroscopy. The obtained polyurethanes were characterized by IR spectroscopy and thermal stability of polyurethanes were studied using thermogravimetric analysis.

E0059-DESIGN AND INVENTION OF LANGMUIR'S PROBE

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Abstract: The emphasis of this research was placed on designing and inventing cylindrical Langmuir's plasma probe. In this research we designed the cylindrical probe tip that was able to insert into the plasma from glow discharged process of D.C. magnetron sputtering coating system to perform the experiments to measure localized plasma at probe tip placed on 9 cm. from center of magnetron cathode. As we measured, we regulated D.C. bias voltage to the probe tip. The tip collected the prefer kind of ion (electron when we set the positive voltage and plasma ion when we set the negative voltage) in form of ions current. Finally we plot the relation of ions and electrons currents against probe bias voltages. From the characteristic when we set the probe tip area 0.17 cm2. we got localized ions current density of probe tip at 9 cm. from center of magnetron

cathode 1.40 mA/cm2. and electron current density of probe tip at 9 cm. from center of magnetron cathode 28.91 mA/cm2. From the experiments we concluded that the cylindrical Langmuir's plasma probe was the suitable tools for studying plasma characteristics from D.C. sputtering coating system.

E0060- STUDIES OF THERMAL PROPERTIES AND SURFACE CHARACTERISTICS OF PRETREATED JUTE FIBERS BY BOILING AND SOXHLET EXTRACTION.

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Abstract: Two pretreatment methods (boiling method and soxhlet extraction) were employed to pretreated jute fibers with methanol-benzene 1:1 solvent mixture at various times. Thermal analysis was performed by Thermal Gravimetric Analysis (TGA) and the surface analysis was done by Scanning Electron Microscope (SEM). TGA curves shows that both of the pretreatment methods effectively remove wax or other low molecular weight components of the fibers SEM results show that the boiling method takes a shorter optimum time to clean the fiber.

E0061-The future application of Rare Earth-Ag ductile intermetallic compound

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Abstract: The astonishing discovery of B_2 intermetallic compound family is ductility at room temeperature. In this experiment tensile tests were performed on DyAg, GdAg, and LaAg to study the mechanical properties of these alloys and to perform fractography by SEM. The results indicated that DyAg and GdAg showed minor ductility at room temperature, but LaAg processed by hot swaging had extensive ductility. CIELAB system analysis will need to be performed on the oxide to determine if blue or black color can be produced in the material for future applications in jewelry and other industries. Moreover, the study may provide insights that could potentially improve the performance of aerospace; marine; pumps; boilers and heat exchangers and furnace components.

E0062-A STUDY OF ADHESION BETWEEN NATURAL RUBBER - NITRILE RUBBER AND INVESTIGATION OF SURFACE PROPERTIES BY ATOMIC FORCE MICROSCOPY

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Abstract: The chemical structure of natural rubber differs enormously from that of nitrile rubber, hence the poor adhesive strength between them. One of the possibilities to improve the adhesion property is the use of adhesion promoters blended in the rubber formulation. In this work the mix of chlorinated natural rubber (CNR) and chlorosulfonated polyethylene (CSPE) was blended in nitrile rubber cover a range of 0 – 60 phr. It was found that the peel strength increased with CNR and CSPE loading. The cohesive failure was observed at CNR and CSPE 40 – 60 phr. Atomic force microscopic analysis found that the adhesion force between silicon nitrile tip and nitrile rubber surface increased with increasing CNR and CSPE content, which the adhesion force could be measured in nanonewton.

E0063-The chemical modification of polyethylene film for chelating of heavy metal ions in wastewater

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Abstract: A chelating ion-exchange membrane containing the hydroxamic acid functional group was synthesized from acrylamide-grafted-polyethylene (PE-g-AAm). The grafted polymer was obtained by 2-stage method. The polymer surface was first functionalized by decomposition of $K_2S_2O_8$ and subsequently grafted with acrylamide monomer by ceric ion technique. The chemical composition at the surface was analyzed by Attenuated Total Reflection Fourier Transforms Infrared Spectroscopy (ATR-FTIR) and ninhydrin method. Surface morphology of the grafted sample was characterized by Atomic Force Microscopy (AFM). The grafted polymer was then converted to poly(hydroxamic acid) by reacting with hydroxylamine hydrochloride under optimum condition. The existence of hydroxamic acid functional group was confirmed by ATR-FTIR. When the membranes were immersed in V^{5+}, Fe^{3+} and Cu^{2+} solutions, it was found that the membranes turned dark purple, deep brown and blue-green, respectively. The sorption behavior of the chelating membrane toward metal ions was also studied with UV-Visible spectroscopy. This behavior can not be observed in original PE and PE-g-AAm.

E0065-SYNTHESIS OF PHOPHORYLCHOLINE-CONTAINING POLYMER BRUSHES BY NANOPOROUS SURFACE-INITIATED POLYMERIZATION

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Abstract: Chemically grafted tris(trimethylsiloxy)silyl (tris(TMS)) monolayer on the silicon oxide substrate was used as a nanometer-scale template for controlling the graft density of phosphorylcholine-containing polymer brushes. Polymer brushes were synthesized by surface-initiated polymerization of 2-methacryloyloxyethyl phosphorylcholine (MPC) from α-bromoester groups tethered to the residual silanol groups on the surface after creating a range of tris(TMS) coverage via atom transfer radical polymerization (ATRP) using CuBr/bpy as a catalytic system. The solvent, percentage of tris(TMS) coverage and polymerization time significantly influenced the thickness and morphology of PMPC brushes. Protrusions observed from AFM images of PMPC brushes evidently suggested that PMPC brushes distributed nanoscopically on the substrate. The size of protrusion and surface roughness corresponded quite well with the graft density of PMPC brushes.

E0067-Effects of Silane Coupling Agent on Natural Rubber Reinforced by Silica Generated *in situ* from Sol-Gel Process of Tetraethoxysilane in Latex

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Abstract: Sol-gel process of tetraethoxysilane (TEOS) was used to generate silica particles in natural rubber for preparing reinforced rubber by adding TEOS directly into concentrated latex. A sulfur-containing coupling agent, bis(3-triethoxysilylpropyl)tetrasulfide (TESPT), was added together with TEOS before the sol-gel step. The influences of the amount of TEOS, TESPT and ammonia on the physical properties of the composite were investigated by a statistical analysis method, namely 'two-level factorial design'. It was found that tensile modulus, tear strength, and hardness were the most significantly affected by TEOS content. The amount of TESPT affected the physical properties somewhat less. But ammonia content showed a negative effect. In other words, the NR composite with high mechanical properties can be obtained when adding a large amount of TEOS and TESPT without adding more ammonia to the latex mixture. In addition, the use of TESPT could reduce sulfur-cure time (t_{90}), compared to the composite without the coupling agent.

E0068-IMMOBILIZATION OF RGD PEPTIDES ON THE SURFACE OF TYROSINE-DERIVED POLYCARBONATE TO IMPROVE CELLULAR RESPONSE

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Abstract: Tyrosine-derived polycarbonates having carboxyl pendant groups, poly (desaminotyrosyl-tyrosine ethyl ester-co-desaminotyrosyl-tyrosine carbonate) (poly(DTE-co-DT carbonate)), have been recently introduced as a new series of biodegradable polymer that can be potentially used for biomedical applications. The carboxyl groups can serve as versatile precursors for a wide range of chemical modification including an attachment with bioactive molecules. In particular, this research has focused on chemical immobilization of RGD-containing peptides which are believed to promote cell adhesion on the surface of poly(DTE-co-20%DT carbonate) through a two-step reaction. The first step involved an activation of carboxyl groups by *N*-hydroxysuccinimide (NHS) in the presence of 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (EDCI). The second step was a covalent attachment of RGD-containing peptides. The extent of activation was monitored by ^{1}H NMR. Preliminary results from *in vitro* cell studies suggested that the alteration of surface functionality has a significant impact on fibroblast adhesion and proliferation. The cytocompatibility of RGD-immobilized surface was slightly improved as compared to the unmodified surface, which is also an excellent substrate for cell attachment and growth.

E0069-Correlation Between Conformations And Photophysics of Conjugated Polymers

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Abstract: This research investigated the correlation between the conformations of conjugated poly-2-methoxy-5-(2'ethylhexoxy)phenylenevinylene (MEH-PPV) in solutions and their photophysics by utilizing technique of UV-visible spectroscopy. When the solvent quality was decreased, it was found that the absorption spectra moved to the higher energy region, indicating the shortening of conjugation length. The shrinkage of polymer chains when dispersed in poor solvent attributed to the decrease of the conjugation length. The decrease of solvent quality also caused the polymer aggregation, affecting their optical properties due to the close proximity of the chains within the aggregates.

E0070-INFLUENCE OF DOPING METALS ON MICROSTRUCTURE OF TUNGSTEN OXIDE NANOPARTICLES

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Abstract: Platinum (Pt) and palladium (Pd) were incorporated into tungsten oxide (WO3) nanoparticles by impregnation method at elevated temperature. The metal doping caused drastically change in the microstructure of the WO3 nanoparticles; spherical, undoped particle having average size of 35 nm changed to disc-like shape having diameter of 180 – 500 nm, depending on the type and content of dopant. The doping also affected the specific surface areas of the final particles. The surface area of the doped powders increased with increasing amount of the metal dopants. Compared with the spherical shape, the disc-like structure was less dense than the spherical powder, leading to enhance porosity and surface area for gas adsorption. However, the doping did not alter crystal structure of the WO3 powders.

E0071-Mechanical properties of carbon nanofibril-reinforced thermoplastic: LDPE and PMMA composites

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Abstract: Polymeric composites are widely used in the aircraft and automotive industries. Their high strength to weight ratio makes significant weight reduction possible. Beside this advantage, the materials also offer a good corrosion resistance but the mechanical properties are not satisfactory. In order to increase these properties, carbon nanofibers (CNF) with high strength can be embedded in the polymeric matrix. In the present work, composites consisting of CNF in different polymers, low density polyethylene (LDPE) and poly(methyl methacrylate) (PMMA) which is a semi-crytalline polymer and an amorphous polymer respectively , have been prepared using a polymer extrusion technique.Experimental conditions such as nanofiber loading, temperature and screw speed of extruder were varied to find the optimum condition. The effects of CNF on mechanical properties and composite morphology have been examined and correlated to establish structure-property relationships. Further more, an addition of CNF to the composites was found to increase the mechanical properties relative to that of polymer/glass fiber composites at the same fiber concentration. The interpretation of the mechanical data for the composites illustrates that tensile strength and modulus were insensitive to the presence of CNF, whereas the impact strength was significantly improved by even small amounts of CNF. In addition to, the improvement of mechanical properties of PMMA composites was higher

than LDPE composites in the same CNF loading. The method proposed here for thr dispersion of CNF in polymers show promise for the preparation of improved engineering composites.

E0072-ELECTRORHEOLOGICAL PROPERTIES OF POLYANILINE SUSPENSIONS

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Abstract: Polyaniline (PANI) was synthesized via an oxidative coupling polymerization in acid condition and dedoped in ammonium solution. Rheological properties of the PANI silicone oil suspensions were investigated in the osillatory shear mode to study the effects of electric field strength, particle concentration, and operating temperature on ER characteristics. The PANI based ER fluids exhibit the viscoelastic behavior under an applied electric field and the ER response can be enhanced with increasing electric field strength. The dynamic moduli, G' and G" dramatically increase by 6 orders of magnitude when the electric field strength is increased up to 2 kV/mm. ER response is enhanced with particle concentration, but is deteriorated with increasing temperature. The sol to gel transition point is determined and found to occur at E = 100 V/mm irrespective to an operating temperature.

E0073-The Effect of Time on Crystallisation Behaviour of Glass in the System $Na_{1+x}Zr_{2-x/3}Si_xP_{3-x}O_{12-2x/3}$

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Abstract: Glass-Ceramic samples were prepared from parent glass of the composition $Na_{1+x}Zr_{2-x/3}Si_xP_{3-x}O_{12-2x/3}$ (where x = 2.50) by heat treatment technique at the appropriate temperature. Effect of treatment duration was investigated by varying treatment time from 4 hours to 10 and 20 hours, respectively. The XRD results indicate that the major phase formed during treatment is crystalline $Na_2ZrSi_2O_7$ one that present as the most stable phase in this glass-ceramic system. Increase of treatment time does not lead to higher crystalline phase concentration but introduce melting of the crystalline phase. The result is confirmed by SEM micrograph. Longer treatment time also generate fracture in the crystalline grains and promote roughness of residual glass at the surface region. Loss or shift of chemical composition due to over heating may also responsible for this observation.

E0074-The Effect of Time on Crystallisation Behaviour of Glass in the System $Na_{1+x}Zr_{2-x/3}Si_xP_{3-x}O_{12-2x/3}$ doped with Fe_2O_3

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Abstract: This work is aim to investigate the effect of heat treatment time on the crystallisation behaviour of the based glass composition doped with Fe_2O_3. The effect of this dopant also studied. The glass sample with composition $Na_{3.25}M_{1.25}Si_{2.25}P_{0.75}O_{10.50}$ for with and without Fe_2O_3 doping were subjected to heat treatment at the appropriate temperature for 10 and 20 hr. The XRD powder pattern results of heat treated samples indicate that parent glasses crystallised at 910 °C to give $Na_2ZrSi_2O_7$ as a major crystalline phase with tiny amount of $Na_{2.5}Zr_2Si_{1.5}P_{1.5}O_{12}$ found in the sample contained Fe_2O_3 and treated for 20 hr. The results also show higher relative concentration of the residual glass for the longer treatment time. SEM results confirmed results observed by XRD. There is no significance effect of the Fe_2O_3 dopant on crystallisation of the glass in this system. The longer treatment time also do not increase relative amount of crystal but rather reduce it.

E0075-The LVDT System for Linear Thermal Expansion Coefficient Measurement of the Materials

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Abstract: The transducer so-called linear variation differential transformer (LVDT) system was developed for linear thermal expansion coefficient measurement of the materials. The optimized ratio of coil turns is 2.5 with diameter of 0.9 cm. The excitation source is the ac signal with frequency of 20 kHz. The dc output is obtained from demodulation circuit and process through an amplifier circuit. The optimized core length is 2.5 cm for 3 cm long of arrow of three coils. Linearity of the system can be found cover range of 12 mm which sufficiently for the application. This system provides an acceptable precision with sensitivity of 2.89 mV/ μm.

E0077-EFFECT OF SINTERING TEMPERATURE ON THE PROPERTIES OF PLZT 7/60/40

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Abstract: In this work, the lead lanthanum zirconate titanate (PLZT) 7/60/40 was prepared from the oxide compound by solid-state reaction. The mixture was calcined at temperature 500 °C for 0.5 h. Sintering temperatures were varied from 700 °C until 1300 °C (with the increasing temperature step of 100 °C) for 2 h. The electrical properties and physical properties of ceramic samples were examined. It can be observed that the ceramic samples show the good values of physical and electrical properties when the sintering temperature is higher. It has been found that the percentage of shrinkage is in the range of 1.11-31.49. And samples are also the show the higher density at higher sintering temperature.

