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ABSTRACT BOOK

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HEPATOPROTECTIVE EFFECT OF BLACK SHALLOT (*Allium ascalonicum*) AGAINST ALCOHOL-INDUCED HEPATIC DAMAGE IN SWISS ALBINO MICE

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Abstract. Black shallot is an innovative food produced by Maillard reaction and aging process of fresh shallot in a regulated humidity and temperature chamber. Incubation process not only changes the texture, color and offensive flavor of fresh shallot but also enhances its bioactivities such as anti-oxidant, anti-cancer, anti-inflammatory effects. In this study, we evaluated the hepatoprotective effect of black shallot versus fresh shallot on alcohol induced hepatic damage model. The pathological model was established via oral administration of ethanol (30 mL of 28.5% ethanol/kg B.W. for 30 days) and liver injury severity was assessed via the changes of liver weight, lipid profile (triglyceride, total-, LDL, HDL-Cholesterol), biochemical testing (ALT, AST, LDH) as well as histological analysis. The results showed that treatment regimen with black shallot (200 mg/kg B.W.) prevented the changes in body weight and liver weight, lipid profile, and biochemical parameters. Furthermore, HE staining indicated that black shallot reduced liver injury and infiltration of mononuclear cells and kept normal portal space structure. This study proves that black shallot possesses the stronger hepatoprotective effect as compared to fresh shallot and provides scientific evidences to utilize black shallot as the new functional food to support the treatment of hepatic disease.

Keywords. Aging process, alcohol induced liver injury, bioactivity, black shallot, functional food, hepatoprotective effect.

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MO@TIO$_2$ MICROSPHERES PREPARED BY SPRAY PYROLYSIS FOR ENHANCED PHOTOCATALYTIC PERFORMANCE TOWARD TETRACYCLINE ANTIBIOTICS

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Abstract. In this work, Mo-modified TiO_2 microspheres (Mo@TiO_2) were rapidly prepared by the spray pyrolysis method. The titania sol solution containing molybdenum salt and citric acid was nebulized to generate fine droplets, which were continuously transported into a quartz reactor heated at 600 ^oC by an N_2 gas flow. Characterization results revealed that the prepared Mo@TiO_2 exhibited enhanced porosity and light adsorption ability. In addition, incorporating Mo species into the anatase TiO_2 lattice narrowed the bandgap energy and created oxygen deficiencies, which are beneficial for the photo-reduction performance. The adsorption-photodegradation of tetracycline was conducted systematically by considering the effects of Mo loads, catalyst dosage, contaminant concentration, and pH media. The results indicated that the optimal Mo@TiO_2 microspheres containing 3 wt% Mo showed the highest removal efficiency of *ca.* ~81% toward tetracycline antibiotics under UV-light irradiation, surpassing the commercial TiO_2 (P25) and other previous catalysts.

Keywords. Sol-gel, spray pyrolysis, Mo@TiO_2, photocatalyst, tetracycline, UV-light.

ICATSD2A.303

PRODUCTION AND ORIENTATION USING SMART UREA FERTILIZER IN WET-RICE CULTIVATION IN VIETNAM

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Abstract. Fertilizers have played an important role in improving the productivity and quality of food sources, but they have also caused many negative impacts on the environment, health, and raw materials. The development and use of smart fertilizers (SFs) were considered a reasonable solution to sustainable and modern agricultural production. SFs did not only help reduce production costs, and save raw materials and natural resources, but also improved the productivity and quality of agricultural products, reduced emissions, and avoided environmental pollution. This project was performed to create and produce smart urea fertilizer (SUF), and to conduct orientational design and formulation using products in wet-rice agriculture in Vietnam. The results of the project indicated that SUF was produced by the particle coating technology with a mixed polymer which was synthesized from phosphate modified starch, polyvinyl alcohol, and polyacrylic acid was biodegradable, durability, permeable, and had chemical and physical properties suitable for use as coating material. The product parameters were also determined by image analysis method, optical microscopy, scanning electron microscope (SEM), and compared with other urea products. The mechanism and mathematical model of the urea release process of SUF were determined to calculate and evaluate the suitability of the product to the needs of wet-rice, thereby orienting the design and use of these products in wet-rice cultivation in the Mekong Delta.

Keywords. Biodegradable polymer, coating technology, smart urea fertilizer, urea release, wet-rice.