E0078-Synthesis and Characterization of PVP-Grafted-Starch Hydrogels Using Gamma Radiation

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Abstract: A series of hydrogels were prepared from gelatinized cassava starch and vinylpyrrolidone by radiation-induced graft copolymerization. Gel fraction, swelling ratio and gel strength of the obtained hydrogels were characterized. The experimental results show that the swelling ratio is inversely dependent on the radiation dose. The results from PVP-grafted-starch were subsequently compared with those of PVP hydrogels and PVP-blended-starch hydrogels. It was found that the PVP-grafted-starch hydrogels, with gel fraction higher than 80%, can be prepared at the dose of 10 kGy, while PVP and PVP-blended-starch hydrogels require at least 30 kGy to obtain gels with more than 80% gel fraction.

E0079-THERMAL AND MECHANICAL PROPERTIES OF PEO-Na^+/MONTMORILLONITE NANOCOMPOSITE FILMS

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Abstract: In this research, apolymer-clay nanocomposites based on Polyethyleneoxide (PEO) and Na^+/montmorillonite (MMT) will be obtained by melt intercalation. Polymer nanocomposite is beneficial because PEO is flexible and water-soluble, while Na^+/MMT clay with nanosized interlayer is abundant in nature. PEO and Na^+/MMT were mixed in an internal mixer. PEO-Na^+/MMT films were prepared by compression molding. Thermal properties of PEO-Na^+/MMT films were determined using Differential Scanning Calorimetry (DSC). The mechanical properties, melt flow index, solubility, moisture absorption ability and biodegradability of PEO-Na^+/MMT films were studied. It was found that the addition of Na^+/MMT in PEO yielded an increase in glass transition temperature and a decrease in crystallinity. It was also found that suitable additions of Na^+/MMT in PEO should be about 5 to 10 weight percent MMT. PEO with 5 weight percent MMT gave the highest stress at break (7.76MPa), the highest percentage of strain at break (1469.08) and a moderate Young's modulus (42.80MPa). PEO with 10 weight percent MMT gave the highest yield stress (12.07MPa), a moderate percentage of strain at break (756.00) and a moderate Young's modulus (51.90MPa). It was also found that the melt flow index of PEO-Na^+/MMT was lower than that of PEO. The solubility of PEO-Na^+/MMT in common solvent was similar to that of PEO. PEO-Na^+/MMT nanocomposite film can absorb moisture and is fully biodegradable.

E0080-HEAT EFFECT ON MECHANICAL PROPERTIES OF HOT WORK TOOL STEEL

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Abstract: This research is to study the heat treatment of hot work tool steel and a final method of this heat treatment for good mechanical properties. This research is studying in tempering temperature of 300, 400, 500 and 600 °C in a vacuum oven. The result shows that the temperature of 500 °C gives the highest hardness of 56 HRC. The plane spacing is computed by the x-ray diffraction technique and then residual stress is obtained. The result shows that temperature of tempering is high, plane spacing is low. It means that hardness is increaseed. The residual stress calculated from plane spacing shows that temperature of 500 °C and 600 °C give low residual stress (367 N/mm^2) but types of residual stress are different. The heated temperature of 500 °C represents compressive stress whereas the heat temperature of 600 °C represents tensile stress and this reserch finds that compressive stress gives higher hardness than tensile stress. Thus the most appropriate temperature used in the heat treatment process was 500 °C because it offers both the highest hardness and the lowest residual stress.

E0081-Fabrication of Au Doped MoO_3 Gas Sensor for Alcohol Sensing.

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Abstract: Molybdenum trioxide (MoO_3) is a wide bandgap semiconduction with bandgap of 3.2 eV. It has an electrical resistivity of $10^{10}\ \Omega cm$ at room temperature. It can be used as a gas sensor. Molybdenum trioxide doping with gold (Au) has less resistance meaning it has high conductivity for better gas sensing. In this work, Molybdenum trioxide powder was mixed with gold powder of the ratio of 10%, 20% and 30% by weight, respectively. Each precursor was fabricated in the form of cylinder with a heater mounted inside for a complete gas sensor. Then molybdenum trioxide gas sensors were tested in ethanol vapor of concentration 4500 ppm. It was found that molybdenum trioxide doped with 30% of gold had highest sensitivity about 22.5 with the response time (τ_{90}) of about 5 sec. Increasing the gold concentration will not affect the response time.

E0082-CO_2 HYDROGENATION OVER Ru/Al_2O_3 CATALYST

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Abstract: Recently, research and developments of catalysts used for a conversion of gas pollutant to valuable petrochemical products has become of great interest. To approach this, the project is aimed to study the effect of preparation conditions on the activity of Ru supported Al_2O_3 catalyst used in CO_2 hydrogenation. The preparation conditions such as the droplet rate of precursors and temperatures used for treatments were focused. The results obtained from the characterization of the supports show that Al_2O_3 prepared under the condition of 0.25-0.50 mL/min and the temperature of 400°C gives high surface areas in the range of 380-530 m^2/g. Surface morphology illustrates η-Al_2O_3 materials. High surface area Al_2O_3 was used to prepare a series of Ru supported Al_2O_3 catalyst. The loading of Ru designed on each support used was 0.10, 0.25, 0.50, 0.75 and 1.00 %. The catalytic results obtained from TPSR experiment reveal that more than one temperature peaks were observed, indicating the different active sites for the hydrogenation of pre-adsorbed CO_2. Temperature peak (T_{max}) which is used as a measurement of catalytic activity shifts to lower temperature when Ru loading enhances. 1.00 % Ru/Al_2O_3 catalyst was found to give a high activity and maximum yield of methane product.

E0083-PROCESSING AND MECHANICAL PROPERTIES OF HOT-PRESSED ALUMINA/ DIAMOND NANOCOMPOSITE

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Abstract: The alumina and alumina/diamond nanocomposite powders were prepared by conventional powder processing route. The prepared powders of the alumina with an addition of 0 and 5vol.% diamond with average particle size of 3.2 nm were hot pressed at 10 MPa in a graphite die for 1 h under argon. The hot pressing temperature was 1450°C. The densities of the hot-pressed alumina and alumina/5vol.% diamond nanocomposite were 99.49% and 78.45% of theoretical density, respectively. The hardness and fracture toughness of the materials were evaluated by the Vickers-indentation technique using loads of 50, 10 and 200N. The average hardness of the alumina and nanocomposite was .1881 $\pm$ 0.48 GPa and 3.35 $\pm$ 0.28 GPa, and the average fracture toughness was 2.65 $\pm$ 0.06 $MPa.m^{1/2}$ and.3 13 $\pm$ 0.33 $MPa.m^{1/2}$ for the alumina and nanocomposite, respectively. It was found that diamond transformed to graphite, as indicated by Raman spectroscopy. The use of nano-sized diamond with high specific surface area and low hot pressed pressure are likely to increase the graphitization in the alumina/diamond nanocomposite, resulting in its low density and low hardness.

E0084-Copolymers of Polysiloxane-Poly(ethylene glycol)

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Abstract: This research studies a synthetic method for preparing amphiphilic block copolymers of polysiloxane-poly(ethylene glycol). A series of the polydimethylsiloxane (PDMS) prepolymers with systematically varied molecular weights were first prepared via acid-catalyzed ring-opening polymerization of octamethylcyclotetrasiloxane (D4). They were subsequently functionalized with hydroxyl functional groups at both terminals. The hydroxyl-terminated PDMS can readily
condense with acid-terminated poly(ethylene glycol) (PEG diacid) to form polysiloxane-poly (ethylene glycol) block copolymers. The PEG diacid was prepared from hydroxyl-terminated PEG through the ring-opening reaction of succinic anhydride. The chemical structures of prepolymers and copolymers were characterized using 1H NMR and FTIR.

E0085-ELECTRICAL CONDUCTIVITY RESPONSE OF POLYPYRROLE-/MOLECULAR SIEVE 13X COMPOSITES TO CH_4, CO_2, CO, AND SO_2: EFFECTS OF CATION TYPE AND CATION CONCENTRATION

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Abstract: Electrical conductivity sensitivity of polypyrrole(Ppy)/molecular sieve 13X composites exposed to CH_4, CO_2, CO, and SO_2 was investigated. Composites were prepared by a dry mixing and dispersion. Effects of zeolite concentration, cation type, concentration of cation were investigated. The electrical conductivity of Ppy doped with naphthalene-2-sulfonic acid(β) sodium salt varies monotonically with the doping level. There is no electrical conductivity response when Ppy and its composites are exposed to CH_4, CO_2, and CO in contrast to the Ppy exposed to SO_2. Undoped Ppy and doped Ppy composites at 10% v/v of 13X content possess the highest sensitivity to SO_2; the sensitivity is reduced as molecular sieve 13X content increases. Cation-exchanged processes on the molecular sieve 13X were carried out by changing from Na^+ to Li^+, K^+, and Cs^+ at various amounts The composites of unmodified 13X in which Na^+ is fully present give the greatest sensitivity to SO_2. The sensitivity of Ppy/13X composite to SO_2 is reduced by exchanging cation in molecular sieve13X from Na^+ to other alkali cations in this decreasing order: Cs^+, K^+, and Li^+.

E0086-PREPARATION OF WOUND DRESSING OF POLYVINYL ALCOHOL/SILK FIBROIN HYDROGELS BY GAMMA RADIATION

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Abstract: Polyvinylalcohol/silk fibroin (PVA/SF) hydrogels were prepared by γ-radiation. The preparation conditions such as absorbed doses and PVA/SF concentrations were investigated. When exposed to γ-radiation, PVA/SF was crosslinked to yield high water absorption materials with water content of 100 – 1000% of their dried weight depending on the preparation conditions. The crosslinked density seems to be the main factor governing the swelling of these gels. The swelling behaviors in NaCl aqueous solutions were also investigated. The swelling of PVA/SF hydrogels decreases when exposed to electrolyte solution. With an increase of absorbed dose, the gel fraction of PVA/SF increases.

E0087-STUDIES ON THE WATER VAPOR PERMEABILITY AND THE EFFECT ON BACTERIAL GROWTH OF PVA/SF BLEND HYDROGELS PREPARED BY GAMMA IRRADIATION FOR WOUND DRESSING

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Abstract: The preparation of hydrogels by gamma irradiation from poly(vinyl alcohol) (PVA) and from blend solution of PVA/silk fibroin(SF) from silk waste and some properties as wound dressing were studied. The thickness of the hydrogel was controlled to be 3 mm. Some properties of hydrogel such as water vapor permeability antibacterial activity, and protection of wound from bacteria were tested. *Escherichia coli*, *Staphylococcus aureus*, and *Psuedomonas aeruginosa* were used as testing cultures. The results revealed that the solution of 7% and 10% PVA and the blend solution containing 10% SF in 7% and 10% PVA (w/w) were induced by γ–irradiation at the dose of 30-60 kGy to form transparent gel with good appearance. The water vapor permeability coefficient of the films was in the range of 1161.12-1527.36 g m^{-2} day^{-1}. It was found that the gel showed only an effective wound protection from

bacterial inhibition but not its antibacterial property. However, remarkable reduction of bacterial growth, of about 1-2 log cycles, was also observed on the agar medium covered with the gel.

E0088-EFFECT OF TYPES AND CONTENTS OF COMPATIBILIZERS ON THE CRYSTALLIZATION BEHAVIOUR OF THE TLCP/PP IN-SITU COMPOSITE FILMS

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Abstract: In this work, the effect of types and contents of compatibilizers on the crystallisation behaviour of the thermotropic liquid crystalline polymer (TLCP)/polypropylene (PP) in-situ composite films was investigated by using differential scanning calorimetry (DSC). Four types of compatibilizers; namely, SEBS1650, SEBS1652, SEP1701 and MA-g-SEBS, were added at 1, 3 and 5 wt% into the 10wt%TLCP/PP composite films. It was found that the melting temperatures for all compatibilized films were approximately 2°C higher than that of the uncompatibilized one. This suggested that the crystalline part of PP phase became more thermally stable. However, the crystallisation temperatures of PP fraction for all compatibilized films were not significantly affected by addition of all four compatibilizers. It was also found that all four compatibilizers exhibited the similar effect on the melting temperature and degree of crystallisation of the compatibilized films. This indicated that there was no significant effect among four types of compatibilizers on the crystallisation behaviour of PP component. Nevertheless, the supercooling temperatures (ΔT) of PP portion for all compatibilized films strongly increased about 7-9°C over that of the uncompatibilized one. This meant that the crystallisation rate of PP component in all compatibilized films was retarded. This behaviour was realized due to the presence of compatibilizer phases located in the interfaces which might hinder the nucleation effect of TLCP phase.

E0089-FLUORINE DOPED TIN OXIDE THIN FILM PREPARED BY SIMPLE PYROSOL METHOD: A POTENTIAL ELECTRODE FOR SOLAR ENERGY HARVESTING

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Abstract: Transparent Conducting Oxide (TCO) thin film is a most importance component in various kinds of solar cell.However,production cost is still high.In this research Fluorine doped Tin Oxide (FTO) thin films were prepared by a simple and low cost pyrosol process. The mixture solutions consist of SnCl2.2H2O, NH4F, DI water, ethanol and HCl was atomized by ultrasonic generator into aerosols. The aerosols were brought to hot (300 oC -500 oC) aluminosilicate glass substrates by air. Substrate temperature was varied in a range from 300 oC to 500 oC. The effect of substrate temperatures and precursor compositions were optimized through the Haake's parameter (ϕTC)[2].The highest value of Haake's parameter of FTO,prepared from 0.2 M SnCl2.2H2O+0.1 M NH4Cl in 95% Ethanol/ deionized water at 450 oC is 6.4x10-3 Ω-1,which is reasonable value for a potential application in solar energy harvesting[3].

E0090-NANOFIBRES OF POLYMERS AND CERAMICS FABRICATED BY ELECTROSPINNING

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Abstract: An electrospinning system has been designed and set up to use in the fabrication of polymer and ceramic fibres. In this work we demonstrate the use of electrospinning technique to prepare nanofibres of polymers i.e. polyethylene oxide (PEO), polyvinyl alcohol (PVA), polypolyacrylonitrile /N, N-dimethyl formamide-(PAN/DMF) and polyvinyl pyrrolidone (PVP). The nanofibres (diameter size of 20-300 nm) were characterized by SEM, AFM, X-ray diffraction, Raman spectroscopy, FT-IR and UV-VIS-NIR spectroscopy.

E0091-Characterization of Some TiAl Alloys with 800 °C Nitridation

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Abstract: The nitridation of Ti-47%Al-2%Nb-2%Cr and Ti-47%Al-2%Nb-2%Mn-0.8% TiB_2 was studied in purified NH_3. The flow rate of the gas was kept constant at 10 $ml.s^{-1}$. The nitridation process was done at 800 °C for 10 h. The

alloys were then characterized using a pin-on-disk wear tester and a microhardness tester. Hardness and wear resistance of the alloys were successfully improved.

E0092-Investigation of Kidney Stones by X-ray diffraction Method

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Abstract: An investigation of 39 male kidney stone samples and 11 female kidney stone samples obtained from Songklanakarind Hospital was carried out. Most samples were obtained from patients with the age over 40 years old. By means of X-ray diffraction (XRD), kidney stones can be classified according to their structures and compositions into 3 groups e.g. 1. uric acid ($C_5H_4N_4O_3$) and ammonium acid urate ($C_5H_7N_5O_3$) 2. oxalates ; whewelite ($C_2CaO_4!H_2O$ $CaC_2O_4!H_2O$) and weddellite ($C_2CaO_4!2H_2O$)) 3. phosphates ; struvite ($NH_4MgPO_4!6H_2O$) and calcium phosphate hydrate ($Ca_3(PO_4)_2!xH_2O$). External and internal environments such as occupation, dietary habits, lack of water-drinking etc. are the major factors for kidney stone formation. Results from this study are very useful for the patients to prevent recrystallization of kidney stones by avoiding some elements or some organic compounds which are main components of kidney stones formed in the human urinary system.

E0093-Effects of Some Additives on the Optical Property of Polythiophene Derivative

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Abstract: The addition of additives on conjugated polymers or doping helps increase the conductivity of the polymer. The frequently used doping agents are acids or oxidizing agents. Our study showed that the addition of trifluoroacetic acid on solutions of poly (3-hexylthiophene) decreased the absorbance of the polymer at λ_{max} 441 nm while the absorbance at 824 nm appeared at ratios that corresponded to the amount of added trifluoroacetic acid. The novel calculation, AC-index was used to monitor the structural change of the conjugated-π system of the polymer that was presumed to structural change of the simultaneous change of the absorbance at various wavelengths. The AC-index values dramatically increased within one minute and then leveled off toward a set of constant values, which well corresponded to the amount of added trifluoroacetic acid until the ratios between polymer and acid were 1:10. These AC-index values were also varied in accord with the increase of the absorbance at 824 nm.

E0094Incorporation of substituents on thiophene and polythiophene derivatives

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Abstract: This research studied the incorporation of substituents on thiophene and polythiophene derivatives. The two reactions under investigation were acetylation and bromination. The acetylation used acetyl chloride and aluminium chloride as the reagents. The product from the acetylation of thiophene was found to give mostly unseparable and unidentifiable mixture. The ^{1}H NMR spectrum of the mixture indicated some signals that could correspond to protons of acetyl group. The acetylation of polythiophene yielded insoluble brown solid, which could be characterized only by the presence of acetyl carbonyl peak in IR spectroscopy. The bromination used N-bromosuccinimide (NBS) in 1 : 1 mixed solvent of dichloromethane and acetic acid. The product obtained from bromination on thiophene was identified to be deep red liquid of 2,5-dibromothiophene in 60% yield. The crude product was relatively pure with no detectable trace of other brominated products.

E0095-Improvement of Mechanical Properties of Polystyrene by Pineapple Leaf fibres

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Abstract: In this research the improvement of mechanical properties of polystyrene by using unidirectional continuous pineapple leaf fibres as a reinforcement was studied. The studied factors were the effect of fibre content and benzoylation of pineapple leaf fibre on mechanical properties of the composite. Experimental results were found that mechanical properties of polystyrene composites increased with the increasing of fibre content and mechanical properties of benzoylated fibre/PS composite was better than untreated fibre/PS composite.

E0096-SEPARATION OF RARE EARTH ELEMENTS FROM MONAZITE ORE DECOMPOSITION PROCESS BY ION EXCHANGE COLUMN

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Abstract: Separation of rare earth elements from monazite ore decomposition process was studied by using ion exchange columns filled with Dowex 50 WX8 resin. Mixed rare earth chloride from monazite composed of La, Ce, Pr, Nd, Y, Sm, Gd and Dy was adsorbed by resin in the column and 0.015 M EDTA was used to elute adsorbed rare earth elements through columns of Cu^{+2} adsorbed resin at linear flow rate of 0.636 and 0.212 cm/min. It was found that rare earth elements were eluted respectively by their atomic weight from heavy to light elements except Y which are Dy, Y, Gd, Sm, Nd, Pr, Ce and La. Ion exchange column has shown a potential method in separation and purification of individual rare earth elements.

E0097-Dynamic vulcanization from reclaimed tire rubber and high density polyethylene

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Abstract: The effect of blend ratio and dynamic vulcanization using sulfur, MA/DCP, mixed system on dynamic mechanical properties of RTR/HDPE blends were investigated. Impact strength increases with increasing RTR loading up to 50 pbw. Sulfur and mixed system proved to be most suitable for dynamic curing which showed highest in impact strength and tensile strength at 50:50 (RTR:HDPE). The phase structure of the thermoplastic elastomer at composition of RTR:HDPE at 50:50 ratio was assessed by differential scanning calorimetry (DSC) and scanning electron microscopy (SEM). Rheological behavior of the blends was also studied.

E0098-Preparation of PMN powder via rapid vibro-milling technique

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Abstract: Perovskite powders of PMN have been prepared by a solid-state reaction via a rapid vibro-milling technique. Phase formation of the calcined powders has been investigated as a function of cacination conditions by TG-DTA and XRD techniques. Moreover, morphology and particle size evolution have been determined via SEM technique, respectively. It has been found that monophasic PMN powders were successfully obtained for calcination conditions of 800 °C/min for 1 h with heating/cooling rates of 20 °C/min. Higher temperature clearly favoured particle growth and the formation of large and hard agglomerates.

E0099-Wear Resistance of Silicon Carbide Nanofiber Reinforced Aluminium-12 wt% Silicon Composite Coating Prepared by Thermal Spraying

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Abstract: This research was aimed to investigate hardness and wear resistance of SiC nanofiber reinforced Al-12wt%Si coating prepared by thermal spraying technique. The SiC nanofiber was produced by current heating technique [1]. The SiC nanofiber was mixed into Al - 12wt%Si powders at 4, 8, 12 and 16wt%. The results showed that the hardness of the coating containing 8 wt% SiC nanofiber was highest and higher than that of the unreinforced by 74.8 %. The coating containing 12wt% SiC nanofiber had highest wear resistance with a decrease of wear rate at approrimately 52 percent compared to an unreinforced coating.

F

F0001-ANALYSIS OF OFFSET PRINT QUALITIES BY USING SUNFLOWER OIL-BASED INK

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Abstract: The sunflower oil-based ink was produced to analyze the print qualities and compare with the mineral oil-based ink from the petroleum distillation. In this study, both sunflower oil-based ink and mineral oil-based ink were produced with the same offset ink formula, but difference in oil type for varnish mixing and ink viscosity improvement. Both inks were then used to print on gloss-art paper by offset printing system in the same condition. The print qualities were analyzed, showing that the tone reproduction was similar, but the sunflower oil-based ink had more advantage in gloss, ink trapping, color gamut and color saturation. However, its disadvantage was slow drying due to the larger molecular size. Therefore, the sunflower oil, which is produced in Thailand and non-toxic, should be developed to substitute the mineral oil in the production of offset printing ink for food package.

F0002-Effect of temperature on minimally processed of carrot, tomato, red cabbage and head lettuce during storage

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Abstract: The carrot, tomato, red cabbage and head lettuce were sliced or shred, packed on trays and wrapped with PVC film. They were stored at 5, 10, 15 or 25°C. It was found that at 5°C the changed in weight loss, color (L* a* b* a b and $\sqrt{a^2 + b^2}$), carbon dioxide and oxygen were minimized. The ethylene production of carrot and tomato could determine. While head lettuce and red cabbage could not determine. The storage life of carrot, tomato, red cabbage and head lettuce at 5°C were 14, 17, 17 and 25 days respectively.

F0003-MOISTURE DESORPTION ISOTHERM OF FOI TONG

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Abstract: Moisture desorption isotherm of Foi Tong was determined at 29 °C. The equilibrium moisture contents at different water activity values were used to fit different sorption isotherm models including the GAB, Smith and Lewicki models. The ranges of water activity for the different sorption isotherm models were reported. The Lewicki model was found to be the better-fitted model for Foi Tong.

F0004-UTILIZATION TREND OF EPOXIDIZED SUNFLOWER SEED OIL FOR BIODEGRADABLE LUBRICANT

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Abstract: The objective of this research was aimed at investigating the utilization trend of epoxidized sunflower seed oil for biodegradable lubricant product. The epoxidation reaction of sunflower seed oil with performic acid generated *in situ* from formic acid and hydrogen peroxide was studied at 50, 60, 70 and 80 °C for 10 hrs. It was found that the level of epoxidation increased with the increasing of temperature at the first hour of reaction. From kinetic and thermodynamic parameters studies, the rate of reaction constant of 406.21 $\times 10^{-4}$ l mol^{-1} s^{-1},activation energy (E_a) of 4.1003 kcal mol^{-1}, enthalpy (ΔH) of -55.52 kcal mol^{-1}, entropy (ΔS) of 0.021 kcal mol^{-1} K^{-1} and free energy (ΔF) of 56.150 kcal mol^{-1} were found. The lubricant properties of sunflower seed oil (SSO) and epoxidized sunflower seed oil (ESSO) were investigated. The result showed that the color of ESSO was slightly changed compared to SSO. The specific gravity and viscosity increased with the increasing of epoxidation level. In addition, the flash point of ESSO was decreased while its pour point increased and became constant at −15 °C with the increasing of the epoxidation level. The lubricant property of the epoxidized sunflower seed oil is likely to be superior to sunflower seed oil and could be used as a lubricant.

F0005-Combining Yeasts and Chitosan Treatment to Reduce Anthracnose Fruit Rot of Mangoes

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Abstract: 'Choke Anan' and 'Nam Doc Mai' mangoes were wounded and treated with one of two yeast antagonists (*Candida* sp. strain NS5 and NS9) for 12 *h* before soaking with chitosan (0.25 and 0.50 %) and followed by inoculation with the anthracnose pathogen *Colletotrichum gloeosporioides*. Treated fruits were stored at 25°C for 7 days. The results revealed

that anthracnose lesions were decreased on fruit where wounds had been allowed to colonized by the antagonistic yeasts before inoculation with the pathogen. The combination of antagonistic yeast with chitosan was more effective in the reduction of anthracnose incidence than yeast or chitosan alone. *Candida* sp.NS9 in combination with 0.5% chitosan was the most effective in controlling anthracnose fruit rot in 'Choke Anan' and 'Nam Doc Mai' mangoes which the average percentage of disease incidences were 6.7 and 13.3 %, respectively, compared with 93.3 and 100 % infection in the control fruit. As for hot water (55 °C for 5 *min*) treated fruits, the disease incidences were 73.3 and 86.7%, respectively.

F0006-STUDY AND COLLECTION OF NUM PU FORMULAR FOR PRODUCT DEVELOPMENT

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Abstract: Fifteen samples of num pu from different local markets were used for sensory evaluation. The evaluation was done with 20 panelists using 9-point Hedonic scale. The result indicated that num pu from Mae vang District, Chiang Mai had the best acceptance score. The best formular consisted of rice-field-crabs, lemon grass and curcumin. The amout of *Escherichia coli* in num pu was less than 3 MPN/g but yeast, molds and *Salmonella* sp. were not appeared. Num pu contained 31.67% protein, 2.54% lipid, 12.68% carbohydrate, 22.52% ash and 1.70% fiber. The amount of iron, sodium, calcium and zinc in num pu were 0.1%, 3.25%, 0.87% and 0.01%, respectively. The amount of vitamin A and vitamin B1 were 35.53 µg and 0.04 mg were found but vitamin C was absented in 100 grams of num pu. The result of amino acid analysis showed that at least 17 kinds of amino acids were found. Glutamic acid was obtained as the highest amount follow by glycine and alanine. Many kinds of organic acids such as acetic acid, citric acid, lactic acid, succinic acid and pyroglutamic acid were found in num pu.

F0007-COMPARISON OF VOLATILE AROMA COMPOUNDS OF FRESH GUAVA, GUAVA JUICE AND PICKLED GUAVA

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Abstract: Comparison of volatile aroma compounds from fresh guava, guava juice and two different recipe of pickled guava were done. The compounds were obtained by distillation under reduced pressure and solvent extraction followed by concentration by distilling out the solvent and sweeping with nitrogen gas. The concentrated aroma solutions were used for identification using gas chromatography-mass spectrometry. Identified compounds in fresh guava were 4-Pentenal, *trans*-2-Hexenal, *cis*-3-Hexenal, Nerolidol, β-Selinene, and α-Copaene whereas the same compounds with different amount were also found in guava juice. The two recipes of pickled guava gave different result from fresh guava and guava juice. The recipe number one containing more salt with the presence of citric acid and vinegar differed from recipe number two. It still had some compounds formerly presented in fresh guava and guava juice with the addition of α-Copaene, Isobutanol, β-Caryophyllene and Globulol while we found less compounds in the recipe number two.

F0008-Biodiesel : Preparation and Properties of Some Esters from Vegetable Oil

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Abstract: Esters from coconut oil or palm oil was prepared by reactions between fatty acid and alcohol using sulfuric acid as a catalyst. The experiment started from refluxing the edible oil with 7 M sodium hydroxide at the ratio of 5:6 v/v and the temperature of 75 °C for 9 hours to form soap. Fatty acid was then prepared by adding 4 M hydrochloric acid to soap. It was further reacted with either methanol, ethanol or isopropanol in the present of sulfuric acid for 8 hours to obtain esters with the percentage yield of more than 80 %. t-Butyl ester, however, was prepared by a different route. t-Butanol was reacted with fatty acid chloride to give t-butyl ester. t-Butyl ester prepared has the characteristics of having low ash and low viscosity. It has a boiling point in the range of 160-210 °C which is lower than the other esters and a specific gravity of 0.8593 Kg/L which is comparable to that of methyl ester. It is expected that *t*-butyl ester prepared form palm oil is able to use for better diesel oil.

F0009-Effect of chitosan and sodium bicarbonate/chitosan coating on quality and shelf-life of sapodilla fruits

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Abstract: Sapodilla fruits have a delicious and very sweet taste, which can be cultivated in all part of Thailand. After harvesting, the mature sapodilla fruits are overripe about 2-3 days at room temperature by a respiration process. Thus, the objective of this research was to extend the storage life of sapodilla fruits by retarding the ripening process and inhibiting the growth of the spoilage-causing microorganisms through chitosan and sodium bicarbonate/chitosan coating. The effect of chitosan and sodium bicarbonate/chitosan coating on storage quality of mature sapodilla fruits at 15°C and 50% RH was

evaluated. The results showed that at 12 days of storage, no decay incidence was observed on both coated fruits. They had significantly better quality as evaluated by general appearance, titrable acid content and firmness compared to noncoated-control fruits. Thereafter, sodium bicarbonate/chitosan coated fruits were slower decay than chitosan coated fruits.

F0010-Drying processing of sapodilla

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Abstract: The drying characteristics of mature sapodilla, a tropical fruit crop, were studied as a prelude to its processing into value added products. Fruits were cut in size of 3, 5 and 7 mm thick-slices and dried at temperature of 60 and 70oC in convection air oven. Drying of sapodilla was strongly dependent on the temperature of drying and the sample size. With increase in temperature and decrease in sample size, drying was faster. Samples dried at 60oC were better than that at 70oC with regard to appearance and aroma of the fruits.