ICATSD2A.304

EVALUATION OF THE CHANGES IN ASCORBIC ACID, TOTAL POLYPHENOLS, AND ANTIOXIDANT ACTIVITIES OF PASTEURIZED PUMMELO JUICE USING OHMIC HEATING

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Abstract. Ohmic heating is an advanced heating method that generates heat directly, uniformly and quickly throughout the food mass. This study investigated the effect of Ohmic Heating on some bioactive components in pummelo juice, namely ascorbic acid, total polyphenols, and antioxidant activity. Pummelo juice was heated from 20 to 80˚C and kept stable for 10 seconds with alternating current frequency at 10, 30, 50, 60, 100, 300, 500, 1000, 10000, 20000 Hz and electric field strength at 10, 20, 30, 40 V/cm. The rate of heating increased gradually with decreasing frequency or increasing the strength of the applied electric field. Degradation of ascorbic acid, total polyphenols, and antioxidant activity changed with the change of frequency and electric field strength. Research results showed that at the frequency of 60 or 1000 Hz and electric field strength of 30 V/cm, Ohmic heated samples retained the most bioactive compounds, the Ohmic heating rate is approximately 4 times as high as that of conventional heating. The decomposition of ascorbic acid, total polyphenols, and antioxidant activities treated with Ohmic heating was slower than that of conventional heating ($p < 0.05$). These results suggested that Ohmic heating can be effectively applied for the pasteurization of pummelo juice.

Keywords. Ohmic heating, pummelo juice, ascorbic acid, total polyphenols, and antioxidant activities.

ICATSD2A.305

THE EFFECT OF BIOCHAR ON PHOSPHATE ADSORPTION CAPACITY OF A HAPLIC ACRISOL IN TAY NINH PROVINCE: BIOCHAR FROM QUAIL DUNG

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Abstract. Phosphorus is one of the essential macronutrients for plants. Many studies suggested that the addition of biochar derived from livestock waste is one of the effective methods to maintain phosphorus in the soil. In the study, 3 forms of biochars derived from quail dung were prepared at temperatures of 300, 450 and 600ºC and used to improve Happlic Acrisols in Tay Ninh province. The purpose of the study was to evaluate the available phosphorus adsorption capacity after amendment soil with biochar forms. The study was carried out when soil (control sample) and soil supplemented with 4% biochar were mixed with phosphate solution at different concentrations and sampling times. The results showed that when the biochar pyrolysis temperature increased, the pH and pHpzc increased, while the recovery efficiency, TOC, and CEC decreased. The results showed that the adsorption data in the study were consistent with Langmuir and Freundlich isotherm models, specifically, the maximum phosphorus adsorption capacity on the soil without biochar (control sample) and soil with 4% added of biochar at pyrolysis 300, 450, 600°C is 1.19, 1.73; 0.68 and 1.12 mg/g respectively. The pseudo-second-order kinetic model were suitable to explain the P adsorption mechanism. The results show that we can apply the addition of biochar prepared at 300ºC derived from quail dung to improve phosphorus adsorption capacity of Happlic Acrisols in Tay Ninh province is based.

Keywords. gray soil, available P adsorption, quail dung, biochar.

ICATSD2A.306

A POTENTIAL SOLUTION IN SUSTAINABLE AGRICULTURE: STUDYING THE EFFECTS OF BIOCHAR AND BENTONITE APPLICATION ON PH AND PH BUFFERING CAPACITY OF AN ACRISOLS SOIL IN CUCHI, HCM CITY

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Abstract. The acidification of agricultural soils should be avoided and low-pH soil should be corrected for better productivity. Soil improvement by applying biochar from agricultural by-products and by bentonite, a rich source in Vietnam, is a trend of green agriculture in Vietnam. The current study is important in assessing the potential influences of biochar and bentonite on the pH and buffering capacity of low-pH soil collected in Cu Chi, Ho Chi Minh City. Experimental methods including biochar preparation (pyrolysis at 300ºC, retention time 2 h), soil incubation (time: 30 days, at the temperature: 27 °C), and determination of pH, and pHBC were performed. Research results have shown that biochar and bentonite have contributed to improving pH, and improving the pH buffering capacity of gray soil samples. Using 1% bentonite and 1% biochar raised the pH (to 6.21) and improved the pH buffering capacity of Cu Chi gray soil (to 24,1 $mmolH^+/OH^-$ kg^{-1}). This dose is suitable in agricultural productions at present in VietNam. The study confirmed the applicability of biochar derived from cow manure prepared at low pyrolysis temperature in combination with bentonite to improve soil parameters such as pH, and the pH buffering capacity of Cu Chi gray soil is based.

Keyword. Gray soil, pH buffer capacity, soil pH, biochar, bentonite.