F0011-Maillard reaction products from porcine plasma protein-sugar model system: Characteristics and antioxidative activity

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Abstract: Maillard reaction products (MRPs) were prepared by heating 2% porcine plasma protein (PPP) and reducing sugars (glucose, fructose and galactose) at a level of 1 or 2% at 100°C up to 5 h without pH control. Browning and intermediate products as monitored by absorbance at 420 nm and absorbance at 294 nm increased as heating time increased ($P<0.05$). However, fluorescence (Ex 347 and Em 415 nm) sharply increased within 1h and decreased subsequently when heating time increased. Increase in browning and formation of intermediate products was observed with a concomitant decrease in free amino groups. Among sugars and concentrations used, galactose at 2% rendered the highest browning and intermediate products. MRPs derived from galactose, especially at a level of 2% possessed greater reducing power and DPPH radical scavenging activity than those prepared from fructose and glucose

F0012-Effect of phosphate compounds on setting and gelling properties of surimi from bigeye snapper *(Priacanthus tayenus)* and threadfin bream (*Nemipterus bleekeri*)

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Abstract: The properties of surimi gel from bigeye snapper and threadfin bream added with various phosphate compounds (Sodium Pyrophosphate; PP, Sodium Tripolyphosphate; TPP and Sodium Hexametaphosphate; HMP) at different concentrations (0, 0.05, 0.1, 0.3 and 0.5 %) and heated under various conditions were studied. Kamaboko and directly heated gel from bigeye snapper and threadfin bream surimi added with 0.05% PP had the increase in breaking force by 17.35%, 7.70% and 6.39%, 6.45%, respectively. Addition of TPP and HMP at the same concentration had no effect and exhibited the detrimental effect on breaking force, respectively. However, the breaking force decreased ($P<0.05$) with the coincidental increased expressible moisture and whiteness ($P<0.05$) when concentration of phosphate compounds added increased.

F0013-FRACTIONATION AND CHARACTERIZATION OF CYSTEINE PROTEINASE INHIBITOR FROM CHICKEN PLASMA

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Abstract: CYSTEINE PROTEINASE INHIBITOR (CPI) WAS FRACTIONATED FROM CHICKEN PLASMA USING AMMONIUM SULFATE (AS) OR POLYETHYLENE GLYCOL (PEG-4000). ADDITION OF PEG AT A LEVEL OF 40% BASED ON THE ORIGINAL VOLUME OF PLASMA PROTEIN EXHIBITED THE MOST EFFECTIVE METHOD TO FRACTIONATE CPI WITH A HIGH YIELD AND PURITY. CPI

ENRICHED FRACTION CONSISTED OF 46 KDA CPI CONTAINING INTRAMOLECULAR DISULFIDE BOND. CPI ENRICHED FRACTION WAS COLORLESS AND HAD NO ABSORBANCE IN THE RANGE OF 700 TO 360 NM. CPI IN THE FRACTION WAS STABLE AT 90°C UP TO 60 MIN. NACL AT THE CONCENTRATION OF 0-3.0% DID NOT AFFECT THE INHIBITORY ACTIVITY OF CPI ENRICHED FRACTION. THE INHIBITORY ACTIVITY OF FRACTION WAS STABLE AT PH 8.0 AND HAD THE MINIMUM ACTIVITY AT PH 5-6.

F0014-PHYSICOCHEMICAL PROPERTIES, GEL-FORMING ABILITY AND MYOGLOBIN CONTENT OF SARDINE AND MACKEREL SURIMI PRODUCED BY CONVENTIONAL METHOD AND ALKALINE SOLUBILIZATION PROCESS

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Abstract: Characteristics and gel properties of sardine and mackerel surimi produced by conventionally washed process were compared with those of surimi prepared by alkaline solubilizing process. Conventional surimi, washed with distilled water or NaCl solution, showed the greater breaking force and deformation than that from alkaline process ($p< 0.05$). Myosin from both species underwent denaturation after alkaline treatment as evidenced by the decrease in Ca^{2+}-ATPase activity ($p< 0.05$) with a concomitant increase in the surface hydrophobicity. However, no difference in myosin heavy chain (MHC) band intensity between surimi produced with both processes was observed. The higher expressible moisture was found in the gels of surimi prepared by alkaline process, compared with those produced by conventional process. For sardine surimi gel, the higher whiteness with the lower myoglobin content was found in sample prepared by alkaline process but the highest whiteness was found in the gel of mackerel surimi washed with distilled water.

F0016-QUALITY CHANGES OF OKRA *Abelmoschus esculentus* (L.) Moench PODS STORED IN VARIOUS PLASTIC FILM BAGS

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Abstract: Postharvest quality changes in pods of 2 okra lines, 'Hit 9701' and a local line, were studied. Pods were placed in 4 different kinds of plastic bags, namely, high-density polyethylene (HDPE), low-density polyethylene (LDPE), OPP20 DL L-LDPE50 (OPP), NY15 PE20 L-LDPE75 (NY), and kept at 2 different temperatures: 10 and 14°C. Appropriate storage period and temperature of pods kept in various plastic bags were found to be: HDPE, 12 days, at 10 and 14°C; LDPE, 12 days, at 10°C, and OPP, 9 days, at 10°C. All pods kept in plastic bags exhibited significantly less change in their appearance, size, weight, and water content than those of the control. Vitamin C content decreased significantly in 3 days, with that in bagged pods decreased at a slower rate. Carbon dioxide content in the bags increased throughout the storage period, with that in HDPE bags having the least amount and the lowest increase rate. No significant differences in pod firmness and contents of total soluble solids, fiber, and pectin were observed.

F0017-SIMPLE SEPARATION OF PAPAIN FROM FRESH FRUIT SKINS OF *CARICA PAPAYA* BY PRECIPITATION

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Abstract: Papain provides many applications and has high economic value; therefore, it is interesting to separate papain from papaya fruit skins. In this research, papain was separated from the fruit skins by extracting with acetic-acetate buffer pH 5.0 followed by precipitating with cold solvents. In the separation step, cold methanol and ethanol were more suitable than cold acetone. Both methanol and ethanol afforded the good yields of the papain precipitates with the ratio of filtrate buffer and alcohol at 1:6 to 1:10. Ethanol afforded higher yields than methanol.

F0018-EFFECTS OF CROCODILE BLOOD CONSUMPTION ON BIOCHEMICAL CHANGES IN RATS

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Abstract::The safety for consuming crocodile blood as traditional medicine has not been scientifically reported. To evaluate the effect of crocodile blood consumption on biochemical values, both sexes of Wistar rats were devided in 5 groups. The

crocodile blood, either in fresh or in freeze dry form, was orally administered for 7 weeks. The rat sera were collected before having the blood and 12 weeks after feeding. The biochemical values including alkaline phosphatase (ALP), aspartate transaminase (AST), alanine transaminase (ALT), blood glucose, blood urea nitrogen (BUN) and albumin were not significantly different among experimental groups throughout the study time. These results indicated no adverse effects of crocodile blood on liver and kidney functions. However, chronic effects of crocodile blood should be taken into account prior to long-term usage.

F0019-CROCODILE BLOOD AS FOOD SUPPLEMENT: ITS EFFECTS ON HEMATOLOGICAL VALUES IN WISTAR RATS

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Abstract: Siamese crocodile, *Crocodylus siamensis*, is a medicinal animal that has been reported for its blood anti-microbial activity. Effects of crocodile blood as food supplement on hematological values were determined in Wistar rats. Groups of five rats of each sex were orally administered (300 µl of fresh blood or 50 mg of freeze-dried blood/ animal) for 45 consecutive days. The blood ingestion had no effect on rat behavior and survival. After taking the crocodile blood 2, 4, 8, and 12 weeks, the rat blood was collected from tail-vein for hematological investigations. The hematological values did not reveal differences between the treated and the control groups. The significantly lower hematocrit values were found in females treated with freeze-dried blood. However, these changes were within normal range. These data suggest the safety of crocodile blood as food supplement in animal.

F0020-EXTRACTION OF VOLATILE OIL FROM *Jasminum sambac*

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Abstract: This investigation compared the quality and main components of volatile oil from *J. sambac* obtained from different extraction method. *J. sambac* flowers were processed through enfleurage extraction of volatile oil using whale's fat as absorbent eluded out using EtOH. Gas chromatography was performed on the alcohol sample from enfleurage and hexane extract using Omegawax column between 200-260 Celcius degree utilization He as a carrier gas. Peaks of benzyl alcohol, benzyl acetate and linalool, three major components of *J. sambac oil*, were quantified. All three peaks showed up in hexane sample but only benzyl benzoate and linalool showed up in enfleurage sample with linalool as a minor peak. It is notable that enfleurage sample contains more base notes volatile oil. Assessment by 25 volunteers all identified the jasmine alcohol absolute and its hexane partition as more closely resemble fresh Thai jasmine fragrance.

F0021-DEVELOPMENT OF CITRUS FRUITS OIL EXTRACTION PROCESS BY USING STEAM DISTILLATION

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Abstract: Development of citrus oil extraction process in commercial scale was proposed. The main objective in this study was process development in oil extraction that caused high productivity. The waste utilization process that cause high production have been developed. The developed oil extraction process in this study consists of peeling, pressing the peel, steam distillation for essential oil, grinding the peel and drying and aromatherapeutic products development. This developed process showed the zero discharge by the end of the process. This citrus oil extraction process has been set up and implemented at Industrial Park, KMUTT. The oil extraction processes in this study, were compared between the in house-developed steam distillation unit and Rotary Evaporator. The citrus fruits in this study were kiffir lime and orange. The in house-developed steam distillation unit showed higher productivity of kiffir lime and orange essential oil (65% and 31%, respectively) than Rotary Evaporator. The optimized condition on essential oil extraction process by using Rotary Evaporator on kiffir lime and orange are in further studied. The high productivity and low environmental impact of this developed process were conclude. The preliminary study on financial analysis showed feasible on commercial production.

F0022-CLEAN PRODUCTION ON PILOT SCALE FREEZE DRIED ORANGE POWDER PROCESSING

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Abstract: Development of pilot scale production on freeze dried orange powder processing to meet the zero discharge criteria were proposed. The main objective in this study was waste utilization on freeze dried orange powder processing that

caused high productivity. Addressing the clean production system can improve environmental protection, increase productivity and decrease operating cost. The clean production using clean technology on pilot scale freeze dried orange powder production have been designed. The clean production on freeze dried orange powder processing in this study consists of freeze dried orange powder process, orange seed processing process, pulp and peel processing process and orange essential oil extraction process. The designed production process had considered the wastes from orange powder processing, which are the pulps, peels and the filtered off seeds. The waste utilization process has been divided to produce three processes. The first one is orange seed processing process, this has been done by grinding the seeds, followed by tray drying and can be used as biorepellant. The second process is orange peel and pulp processing by using some part of peels and pulps to produce jam. The third process is orange peel essential oil extraction process followed by aromatherapeutic products development. This designed process showed the zero discharge by the end of the process. The designed clean production on freeze dried orange powder processing, has been implemented by Freeze dried Pilot Plant at Industrial Park, KMUTT. The results showed high productivity and low environmental impact. The preliminary study on financial analysis showed feasible on commercial production.

F0023-Isozyme variation in *Elaeagnus latifolia* Linn. in the upper north of Thailand.

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Abstract . *Elaeagnus latifolia* Linn., an endemic native fruit plant distributed in the upper north of Thailand, were studied. Eighty samples were randomly selected for isozyme patterns analysis using PAGE system. Seven enzyme systems: diaphorase (DIA) glutamate dehydrogenase (GLD) malate dehydrogenase (MDH) malic enzyme (ME) peroxidase (POX) shikimate dehydrogenase (SKD) superoxide dismutase (SOD) were applied in the banding patterns analysis and polymorphism construction. Results showed that frequencies of banding types of each enzyme were polymorphic and were different among some populations. Coefficients of genetic similarity were used to estimate the degree of relationship which indicated that *Elaeagnus latifolia* Linn populations have considerable genetic variations not only within but also between populations

F0024-MORPHOLOGICAL CHARACTERISTIC OF *IN VITRO* GINGER PLANTLET CULTURED UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

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Abstract: Ginger (*Zingiber officinale* Rosc.) is one of the important herbs thatcommercially cultivated throughout Southeast Asia, including Thailand. Nevertheless, the productivity is consecutively decreased due to the severity of disease susceptibility and further affected to the lack of aseptic stock plant. Plant tissue culture has been applied as an alternative strategy for high multiplication rate with disease-free property. Since it has been well known that the growth and development of *in vitro*-derived plantlet is stronglydepended on *in vitro* environmental conditions. In this present study, investigation of morphological development of ginger plantlet was observed after various factors such as plant bioregulator i.e. cytokinin concentration (6-Benzyladenine, BA and 6-(γ,γ-Dimethylallylamino) purine, 2iP), temperature and Photosynthetic Photon Flux (PPF) were applied to the cultures. The highest numbers of shoot (7.8 shoot/clump) was obtained onMurashige & Skoog (MS) medium containing 2% (w/v) sucrose and 8 mg L-1 BA. It was found that these shoots produced high dry mass. When incubated the cultures under low temperature (15 or 20 °C) and dark condition (0 µmol m-2s-1), the shoots performed bigger root although lower shoot numbers were obtained. Sucrose, glucose and fructose derivedfrom this particular root part were two-time higher than shoots. It was obviously demonstrated that different culture conditions affected to different morphological development of *in vitro* ginger plantlets. Plantlets with vigorous root may possibly give a higher percentage of survival after transfer to *ex vitro*. Conditions used for *in vitro* culture not only effect to shoot multiplication, but the development also varies and concerns on plant quality.

F0026-DETERMINATION OF SOME ALKALI AND ALKALINE EARTH METALS IN NATURAL SALTS BY INDUCTIVELY COUPLED PLASMA-ATOMIC EMISSION SPECTROMETRY

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Abstract: An inductively coupled plasma atomic emission (ICP-AES) procedure has been carried out for the quantitation of some alkali and alkaline earth metals namely Na, Ca, Mg, K, Ba and Sr in natural salt samples available in Thailand before and after purification. Optimum conditions for these metal determinations were investigated. The optimum viewing heights for both monochromators (A and B) were 12-16 mm, while the optimum flow-rates in the nebulizer were 0.6-1.0 L.min^{-1}. Maximum emission measurements were made at 588.995, 393.366, 280.270, 766.490, 455.403 and 407.771 nm for Na, Ca,

Mg, K, Ba and Sr respectively. Linear calibration graph over the range 2-100 $mg.L^{-1}$ of each metal was established. The method was found to be reproducible, accurate, rapid and sensitive. The RSD values were less than 1% and the detection limits were 0.72, 0.84, 1.80, 1.02, 0.06 and 0.39 $mg.L^{-1}$ respectively.

F0027-Scoville Heat Units Determination from Chili

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Abstract: Scoville Heat Units, SHU was investigated from Thai chili : Chinda, Chifa and Keenu by extraction of capsaicin in acetone for 22 hours. Capsaicin quantity was analysed by HPLC Walter 600E, YMC-Pack ODS-A, S-5 12 µm, 12 nm, 50 x 4.6mm I.D. column, UV detector 280 nm and mobile phase, MeOH : Ultrapure water 75 : 25 with flow rate 1.0 mL min^{-1}. It was found that SHU of Chinda is 28,050 – 40,200 SHU, Keenu is 19,500 – 28,050 SHU and Chifa is 7,500 – 16,500 SHU. Percentage of recovery for this experiment is 81.13.

F0028-EFFICACY OF OZONATED WATER AGAINST SOME MICROORGANISMS RELATED WITH BLACK TIGER PRAWN

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Abstract: The ozonated water with total ozone concentration (TOC) 217.6-1132.27 mg/l or residual ozone concentration (ROC) less than 0.1-0.25 mg/l were evaluated against total bacteria, psychrotrophic bacteria, and coliform which were bacterial flora in black tiger prawn and pure culture of *E. coli*, *V parahaemolyticus* and *S. anatum* For antimicrobial effect, it was found that ozonated water with concentration of 548.53 mg/l TOC (0.13 mg/l ROC) was the minimum concentration for destroying 5 log cycle of all 6 tested bacteria after they were contacted for 1 minute. The reduction pattern of all tested bacteria after exposed to ozone was the same and depended on the concentration of ozone.

F0029-ISOLATION AND CHARACTERISATION OF ACID AND PEPSIN-SOLUBILISED COLLAGEN FROM BROWNSTRIPE RED SNAPPER (*LUTJANUS VITTA*) SKIN

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Abstract: Acid-solubilised collagen (ASC) and pepsin-solubilised collagen (PSC) were successfully extracted from the skin of brownstripe red snapper (*Lutjanus vitta*) with the yields of 9% and 4.7% on the basis of wet weight, respectively. Both ASC and PSC comprised two different α chains (α1 and α2), and were characterised to be type I with no disulfide bond. PSC contained a lower content of high molecular weight cross-links, compared with ASC. Peptide maps of ASC and PSC hydrolysed by V8 protease and lysyl endopeptidase showed some differences in peptide patterns between two fractions and were totally different from those of calf skin collagen type I, suggesting the differences in amino acid sequences and collagen conformation. Maximum solubility in 0.5 M acetic acid was observed at pH 3 and 4 for ASC and PSC, respectively. Maximum temperature (T_{max}) of both collagen fractions were similar and shifted to a lower value in the presence of acetic acid, suggesting some changes in the collagen structure caused by acid induction.

F0030-A PRODUCTION OF EDIBLE FILM FROM ISOLATED RED KIDNEY BEAN PROTEIN

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Abstract: A production of edible film from isolated red kidney bean protein was described. Separation of protein from red kidney bean was carried out by using 0.1 N sodium carbonate. Precipitation of separated protein was achieved by adjusted pH with 0.1 N. hydrochloric acid. The efficiency of protein separation from red kidney bean and the efficiency of protein precipitation from solution were found to be 96.28% and 71.02%, respectively. The extracted protein was subsequently used for film preparation. Mixture of extracted protein and carbohydrate (cassava starch) with the ratio of 1:0.15 was mixed with plasticizer (sorbitol) at a fixed concentration of 15%. Thin brown film was ultimately obtained. The properties of the resulted film i.e. moisture, film thickness, water vapor transmission rate, tensile strength and elongation and water solubility index were studied. The film was successfully applied to use as a wrapping material for some typical Thai sweetmeats such as kalamae and kuaykuan.

F0031-Effects of Herbal Feed Additive, Banana (*Musa sapientum* LINN O. Kutze.) in Native Crossbred Chicken Diets on Growth Performances and Caecal Coccidiosis Control.

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Abstract The present experiment aimed at studying, effects of green banana as herbal feed additives at different concentrations in the native crossbred chicken diet on growth performance and caecal coccidiosis control. Day old chicks, a total of 315 were divided into 21 experimental units including 7 treatments- 3 replications in the CRD experiment. Two formulations of diets were provided for starting (0-6 weeks) and finishing (6-12 weeks) chickens. Basal diets were supplemented with green banana powder at 0, 2, 4, 6, 8 % compared with basal diets with chlortetracycline (CTC) at 0.01 % and tannic acid at 0.01%. Results were noted below. It was found that body weight gained of starting (0-6 weeks) chickens showed that chickens fed with diets containing green banana powder had highest weight gained comparing among green banana powder supplemented groups. The ted diets supplement with banana powder at 6% higher (461.44 g/h, $p>0.05$). During the finishing period (6-12 weeks), chickens fed with green banana powder 4% gained higher weight (734.44 g/h, $p<0.05$) than that of tannic acid treated and control groups. The figure was similar to that of CTC treated groups. During the starting (0-6 weeks) periods, green banana powder 6% treated groups had the best feed conversion ratio which was better than that of control (2.32 vs 2.66, $p< 0.05$) and finishing 6-12 weeks. The feed convertion ratio of the banana powder 6% tanden to be heavier than those of the control (2.62 vs 2.69, $p< 0.05$).

Considering the feed cost per 1 kg gained, there was a highly significant different ($p< 0.01$) cost for starting (0-6 weeks) and finishing (6-12 weeks) periods. The 6% green banana powder supplemented group had a lowest production cost for both periods (15.33 baht/kg and 17.60 baht/kg, respectively). The effect of diets containing green banana powder on caecal coccidiosis control illustrated that at 2% and 6% green banana powder supplemented. Nevertheless, no significant difference was encountered. At the same time, tannic acid treated groups showed a remarkably lower lesion score (1.00).

Results from the workshop of green banana powder as feed additives on growth performances and caecal coccidiosis control among participants indicated that farmers gained better knowledge than they formerly do. Especially knowledge concerning native crossbred chicken productions, green banana powder preparations, feed formulations, addition of green banana powder in chicken diets, techniques and feeding exercises ($p<0.05$).

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G0001-GEOCHEMISTRY OF SEDIMENTS ASSOCIATED WITH DINOSAUR DEPOSITS IN THAILAND

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Abstract: Soils and rocks associated with dinosaur deposits at Chiang Muan District Payao Province, and Phu Kum Khao, Sahusakhan District, Kalasin Province, were studied. It was found that they both are in Sao Khua Formation, Khorat Group. They consist similarly in physical properties, mineralogy and chemistry with limited differences. Major mineral is quartz range from 55.22-91.46 %, minor minerals are calcite 0-34.78 % illite 8.58-22.10% plagioclase 4.60-18.15% and montmorillonite 0.0-9.01 % and trace of hematite and kaolinite. The mineral acid extraction shows the concentration of elements accordingly. Apart from that, the soil from Chiang Muan District Payao Province shows more clays than that of the Sahusakhan soils. From petrographic and mineralogical studies include the volcanic ash in the sediments could indicated that during the fall of those dinosaur there was some volcanic eruption in the vicinity, resulted in deposition of volcanic ash in the basins. There is no evidence, however, that the sediments deposited in the basins and their possibly toxic was resulted from volcanic eruption and caused the death of dinosaur which deposited in Sao Khua Formation. It should have further intensive investigation for more details.

G0002-THE INTERPRETATION OF SEISMIC REAFRACTION DATA USING GENATIC ALGORITHM BASED ON THREE PARALLEL AND SMOOTH LAYERS

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Abstract: The exploration of geophysics using seismic refraction technique is the method for surveying underlying rock structure, by analytical velocities of rocks. We will show the properties of rocks. The analysis of seismic travel-time data requires experienced geologists, therefor this research will study the method of computer called Genetic Algorithm for seismic refraction interpretation for the simplicity, the structure is based on three parallel and smooth layers. The result shows the velocity and depths of the layers which received from the model.

G0003-A preliminary report on subfossil canids from the Noi River, Ayutthaya Province, Central Thailand

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Abstract: A number of skeletal remains of mammals, including canids, were unearthed from the bottom of the Noi River in Ayutthaya Province. 25 crania of those canids were studied on morphology. These crania have not been described, before this study. The identification of these crania was carried out through comparison with *C. aureus* and *Cuon*, which are native wild canids of Thailand, as well as with *C. lupus* and *C. familiaris* (domestic dog). The results were that these crania show high variation, but their dental morphology is similar to each other. The dental configuration is closest to that of *C. familiaris*. The metric data of these crania, show a relatively larger size than *C. familiaris*.

G0004-Preliminary Tungsten ore investigation in stream sediments of Chiang Mai basin, Thailand

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Abstract: Regional geochemical survey was investigated tungsten ores in stream sediments from the Ping River, Chiang Mai Basin, in Chiang Mai and Lamphun province. Bulk sediment samples from 31 locations along the Ping River were collected and examines. Tungsten from stream sediments was analyzed by colorimetric method. The results showed the maximum value of 400 mg/L at the junction of Mae Chaem River. The results showed that tungsten ores have high potentials in some locations of the Ping River.

G0005-Total Phosphate on Surface Water in the upper Ping River, Chiang Mai province, Thailand

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Abstract: The total phosphate (PO_4^{-3} - P) on surface water of the upper Ping River was determined by the flow injection analysis (FIA). The water quality-monitoring project had examines since 1995, 1997, 2000 and 2003. Phosphorus was formed a blue

complex to the phosphorus molybdenum blue. Concentrations of the total phosphate were found in the range of 1.0-5.0 mg/L, which indicated the possibility of cultural eutrophication and algal blooms. Highly amount of the total phosphate was shown at the intermittent streams of Amphoe Mae Taeng and Hang Dong. Both locations were mainly polluted from run-off in the agricultural areas and domestic sewage.

H0001-HISTOPATHOLOGICAL ALTERATIONS OF A SINGLE LOW- OR HIGH-DOSE *Schistosoma mekongi* INFECTIONS IN MICE

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Abstract: *Schistosoma mekongi* infection is one of the Asian shistosomiasis forms. Not many studies were done on this infection until 1992 when a focus of shistosomiasis mekongi was rediscovered in the Northeast of Cambodia. The purpose of this study is to investigate pathogenesis of experimental schistosomiasis mekongi in mice given in high (30 cercarias) and low (10 cercarias) intensity infections at various time interval. The results showed that the longer exposure time and higher cercarias infection resulted in significant decrease ($p < 0.05$) in body weight, increase in lung, liver, and spleen index, decrease hematological parameters, increase serum aspartate and alanine aminotransferase and alkaline phosphatase. Total protein level was unaffected while albumin level increased. The main histopathological alterations in the liver were the deposition of the eggs and egg granulomas, proliferation of fibrosis tissues in the portal areas and infiltration of the inflammatory cells. Spleen showed large numbers of megakaryocytes, thickening of capsule, fibrosis around splenic arteries, congestion with marked dilatation of the splenic sinus. These results revealed that *S. mekongi* infection might suggest invasion of the mice immunity system.

H0002-Modulation of Multidrug Resistance Related Protein 1 (MRP1) function by curcuminoids purified from Turmeric powder

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Abstract: Multidrug resistance (MDR) is a major cause of unsuccessful treatment of cancer in patients. One of the resistance mechanisms that has been characterized is the overexpression of the P-glycoprotein (Pgp) and MRP1 protein. Previously, we reported that curcuminoids are able to modulate the P-gp function and expression. In this study curcuminoids purified from turmeric; curcumin I, II and III were tested for their potential ability to modulate the function and expression of MRP1. We found that curcuminoids increase the sensitivity of etoposide drug as well as the accumulation of MRP1 fluorescent substrates; calcein-AM and fluo-4AM, in drug resistant and not in drug sensitive cell lines. In addition, curcuminoids stimulate ATP hydrolysis of MRP1, suggesting the interaction of curcuminoids with the transporter. However after treatment with curcuminoids, the level of MRP1 protein was not significantly different indicating that the modulatory effect of curcuminoids on MRP1 occurred at the functional but not expression level. Curcumin I is the most active form following by curcumin II and III indicating that the methoxyl group in the structure of curcuminoids may play an important role in this inhibitory effect. However this effect is comparable with curcumin mixture. Therefore economically, curcumin mixture is the best form to develop for more efficacious chemotherapeutic drug in combination with conventional chemotherapy.

H0003-DETERMINATION OF VITAMIN B-COMPLEX IN PHARMACEUTICAL PREPARATIONS BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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Abstract : A reverse-phase ion-pair high performance liquid chromatographic method (RP-IPC) for the determination of vitamin B1, B2, B3 and B6 in sample injection was developed. An appropriate volume of samples was filtered by means of nylon filter membrane (0.45 μm). The amount of each vitamin B was quantified by HPLC using ODS (C18) column. The mobile phase was a mixture of acetonitrile and 10 mM solution of sodium-1-hexanesulfonate which was adjusted to pH 2.8 with 10% solution of orthophosphoric acid (24:76 v/v). The detection was made at UV 280 nm. The limits of detection (LOD) for vitamin B1, vitamin B2, vitamin B3 and vitamin B6 were 0.50, 0.10, 2.00 and 0.07 μg mL^{-1} with the limits of quantitation (LOQ) 1.50, 0.30, 5.00 and 0.30 μg mL^{-1} for vitamin B1, vitamin B2, vitamin B3 and vitamin B6 respectively. The % labelled amount of vitamin B1, vitamin B2, vitamin B3 and vitamin B6 were 114.00, 129.90, 107.35 and 125.80 respectively.

H0004-DETERMINATION OF DICLOFENAC SODIUM BY HIGH PERFORMANCE THIN LAYER CHROMATOGRAPHY

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Abstract: A high performance thin layer chromatographic method was developed for the determination of diclofenac sodium in pharmaceutical preparations. The drug was extracted from the sample then various aliquots of this solution were applied on a silica gel plate, using toluene:ethyl acetate:glacial acetic acid (60:40:1, v/v/v) as mobile phase. The spot areas were quantified by densitometry at 282 nm. Linear calibration curve was obtained over the range 100.80-604.80 mgL^{-1} (R^2 = 0.9993). The method was applied to the determination of diclofenac sodium in Diclogel®, Votalen® Emulgel and Dosanac® Emulsiongel with the percentage recovery of 104.21, 112.41 and 101.27 respectively and the % labelled amount of 94.61, 97.87 and 94.81 respectively. This method was suitable for routine analysis, more rapid, low-cost and low reagent consumption.

H0005-Composition and antituberculosis activity of the volatile oil of *Heliotropium indicum* Linn.

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Abstract: The volatile oil from the aerial parts of *H. indicum* was isolated by hydrodistillation and analyzed by a combination of gas chromatography (GC-FID) and gas chromatography-mass spectrometry (GC-MS). The essential oil was obtained in 0.004% yield as a light brown liquid. The major constituents of the volatile oil of *H. indicum* were phytol (49.1%), 1-dodecanol (6.4%) and β-linalool (3.0%). In addition, the volatile oil showed significant antituberculosis activity against *Mycobacterium tuberculosis* H37Ra in the alamar blue assay system with an MIC of 20.8 µg/ml.

H0006-FLOW INJECTION CHEMILUMINESCENCE DETERMINATION OF CEFADROXIL IN PHARMACEUTICAL PREPARATIONS

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Abstract: A simple flow injection chemiluminescence (FI-CL) method was developed for the determination of cefadroxil in pharmaceutical preparations. The method is based upon its chemiluminescence (CL) induced by potassium permanganate in sulfuric acid medium and sensitized by formaldehyde. Under the optimum conditions, linear calibration graphs over the ranges of 0.05–0.8 µg ml^{-1} and 1.0–10.0 µg ml^{-1} were obtained. The proposed method has been applied to the determination of cefadroxil in pharmaceutical sample with a detection limit (3σ) of 25 ng ml^{-1} and RSD (n=20) less than 2% at 0.4 and 4.0 µg ml^{-1} cefadroxil. One hundred and twenty injections per hour can be carried out, which means a sample throughput of 40 h^{-1} if three injections per solution are performed. No interference encountered from some common excipients used in pharmaceutical preparations.

H0007-HIGH PERFORMANCE THIN LAYER CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF PARACETAMOL AND CHLORPHENIRAMINE MALEATE IN COLD PREPARATIONS

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Abstract: High performance thin layer chromatographic (HPTLC) method for the determination of paracetamol and chlorpheniramine maleate in cold preparations was developed. Paracetamol in formulation was separated on a silica gel 60G plate, using butyl acetate: chloroform: 85% formic acid (6:4:2 v/v) as mobile phase, while chlorpheniramine maleate was separated on a silica gel GF_{254} plate, using methanol as mobile phase. Developments were made in an automated multiple development chamber. The chromatograms were viewed under short wavelength UV and the spot areas were quantified by densitometry at 254 nm. The detection limits for paracetamol and chlorpheniramine maleate were 1 µg/20µl and 2.5 µg/20µl with the quantitation limits of 3.5 µg/20µl and 7.6 µg/20µl respectively. Linear calibration curves over the ranges of 5 – 25 µg for both drugs were established with the correlation coefficients of 0.9955 for paracetamol and 0.9846 for chlorpheniramine maleate. The percentage recoveries of the spiked paracetamol and chlorpheniramine maleate in cold preparations were found to be 98.78 ± 0.54 and 98.68 ± 0.55 with the relative standard deviations of 0.55% and 0.56% respectively. The proposed method have been applied to the determination of paracetamol and chlorpheniramine maleate in pharmaceutical formulations. The method was simple, accurate, reproducible and suitable for routine analysis.

H0009-Determination of antioxidant in phytocosmetic

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Abstract: The purpose of this study was to estimate the phenolic content and evaluate the anti-oxidant activity of green tea and vitamin E in a peel-off face mask cream. The percent recovery of the active ingredients from the methanolic extract was 95.57%. The total phenolics in the green tea/ vitamin E mix, as percent yield of gallic acid equivalent (GAE), was 80.78 mg/g dry weight. Antioxidant activity was assessed by measuring the cream's capacity to inhibit free radical formation. The cream containing both green tea and vitamin E resulted in 87.54% inhibition of free radical formation compared with the control. This study demonstrates that a face cream containing both green tea and vitamin E has both high phenolic concentration and high antioxidant activity.

H0010-Study on Antioxidant of Extracts from Rice Bran Tablets compared with others

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Abstract: A comparative study of antioxidant activities of soft rice bran tablets (sRBT), which was formulated and processed for future use as a health product, , defatted rice bran (dRB), crude rice bran oil (cRBO) and refined rice bran oil (rRBO) by analyzing of scavenging effect on 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radicals. The formulation of sRBT selected for investigations contained 200 mg of sRB and mixed with microcrystalline cellulose (MCC) at a ratio of 1:1. Then, 15% of poly(vinyl pyrrolidone) and 1.5% of a glidant and a lubricant were added and thoroughly mixed with the mixtures prior to subjected to tabletting by a machine. In average, the sRBT were 12.09 mm. in diameter, 3.58 mm. in thickness and 5.92 Kp in hardness, and possess a scavenging activity upto 95% of sRB. While rRBO demonstrated the lowest antioxidant activity and 3 times lower than that of cRBO. Powder forms of sRB and dRB showed some similarity in conc dependent antioxidant activity. The antioxidant of the sRBT developed was more or less in the same range as current consumer available products and could be further developed for product improvement.

H0011-TESTING TIMESERIES FORECASTING MODELS FOR INCIDENCE OF INFLUENZA IN NAKHONSITHAMMARAT

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Abstract: Using *Mathematica*, this study tested seven timeseries forecasting models for monthly influenza cases in Nakhonsithammarat over a period of 120 months between 1994 and 2003. Forecasting and error values from each model were calculated, and error values compared by using analysis of variance (ANOVA) tests. Post-tests were then calculated by using Student Newman Keuls method for determining the best-fit model. The result showed that Single Exponential Smoothing Model using constant value of 0.8 (SES0.8) gave the minimum error value. On the other hand, the Global Linear Trend Model (GLT) gave the maximum error value. Therefore, of these seven timeseries models, the SES0.8 is the most appropriate forecasting model for the study.

H0012-SKIN PERMEATION STUDY OF BIOACTIVE COMPOUNDS FROM GEL FORMULATION CONTAINING THE EXTRACT OF WHITE KWAO KRUA (*Pueraria mirifica*)

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Abstract: The objective of this study was to study rat skin permeation of bioactive compounds in White Kwao Krua extract These bioactive compounds were puerarin genistein, daidzein and miroestrol. Gel formulations containing 0.005, 0.01, 0.05 and 0.01% w/w of the extract and the 0.01% w/w solution of the extract in water were prepared. Skin from abdomen of Sprague-Dawley rats was freshly prepared and the permeation study of the bioactive compounds was investigated using Franz Diffusion Cells. Gel or solution was put in the donor chamber and PBS was placed in the receiver chamber. The cells were controlled at 37°C and withdrawn at 2, 4, 6 hours. The bioactive compound contents in the skin and the receiver chamber were extracted and assayed by HPLC comparing to the standard references of Sigma Company. It has demonstrated that daidzein and genistein can pass through the skin and the amounts found depend on the concentration of the extract in the sample. But, no puerarin and miroestrol were found in the receiver chamber. The result from this study can be preliminary used for the differentiation of the product types (pharmaceuticals or cosmetics) for the products containing extract of White Kwao Krua.

H0013-INCLUSION COMPLEXATION OF AZELAIC ACID WITH HYDROXYPROPYL-β-CYCLODEXTRIN

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Abstract: This study aimed to improve the dissolution of azelaic acid in water by the formation of inclusion complexes with hydroxypropyl-β-cyclodextrin (HPβCD). Solid inclusion complexes of azelaic acid-HPβCD (1:1 in molar ratio) were prepared by coevaporation and freeze-drying methods. Two types of coevaporation methods were performed, namely, coevaporation using 80% (v/v) ethanol and coevaporation using mixture of HPβCD in water and azelaic acid in absolute ethanol the same as the freeze-drying method. The solid inclusion complexes were characterized by differential scanning calorimetry, X-ray diffractometry, infrared spectroscopy and dissolution studies. Coevaporation method using 80% (v/v) ethanol gave the true inclusion complex of azelaic acid in the HPβCD cavity. The dissolution rates of azelaic acid were increased by the complexation with HPβCD. Solid inclusion complex obtained by coevaporation method using 80% (v/v) ethanol exhibited the highest dissolution rate of azelaic acid.

H0014-THE RELEASE STUDY OF AZELAIC ACID FROM AZELAIC ACID-HYDROXYPROPYL-β-CYCLODEXTRIN INCLUSION COMPLEX THROUGH SYNTHETIC MEMBRANES

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Abstract: The aim of this study was to compare the release rate of pure azelaic acid and azelaic acid-hydroxypropyl-β-cyclodextrin (HPβCD) inclusion complex through three types of the synthetic membranes, namely a cellophane, silicone and elastomer membrane. The solid azelaic acid-HPβCD inclusion complex was prepared by coevaporation method at the molar ratio of 1:1. Release studies of azelaic acid through the synthetic membranes were conducted, using vertical Franz diffusion cell at 30°C for 7 days. The pure azelaic acid flux of azelaic acid through a cellophane, silicone and elastomer membrane were 0.0165; 0.0031 and 0.0152 mg/cm^2/h, respectively, while azelaic acid-HPβCD inclusion complex exhibited the enhanced flux through those membranes of 0.2706; 0.2516 and 0.1737 mg/cm^2/h, respectively. The release rate of azelaic acid through the synthetic membranes were improved by the formation of inclusion complex with HPβCD at the molar ratio of 1:1, with the increasing flux in the order of elastomer, silicone and cellophane. The result from this study can be applied for the development of azelaic acid for topical use.

H0015-DENGUE VIRUS PRODUCTION IN A LIVER CELL LINE

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Abstract: Infections with dengue virus represent one of the major reasons for hospitalization amongst children in Southeast Asia. There are many cell types that have been considered as cellular targets of dengue viral infection. However, while the virus is able to replicate and propagate in a wide range of both target and non-target cells, the exact nature of the propagation is cell type specific. As the liver is known to be one of the major target tissues in cases of human infection, it is interesting to investigate the factors that control the speed of replication of virus within the cell. This study aimed to determine the production profile of all four serotypes of the dengue virus in Hep3B cells. Virus production profiles were determined by the infection of cells with dengue virus at multiplicity of infection of 1 and virus titer was determined by the plaque assay technique. The results show that Hep3B cells were able to support the propagation of all four serotypes with mature viruses being produced by 15 hours for dengue serotype 4 and 18 hours for serotype 1 and 3 and 22 hours for serotype 2.These results suggest that the viral production is serotype specific and might be controlled by the different viral machinery.

H0016-CHEMICAL CONSTITUENTS OF *ERYTHRINA FUSCA* AND *ERYTHRINA SUBEROSA* STEM BARK AND THEIR BIOLOGICAL ACTIVITIES

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Abstract: Phytochemical study of the stem bark of *Erythrina fusca* Lour. led to the isolation of a new pterocarpan, 3-hydroxy-10-(3-hydroxy-3-methylbutyl)-9-methoxypterocarpan, together with 11 known compounds: sandwicensin, lupinifolin, citflavanone, lonchocarpol A, erythrisene galone, liquiritigenin, daidzein, 8-prenyldaidzein, cerinic acid, 1-octacosanol and erythrinassinate B. Phytochemical study of the stem bark of *E. suberosa* Roxb. yielded 6 known compounds, erythrabyssin II, sandwicensin, erythrinassinate B, 5,7,4'-trihydroxy-8,3',5'-triprenylflavanone, erythratidinone, and a mixtures of β-sitosterol and stigmasterol. The structures of all these isolates were determined by extensive spectroscopic studies, including comparison of their UV, IR, MS and NMR properties with previously reported data. Some of these compounds were evaluated for its antimalarial activity, antimicrobial activity, free radical scavenging activity,

antituberculosis activity and cytotoxic activity against cancer cell. All of the tested compounds showed weak antimicrobial activity except lonchocarpol A and lupinifolin which were strongly active against *Bacillus subtilis* and moderate active against *Enterococcus faecalis* and *Staphylococcus aureus*. Lonchocarpol A showed the highest *in vitro* antimalarial activity against K1 strain (EC_{50} 1.6 µg/ml), when compared with 8-prenyldaizein, erythrabyssin II and citflavanone (EC_{50} 3.9, 5.0 and 5.0 µg/ml, respectively). However, lonchocarpol A exhibited no *in vivo* antimalarial activity (at 20 mg/kg). In addition, all of tested compounds showed marginal free radical scavenging activity. Almost all of the tested compounds showed weak antituberculosis activity against H37Ra strain, whilst erythrisenegalone and lupinifolin displayed strong cytotoxic activity against breast cancer (BC) cell line.

H0017-DISTRIBUTION OF *AEDES AEGYPTI* AND *AE. ALBOPICTUS* IN BUDDHIST AND MUSLIM HOUSEHOLDS IN TWO DIFFERENT TOPOGRAPHICAL LOCATIONS IN NAKHONSITHAMMARAT PROVINCE.

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Abstract: This study investigated the effect of topographical and religion on distribution and abundance of *Ae. aegypti* and *Ae. albopictus* in Nakhonsithammarat Province, southern Thailand. Data were collected by using a stratified simple random sampling with the total sample size of 400 households. The results showed that Muslim differed from Buddhists including long-sleeved blouses and trousers/long skirts, higher number of family member, lower income and wood for construction material. Houses near the sea had more water jars but fewer mosquito larvae per jar than houses in the mountainous area. Greater numbers of *Ae. aegypti* larvae were found in larger jars and smaller jars which were < ¼ full. Greater numbers of *Ae. albopictus* larvae were also found in larger jars which were ¼ full.

H0018-BREEDING SITE OF VECTORS SURVEY OF DENGUE HAEMORRHAGIC FEVER IN NAKHON SI THAMMARAT.

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Abstract: In this study, the association between water storage containers and vectors(Aedes sp.) of dengue haemorrhagic fever (DHF) were investigated. Sampling surveys were carried out during March and April 2004 in 400 households selected by systematic stratified random sampling from six districts of Nakhon Si Thammarat province in southern Thailand. The districts were categorised into two groups: high and low DHF risk areas. The water storage containers were composed of 29 types of containers. The mosquitoes larvae presence in containers used for storing drinking and washing water indoor and outdoor of households were measured. The results showed that key breeding sites of *Ae. aegypti* and *Ae. albopictus* in high risk areas were a jar that was used to keep preserved arecas. On the other hand, in low risk areas, *Ae. aegypti* larvae was found the most in plastic box, and *Ae. albopictus* larvae was found the most in earthen jar. In addition, high DHF risk areas had a greater proportion of containers with larvae than low DHF risk areas.

H0019-CHARACTERISTICS OF AZELAIC ACID ENTRAPPED IN NANOPARTICLES

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AbstracT: The aim of this study was to characterize the entrapment of azelaic acid (AA) in nanoparticles. The nanoparticles were prepared by hydrating the mixtures of phospholipid (dipalmitoyl phosphatidylcholine, DPPC) or non-ionic surfactants (Polyoxyethylene sorbitan monostearate, Tween61) with cholesterol (CHL). AA has poor solubility in water and is irritate to the skin. AA was entrapped in nanoparticles in order to decrease irritation and increase the absorption through the skin for topical application. The composition of the nanoparticles in molar ratio were DPPC: CHL =7:3, Tween 61/CHL =1:1 and Tween61/CHL/ dicetyl phosphate =10:10:1. The vesicle formation was characterized by transmission electron microscope (TEM). The photograph demonstrated multilamellar vesicles with the particles sizes ranging from 0.02 to 0.08 µm. The formulation of Tween 61/CHL (1:1) with the entrapped AA seemed to demonstrate higher stability than other formulations, since it showed the least formation of sediment and layer separation (stored at 4, 30 and 45°C for 3 months). The pH values of all nanoparticle formulations were in the range of 4.0-4.5 while the formulations without the entrapped AA were in the range of 5.5-6.0. The AA contents in nanoparticles were analyzed by derivatizing AA with 2,4-dibromoacetophenone and N-ethyldiisopropylamine, and determined by HPLC with UV detection at 254 nm. The percentages of the entrapment of AA in all nanoparticle formulations were more than 80%.

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H0020-THE ENTRAPMENT OF DNA PLASMID LUCIFERASE IN NANOPARTICLES

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Abstract: The objective of this study was to entrap plasmid DNA luciferase (pLuc) in nanoparticles (liposomes and niosomes). Cationic and neutral liposomes were prepared using phospholipids (DPPC), cholesterol and or stearylamine. The niosomes (non-ionic surfactant vesicles) were composed of sorbitan monostearate (Span 60) or polyoxyethylene sorbitan monostearate (Tween 61) and cholesterol. Nanoparticles were prepared using freeze dried empty liposomes (FDEL) method. DNA of luciferase plasmid was propagated in *Escherichia coli* by transformation and the quantity of of luciferase plasmid DNA was determined using gel documentation and spectrophotometer. Characteristics and particle sizes of liposomes and niosomes were investigated by Transmission Electron Microscope (TEM 1200s JEOL). The entrapment efficiency of plasmid DNA luciferase in nanoparticles was determined by gel electrophoresis. Results from this study can suggest the selection of the appropriate formulation to entrap other genes in nanoparticles for gene therapy.

H0021-THE SCREENING OF FREE RADICAL SCAVENGING ACTIVITY OF EXTRACTS FROM THAI MEDICINAL PLANTS IN GUTTIFERAE AND SCHISANDRACEAE FAMILY

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Abstract: The objective of this study was to screen free radical scavenging activity of extracts from Thai medicinal plants in family Guttiferae and Schisandraceae. Six Thai medicinal plants (*Hypericum hookerianum*, *Garcinia speciosa*, *G. xanthochymus*, *Chatoxylum formosum* ssp. *Pruniflorum*, *C. polyanthum* and *Schisandra verruculosa*) were extracted by methanol and chloroform. The extracts were screened for free radical scavenging activity using DPPH (1,1-diphenyl-2-picrylhydrazyl) as a stable radical. All extracts showed a dose dependence activity relationship with the lowest IC_{50} value of the methanol extracts from wood of *G. speciosa*. This IC_{50} value was less than those of the standard antioxidants (ascorbic acid and α-tocopherol) of 2.5 and 5.3 folds, respectively. Similar free radical scavenging activities were also observed for extracts from other plants. This study indicated the potential of these plants for further development as pharmaceuticals. We are now in the process of isolation of bioactive compounds from these extracts.

H0022-IMMUNOMODULATORY ACTIVITY STUDY OF *ARTOCARPUS INCISUS*, LINN. F. HEARTWOOD EXTRACT

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Abstract: To study immunomodulatory effects of *Artocarpus incisus* heartwood extract on macrophage and splenocytes of ICR mouse. The phagocytic activity of peritoneal macrophages and splenocyte proliferation in the absence and presence of mitogens (phytohemagglutinin, concanavalin A, lipopolysaccharide and pokeweed mitogen) were assayed. The extract effected to the enhancement of lysosomal enzyme activity but had no effect on the superoxide anion production on phagocytosis. Antiproliferative activity of spleen T- and B-lymphocytes was also presented. The extract with PWM gave the maximum suppression of B-lymphocyte proliferation, suggesting specificity towards T cell dependent pathway the same as PWM. The results showed immunomodulatory effect of *A. incisus* to mouse immune system and may prove the folklore remedy of this plant relating to human immune system.

H0023-CHARACTERIZATION OF ION CHANNELS IN THAI CHOLANGIOCARCINOMA CELL LINES

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Abstract: Cholangiocarcinoma (CCA), or bile duct carcinoma, is an important public health problem in northeasthern Thailand. The carcinogenesis of CCA, however is still uncertain. Interestingly, it appears that the carcinogenic mechanism of CCA in Thailand may be different from that in other countries, since CCA risk factors and clinical features are different. On the other hand, some ion channels are reported to be involved in regulating proliferation and apoptosis in some cancer cells. The objective of this work was to characterize ion channels in Thai cholangiocarcinoma cell lines using whole-cell patch clamp technique. Average cell diameter, cell capacitance and series resistance were (mean ± S.E.M.) 22.25 ± 0.42 µm, 30.41 ± 1.73 pF and 7.00 ± 0.83 MΩ, respectively. Basal current response could be separated into three patterns, according

to voltage dependence. First, outwardly rectifying pattern (38%) consisted of two currents with different kinetics: The time-independent (TI) current was inhibited by 250 μM DIDS but not effected by 10 mM TEA, 2 mM Ba^{2+} and external Cl^- ion substitution. The slowly activating (SA) current was found in a small number (6%) and the ionic basis was not tested. The other two current patterns were the linear pattern (LP, 54%) and the inwardly rectifying pattern (8%). The latter can be further classified by kinetics to time-independent (TIir) and inactivating (IN) forms. Both LP and TIir were not affected by 250 μM DIDS, 10 mM TEA, 2 mM Ba^{2+} and external Cl^- ion substitution. Furthermore, when CCA cells were exposed to 600 μM ATP, the outward and inward currents were increased by 4.4 times (p=0.0024, n=8) and 3.3 times (p=0.0156, n=8) in 53.33% of patched cells. ATP-activated outward current were blocked by 250 μM DIDS (p=0.0016, n=5) and 10 mM TEA (n=1). These findings indicate that some cells of Thai cholangiocarcinoma cell lines may possess a voltage-gated Cl^- channel and ATP-sensitive Cl^- and K^+ channels. The discrepancies between CCA cells from Thai patients and those from pateints in other countries, in both the current pattern response and ATP sensitivity, may reflect the differences in the carcinogenic mechanism, risk factors and / or causes. Therefore, the roles of ion channels in carcinogenesis in Thai cholangiocarcinoma need further investigation with possible therapeutic implications in the future.

H0025-EFFECTS OF MICROWAVE DIATHERMY ON ELECTROCARDIOGRAM SIGNALS

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Abstract: Although microwave diathermy is used in physical therapy rehabilitation by electromagnetic radiation, there is substantial scientific data that establish negative health effects associated with exposure to microwave radiation. The purpose of this study is to investigate effects of microwave diathermy on electrocardiogram. Results obtained from 15 subjects show that the amplitude of the R-wave and S-wave decrease after exposure to pulse mode 2450 MHz microwave diathermy. This is because the sodium channel-protein membrane is denatured, however, blood pressure and heart rate are not changed significantly.

H0026-Electrosurgical Unit

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Abstract: In an operating room, an Electrosurgical Unit (ESU) is one of the important instruments for cutting tissue and controlling the amount of bleeding. In this study, the ESU is designed and constructed with the purpose of using the appropriate technology and materials available in Thailand. This designed ESU provides an adequate power output of 200 watts, covering a wide range of surgical needs ranging from simple to moderate surgical procedures. It has two electrosurgery modes, a monopolar mode and a bipolar mode. In the monopolar mode, the ESU provides the surgical effects such as cutting, blend, and coagulation. In the bipolar mode, it provides coagulation only. The surgical performances of the ESU were tested by cutting a piece of meat and a bar of soap. Results showed that the ESU can provide the surgical effects for both monopolar and bipolar modes. In addition, this ESU was tested for electrical safety and it satisfied the requirements of the safety standard.

H0027-THE DESIGN AND CONSTRUCTION OF A PULSE OXIMETER TESTER

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Abstract: At the present, many manufacturers for medical instrumentation are developing the testing instruments for a pulse oximeter known as a pulse oximeter tester with different systems. Since these instruments are very expensive, some hospitals have no an opportunity to use them due to the limited budget. The objective of this research is to design and construct the pulse oximeter tester utilizing the available components in Thailand, in order that the imported medical instruments are reduced. The designed and constructed pulse oximeter tester consists of the several analog circuits such as the power supply, amplifier, pulse conditioning, pulse rate generator and display circuits. In addition, a microcontroller is also used to handle the operation of the display circuit. Two vital sign monitors (the Welchallyn model Atlas and the Mennen model Enmove) are taken to evaluate the constructed system for testing. The obtained results from testing have shown that the pulse oximeter tester is able to generate the content of oxygen saturation in the blood, generate three pulse rates, simulate the condition of color of skin or thickness of tissue, regulate the amplitude of signal applied to pulse oximeter and use the LCD to display in a digital format.

H0028-ELECTROENCEPHALOGRAM MEASUREMENT SYSTEM

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Abstract: The main objective is to acquire the brain signal in an analog form that can be taken into the analyzing and processing sections with a mathematic method for the development of a diagnostic procedure. The key part of the electroencephalogram (EEG) measurement system consists of: electrodes, electrode junction box, and amplifier and filter circuits. The electrode placement system is configured as the international 10-20 method. Lead wires connected to each electrode are collected into an electrode junction box to determine the position of each electrode for linking to an input of the amplifier. There are sixteen channels of the amplifier and filter circuits. Each channel can independently adjust the voltage gain and frequency response in the various levels according to the desired EEG signal. The constructed system is arranged for the EEG measurement. The measured EEG signals are displayed by the oscilloscope. The result shows that each channel of the constructed EEG measurement system provides good quality of biopotential signals originated from the brain at the interesting site

H0029-High Resolution Electrocardiogram System

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Abstract: A High Resolution Electrocardiogram (HRECG) system is served as a noninvasive tool for detecting very small cardiac signals called Ventricular Late Potentials (VLPs) from patients with heart diseases. VLPs are caused by conduction abnormalities of the damaged myocardium. Many studies have reported that VLPs are correlated with the presence of Ventricular Tachycardia which is the major cause of the patient's death. In this paper, a HRECG system is designed and constructed to detect the presence of VLPs. It includes the ECG amplifier, isolation amplifier, baseline restoration circuit, low pass filter, and high pass filter. The voltage gain of the ECG amplifier can be adjusted from 1 to 50,000. The HRECG system was tested by recording the simulated ECG and real ECG signals. Preliminary results showed that the HRECG system can measure and display three leads of ECG signals with an appearance of small power line interference in the ECG tracing

H0030-A teaching-aided module for an Electrocardiograph

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Abstract: This study presents a teaching-aided module for an Electrocardiograph(ECG). The module is used as an aid to learning in the biomedical instrumentationcourse at the Department of Industrial Physics and Medical Instrumentation, King Mongkut's Institute of Technology North Bangkok. It consists of main and necessarycomponents of the modern ECG such as a patient cable, a right leg driver, an instrumentation amplifier, a low pass filter and a high pass filter. Students can take benefits from this module to gain a better understanding of the concept and theprinciple of operation of the Electrocardiograph. When tested in the laboratory with the BIO-TEK model AS-1 Arrhythmia/ECG Simulator, the module can measure and show ECG waveforms on an oscilloscope. The displayed ECG signals are of goodquality for the objective of teaching the students in the biomedical instrumentation course.

H0031-ANTIDIABETIC ACTIVITY OF THE METHANOLIC EXTRACT
FROM Erycibe expansa WALL.

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Abstract: Antidiabetic properties of 80% methanolic extract from *Erycibe expansa* were investigated. The extract exhibited the inhibition of α-glucosidase activity, sucrase and maltase activities, with IC_{50} values of 95 and 290 μg/ml. Furthermore, the extract also significantly inhibited the increased of serum glucose levels in rats after oral administration of 20% sucrose at 30 and 60 min. These findings suggest that this plant may contribute for the treatment of diabetes mellitus as α-glucosidase inhibitors and lowering of the blood glucose level.

H0032-The Isolation of Pathogenic Bacteria From The Sinuisitis Patients, Phramongkutklao Hospital in year of 2003.

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Abstract: Sinusitis is the inflammation of one or more paranasal sinuses and occurs with obstruction of the normal drainage mechanism. It is commonly found as a respiratory disease caused especially by bacterial infection. A doctor

usually prescribes antibiotics that affect all of *β-lactamase* producing bacteria as initial treatment. However, such practice is not really recommendable because micro-organisms become resistant to antibiotics and that it is only a wasteful expense. This study was undertaken with the objective of learning the prevalence of the pathogenic bacteria in sinusitis and *β-lactamase* producing bacteria. The specimens, fluids taken from the maxillary aspiration of 20 acute sinusitis patients at Phramongkutklao Hospital during May to October, 2003 were sent to the microbiology laboratory for aerobic and anaerobic culture. *β-lactamase* activity was determined by the cephalosporin analog 87/312 method. In this study, 9 pathogenic bacteria were found from the 20 specimens. The predominant isolates were *Haemophilus influenzae* (8 isolates) about 42.1%, *Klebsiella pneumoniae* (3 isolates) about 16.79% and *Citrobacter sp.* (2 isolates) about 10.5%. Anaerobic bacteria were not found in any of the specimens. Only 3 *β-lactamase* producing bacteria in about 30% of the determined bacteria were found. They were *Haemophilus influenzae, Moraxella catarrhalis* and *Staphylococcus aureus*. Therefore, the result of this study may be used a guideline for doctors to select and to prescribe a narrow spectrum antibiotic to patients suffering from sinusitis. This part of the research was granted by Phramongkutklao Hospital Foundation.

H0033-Bcl-xL activation by different risk groups of Human papillomavirus (HPV) E7

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Abstract: Human papillomaviruses (HPVs) are associated with cervical diseases and cancer. According to malignant progression of the lesion, HPVs can be divided into three groups; the high risk group such as HPV16, the intermediate risk group such as HPV59 and the low risk group such as HPV6. These viruses produce an important early protein, E7, which plays crucial role in tumor formation and contributes to apoptosis pathway. There has been evidence showing that the high risk group has stronger transforming activity than the low risk group does. We are interested in comparing the transcription activation activity of different types of HPVs E7 on anti-apoptotic genes in Bcl-2 family. The expression vector, pcDNA3 containing E7 cDNA from various types of HPV was individually transfected into a cervical cancer cell line, C33a, and monitored for the transcription activation of Bcl-2 and Bcl-xL genes. Only HPV16 E7 was shown to activate the expression of Bcl-xL gene. In contrast, none of the three HPV E7 can up-regulate the transcription of Bcl-2 gene in this cell line.

H0034-Effects of Prenatal Stress on Calbindin D-28K Immunoreactivity in Neonatal Rat Brain

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Abstract: Evidence from animal studies shown that prenatal stress may be a risk factor for psychopathology. In the offspring of prenatal stress animals, overactivity and impaired negative feedback regulation of the hypothalamic-pituitary-adrenal axis are consistent finding and may reflect a pathophysiological mechanism involved in the development of psychopathology later in life. Calbindin D28k (CALB), a member of the superfamily of calcium binding proteins, has received a great deal of investigative attention in the past several years. CALB not only play an important role in buffering intraneuronal calcium levels and served as a putative neuroprotective molecule against excitatory amino acids and apoptosis, but also have an important role in neurogenesis of the central nervous system. Moreover, selective losses of CALB immunoreactivity in the brain has been reported to correlated with cortical GABAergic deficit in neuropsychopathology. An impact of prenatal stress on the level of CALB immunoreactivity in several brain areas such as, hippocampus and prefrontal cortex, may alter several steps of brain development and may be related to neuropsychopathology later in life.

H0035-3D QSAR ANALYSIS OF FLAVONES AS HIV-1 REVERSE TRANSCRIPTASE INHIBITORS

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Abstract: Flavones are natural compounds, abundant in food and flowers, and relatively low toxicity. The hydroxyl groups at certain positions of flavone structures are important for HIV-1 reverse transcriptase (HIV-1 RT) inhibitory activity. To further understand the relationships between flavone structures and their HIV-1 reverse transcriptase inhibitory activity function, the three-dimensional quantitative structure-activity relationship (3D QSAR) study was conducted on a series of 30 flavone analogues. Predictive 3D QSAR models were established using molecular alignment obtained by docking the compounds into the active site of HIV-1 RT. The best 3D QSAR models gave non-cross-validated (r^2) and cross-validated (q^2) coefficients of 0.991 and 0.902 for CoMFA, and 0.988 and 0.907 for CoMSIA, respectively. A test set of 4 compounds was used to evaluate the predictive utility of both CoMFA and CoMSIA models. The calculated (predicted) and experimental inhibitory activities were well correlated. The CoMFA, CoMSIA contour maps, and the docking results were integrated to propose a binding mode for the flavone inhibitors at the active site of HIV-1 RT.

H0036-TRANSLATION OF LANNA MEDICINAL PLANT RECIPES FOR RESEARCH AND DEVELOPMENT OF MODERN PHARMACEUTICALS

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Abstract: The objective of this study was to translate Lanna medicinal plant recipes for research and development of modern pharmaceuticals. A number of 190 copies of the old Lanna medicinal plant recipes were surveyed and collected from 8 provinces of the Lanna region, Thailand. These recipes were written in Lanna script on dried palm leaves, mulberry-pulp paper or [illegible] paper books. The 3 most reliable and complete recipes from each provinces were selected and translated into Thai. The translation comprised of 2 steps, first, Lanna to Thai (Lanna meaning) and second, Thai to the common understandable Thai. The medicinal plants appeared in the recipes were collected, prepared and arranged as scientific monographs. Therapeutic indications appeared in Lanna recipes were also included. For example, a recipe from Chiang Mai province contained 1,344 formulae. The medicinal plant which appeared in high frequency of 103 formulae was Oi Dang (*Saccharum officinarum* Linn.), family GRAMINEAE. Oi Dang was one of the ingredients in the recipes for the treatment of malaria, cough, chest pain and intrinsic fever. The information of medicinal plants and therapeutic indications obtained from this study will be an important data which can be applied for the research and development of Lanna medicinal plant to modern medicines. Also, the Lanna folk wisdom will be beneficial for the consevation of the Lanna wisdom as well.

H0037-AUDITORY PREATTENTIVE PROCESSING OF CLUSTER VS. NONCLUSTER INITIAL CONSONANTS PERCEPTION IN MONOSYLLABIC THAI WORDS

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Abstract: As the MMN seems to reflect cortical memory traces for individual language elements, it may possibly allow for investigating even fine-grained properties of neural systems that realize these elements. We therefore set out to use it to explore the processing of functional elements of language in the human brain, in particular memory traces for cluster and noncluster initial consonant forms in Thai lexicality. We chose to record the MMN elicited by the noncluster *ka:ng* and cluster *kla:ng* initial consonant forms in monosyllabic Thai words, and to compare the responses evoked by these initial consonant forms. The MMN was elicited by either a noncluster or cluster initial consonant form, phonetic contrasts being identical in both conditions. Using this approach, we found evidence for specific brain signatures of initial consonant forms in monosyllabic Thai word. The topography of the mismatch responses showed clear left-hemispheric laterality in both conditions. However, the MMN to the cluster initial consonant form occurred later than that for the noncluster one. Furthermore, the cluster initial consonant stimulus produced MMN maximal in temporoparietal sites, whereas the noncluster initial cluster consonant-elicited MMN was more profound at more frontal sites. We suggested that these features of the MMN to cluster initial consonant form indicate delayed activation of left-lateralized perisylvian cell assemblies that function as cortical memory traces of initial consonant form in monosyllabic Thai words.

H0038-AUDITORY PREATTENTIVE PROCESSING OF SHORT VS. LONG VOWELS PERCEPTION IN MONOSYLLABIC THAI WORDS

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Abstract: As the MMN seems to reflect cortical memory traces for individual language elements, it may possibly allow for investigating even fine-grained properties of neural systems that realize these elements. We therefore set out to use it to explore the processing of functional elements of language in the human brain, in particular memory traces for short and long vowel forms in Thai lexicality. We chose to record the MMN elicited by the short *k'at* and long *k'a:t* vowel forms in monosyllabic Thai words, and to compare the responses evoked by these vowel forms. The MMN was elicited by either a short or long vowel form, phonetic contrasts being identical in both conditions. Using this approach, we found evidence for specific brain signatures of vowel forms in monosyllabic Thai word. The topography of the mismatch responses showed clear left-hemispheric laterality in both conditions. However, the MMN to the long vowel form occurred later than that for the short one. Furthermore, the long vowel stimulus produced MMN maximal in temporoparietal sites, whereas the short vowel-elicited MMN was more profound at more frontal sites. We suggested that these features of the MMN to long vowel form indicate delayed activation of left-lateralized perisylvian cell assemblies that function as cortical memory traces of vowel form in monosyllabic Thai words.

H0039-Construction of a Breath Alcohol Analyzer Using SnO_2 Gas Sensor

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Abstract: In this work a breath alcohol analyzer was studied and constructed for screening test by using tin dioxide (SnO_2) semiconductor Model 822 , manufactured by Figaro Engineering , as a gas sensor. The signal from the sensor was controlled and processed by a micro-controller 68HC11 of Motorola in conjunction with an Alcohol Simulator Model 34C of GUTH LABORATORIES for alcohol vapor concentrations of 20 mg% , 50 mg%, 80 mg%, 110 mg%, 150 mg% (mg% equivalents to mg/100 ml), respectively 5 samples were employed for each concentration. The average of alcohol concentrations observed from the experiment were 20.5 ±6%, 49.9 ± 2% , 73.5±11%, 100.2 ±13%, 144.9 ±11%, respectively. It was observed that for the 50 mg% alcohol vapor concentration, the measurement error was very low, that is in accordance with the breath alcohol testing required by law for drunken driving. So it is convinced that this instrument can be used for screening test for law enforcement purpose. However, more rigorous testing may required prior to really use in practical work.

H0040-CONSTRUCTION AND TESTING OF AN ANALOG BREATH ALCOHOL METER.

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Abstract: The key component of the analog breath alcohol meter is SnO_2 gas sensor model TGS-822 from Figaro company. The change of its conductivity due to the alcohol vapor was employed as the means for driving the movement of a moving coil analog meter. Calibration of the meter with a Fuel cell breath analyzer model Sensor IV made by Alco has been carried out at room temperature in the concentration range of 0-100 mg%. The reference alcohol standard solutions of 30, 50, 80, 100 and 150 mg% were used in the calibration and testing process. It was found that average deviation for the whole range of interest was about ± 4 %.

H0041-EFFECT OF MECHANICAL LOAD ON ELASTIC DEFORMATION OF COATED CARTILAGE SURFACE

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Abstract: Articular cartilage has a limited capability for self-repair. The consequence of injuries to articular cartilage tissue is typically degeneration until surgery becomes necessary. However, isolated chondrocytes loose very rapidly their phenotypic expression in the absence of their extracellular matrix environment. Cartilage engineering offers new possibilities to prepare chondrocyte/matrix constructs that can reproduce a cartilage-like biomaterial, suitable to be injected into the defect area. The aim of research is to analyse behaviour of the tissue, which is affected by mechanical load such as the stresses to which it is subjected and the boundary conditions that govern it response. One of interest is the load condition of applied stress on the cartilage surface. Advantage of this research has to assist in the diagnosis of osteoarthritis and contribute to the longevity of articular cartilage in diarthrodial joint.

H0042-FEED-BACK REGULATION OF PROSTAGLANDIN METABOLITES ON PGE_2 SYNTHESIS AND THE EXPRESSIN OF $cPLA_2$, COX-1 AND COX-2 IN MOUSE LUNG FIBROBLAST CELLS

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Abstract: Prostaglandins (PGs) are cell mediators essential for maintaining physiological functions in the body. The synthesis of PG precursor, PGH_2, is controlled by the rate-limiting enzyme called cyclooxygenase (COX). There are two isoforms of COX, COX-1 and COX-2. It is known that COX-1 is a constitutive isoform, while COX-2 is highly inducible by inflammatory stimuli. Previous study demonstrated compensatory regulation between the two isozymes <1>. To investigate whether PG levels are the factors that control the compensatory regulation between COX isozymes, we investigated the effects of PG metabolites, including PGE_2, 15-deoxy-delta-12,14-PGJ_2 (15d-PGJ_2), 6-keto $PGF_{1\alpha}$ and $PGF_{2\alpha}$, on PGE_2 synthesis and the expression of cytosolic PLA_2 ($cPLA_2$), an upstream enzyme in the PG synthesis pathway, COX-1 and COX-2 enzymes in the mouse lung fibroblast cell line. We observed the positive feedback regulation of COX-2 protein and mRNA expression in a dose-dependent manner by high concentrations of PGE_2, 15d-PGJ_2, 6-keto $PGF_{1\alpha}$ and $PGF_{2\alpha}$, which was correlated with the increased production of PGE_2. On the other hand, COX-1 and $cPLA_2$ protein and mRNA expression was not affected by all of these PG metabolites. These data demonstrated positive feedback regulation of COX-2 by PG

metabolites, indicating that PG levels do not play an important role in the compensatory regulation between the two COX isozymes. Moreover, we examined specific PG products secreted by the mouse lung fibroblast cells treated with these four PGs. Our data showed that these PG metabolites had differential effects on the level of each PG production, suggesting their roles in the regulation of PG synthases, the enzymes responsible for PG isomerization.

H0043-PRELIMINARY STUDY OF RELATIONSHIP OF HUMAN PAPILLOMA VIRUS INFECTION IN ASCUS LESIONS OF PAPANICOLOAU SMEARS

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Abstract: Human papilloma virus (HPV) plays a role in development of cervical cancer or precancerous lesion. Cytological report of ASCUS categories based on The Bethesda System 2001 contained 5 subclasses; Atypical with immature squamous intermediate type cytoplasm (AMI), Atypical squamous cell in the setting of atrophy (ASA), Atypical parakeratosis (APK), Atypical repair (ARC) and Atypical cell due to compromised specimen (ASC). This study tested the correlation of HPV infection and subclass of ASCUS by using immunocytochemistry techniques with monoclonal antiboby against HPV types; 6, 11, 16, 18, 31. The studies were performed using 90 Papanicolaou smears, representing 5 normal cervicalsmears, 5 cervical carcinoma and 80 ASCUS smears. All of the normal cervical smears were not stained with HPV antibody while all cervical carcinoma revealed strongly positive immunoreactivities. ASCUS cervical smears revealed 21 smears of positive immunoreactivities from total of 80 smears which equaled to 16.8% The percent of positive cases revealed 15% for AMI, 38% for ASA, 25% for APK and 33% for ARC However, ACS slides were not stained. This result supported the correlation of HPV infection and subclasses of ASCUS lesions. Interestingly, ASA which mainly found in menopause women had the highest percentage of HPV infection.

H0044-SYNTROPHIN BINDING TO AQUAPORIN-4 WATER CHANNEL PROTEIN AND POTASSIUM CHANNEL (Kir4.1 SUBUNIT): ROLE IN WATER HOMEOSTASIS IN MICE RETINA

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Abstract: AQP4 water channel and the inward rectifying potassium channel Kir4.1 are co-expressed in a highly polarized manner at the perivascular and vitreal endfeet of the retinal Müller cells. The anchoring mechanisms responsible for their expression at the Müller cell endfeet are unknown. Both AQP4 and Kir4.1 contain PDZ-domain binding motifs at their C-termini, making them able to interact with the PDZ domain containing proteins present at these membrane domains. Syntrophin are PDZ-domain containing scaffold proteins attached to the dystrophin complex that is present in the Müller cells. Study of mice with targeted disruption of the dystrophin gene (mdx mice) shows impaired clustering of AQP4 and Kir4.1 at the Müller cell endfeet. The expression of AQP4 at perivascular astrocyte endfeet in brain depends on alpha-syntrophin. Moreover, recent biochemical studies have shown an association between Kir4.1 and alpha-syntrophin pointing at alpha-syntrophin as the main candidate for anchoring of AQP4 and Kir4.1 in retina.

H0045-Development of ECG System Monitor via Mobile Telephone

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Abstract: This paper is partial of a real-time patient monitoring system through the HLAN (Hospital Local Area Network) which using electrode are attached to the patient's bodies. Then the electrocardiogram signals from patient's bodies are sent by a electronic card through the HLAN to let the patient's work as an agent card connected to the server of the computer network. The system enables the physicians to monitor the patient's ECG signal condition and other database in real-time. It can be enable the physicians to use mobile telephone to check the patients conditions 24 hours each day. And we can develop this system through LAN and the internet.

H0046-GENDER DIFFERENCES BETWEEN MALE AND FEMALE SPRAGUE-DAWLEY RATS IN THE PONTINE NUCLEI: AS THE STUDIES BY THREE-DIMENSIONAL COMPUTER GRAPHIC SYSTEM

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Abstract: Many brain areas show dimorphic gender differences. The study using MRI showed that the human cerebellum had the differences in size between male and female. The pontine nuclei in the brainstem are an important relay system for the cerebro-cerebellar interactions. Pontine nuclei received direct projection from specific cerebral cortical areas and project their axons as mossy fiber afferents to specific areas of the cerebellar hemisphere. Twelve male and female Sprague-Dawley rats (Six males and six females), weighting between 250-320 gm were used in the experiments. The rat brains were perfused and cut on freezing microtome. Brain tissues were stained with Luxol Fast Blue/Neutral red. The complex organization of the cerebro-ponto-cerebellar projection system has been studied by 3 dimensional computer graphic and morphometric system (Micro 3D). The data showed that there were significant differences in volume and neuronal distribution between male and female rats in different areas of the pontine nuclei ($p < 0.05$).

H0047-FREE RADICAL SCARVENGERS FROM *MACLURA AMBOINENSIS* BL. ROOTS.

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Abstract: As part of our search for potential antitumor constituents from Thai traditional plants used for the treatment of cancer of the National Cancer Institute, the active plants have been selected and investigated for bioactive compounds using bioactivity-guided isolation. The *n*-hexane and chloroform extracts isolated from the roots of *Maclura amboinensis* Bl. (family Moraceae) were also exhibited potent DPPH free radical scavenging activity. Chromatographic purification of these active extracts afforded four main xanthones: macluraxanthone (1), gerontoxanthone-I (2), gerontoxanthone-G (3), gerontoxanthone-C (4); one flavanone: cycloartocarpesin (5); one triterpenoid: butyrospermol acetate (6) and one long chain ester (7). Their structures were elucidated on the basis of spectroscopic and chemical evidences. All xanthones (1-4) and cycloartocarpesin (5) displayed potent free radical scavenging activity with IC_{50} values in range of 0.023-0.084 mM using 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical assay. Among of them, gerontoxanthone-I was the most active compound whereas butyrospermol acetate and long chain ester had no activity. Our findings can be concluded that *M. amboinensis* Bl. and its active compounds are interesting candidates for development of cancer chemopreventive agents and/or treating diseases associated with excess free radicals.