ICATSD2A.307

GREEN SYNTHESIS OF AG NANOPARTICLES USING DRAGON FRUIT EXTRACT FOR THE ANTIBACTERIAL AND ANTI-OXIDATION

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Abstract. In 2020, the whole world experienced the SARS-CoV-2 pandemic showing a rapid increase of viruses that are potentially life-threatening to the entire humanity on earth. Shows the urgency in researching and manufacturing natural extracts products with antibacterial properties which are highly effective but do not cause irritation to users. The successful synthesis of silver nano from the dragon fruit peel extract can both synthesize a clean and safe nanoparticle and solve the problem of organic waste in the processing industry. The nanoparticles have been morphologically and structurally characterized by modern physicochemical methods: FT-IR, DLS, XRD, and TEM. The characteristics of Silver nanoparticles are shown on XRD spectrum with angles 2θ = 38.24, 44.28, 64.48, 77.38. The average nanoparticle size through TEM and DLS images are in the range of 20-30 nM. Furthermore, Silver nanoparticles have been evaluated for their antibacterial factor and antioxidant properties. In testing process shows that they have outstanding anti-oxidation and antibacterial abilities. It is promising for potential anti-oxidation and antibacterial applications.

Keywords. Dragon fruit, Antibacterial, Anti-oxidation, Silver Nanoparticles.

ICATSD2A.308

NOVEL OPTOSENSING STRATEGIES FOR TRACE BIOCHEMICAL MOLECULES USING FUNCTIONALIZED NANOMATERIALS

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Abstract. Developing ultrasensitive, low-cost, and easy-to-use optosensing strategies for trace amounts of biochemical compounds and the early detection of cancer biomarkers is an attractive trend and should be seen as a rewarding challenge. Although several analytical methods have been used for these purposes, most of them are expensive, less sensitive, time consuming, and complex to handle for on-site detection. Utilizing paper as a substrate to develop bio/chemical sensors is attractive because the resources required to produce them are minimal and the materials are ubiquitous and inexpensive. We have developed highly sensitive and selective sensors based on novel nanohybrids, novel multiple emitting amphiphilic conjugated polythiophene-coated quantum dots for pictogram determination of 2,4,6-trinitrophenol explosive and fluorescence molecularly imprinting conjugated polythiophene for cancer biomarkers with LODs of 15 fg/mL for α-fetoprotein (AFP) and 3.5 fg/mL for carcinoembryonic antigen (CEA). More importantly, we successfully proposed the feasibility of integrating printed paper with a low-cost and sensitive smartphone and prototype electronic device readout that could be applied as rapid point-of-care cancer detection. Modern inkjet printers support the creation of precise and contactless deposition of microscopic sized droplets of the chemical sensor onto paper. I will also present several versions of fluorescence "Turn on–off" sensors based on nanohybrid materials coated with amphiphilic polythiophenes for the quantitative analysis of environmental and biological samples. We believe that our optosensing approaches represents a significant step forward in the advancement of cost-effective, portable, point-of-care diagnostics.

Keywords. Nanomaterials, Optical sensing, Cancer biomarker, Smartphone-based colorimetry Point-of-care diagnosis**.**

ICATSD2A.309

EMISSIONS OF C-BASED GREENHOUSE GASES FROM PADDY SOILS AS INFLUENCED BY BIOCHAR ADDITION

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Abstract. Emissions of greenhouse gases including CH_4 and CO_2 from paddy soils can be determined by biochar addition and soil properties. The current study aimed to assess the effects of biochar on emissions of CH_4 and CO_2 from paddy soils and to quantify soil C sources contributing to the emitting CH_4-C. Two soils with high organic carbon (OC = 3.05%) and low OC (OC = 0.54%) were taken from two paddy fields, mixed with biochar at 0, 2, and 4%, submerged, and incubated in closed plastic jars for 53 days. On days 1, 4, 8, 13, 19, 26, 34, 43, and 53, gas from the jar's headspace was collected for the determination of CH_4 and CO_2, as well as delta ^{13}C of CH_4. Standing water in each jar was measured for pH and EC on the same day of gas sampling. The results revealed that biochar addition reduced CH_4 emissions by 13% and 74% while increasing CO_2 emissions by 36% and 86% in high-OC and low-OC soil, respectively. The reduced magnitude of CH_4 emissions was much greater than the increased magnitude of CO_2 emissions, suggesting that biochar has a great carbon-negative effect in paddy soils. The two gasses were inversely correlated, which could be because the two gases have the same carbon sources. Carbon from CH_4-C was mainly derived from soil organic C and a minor from biochar-derived C. The inverse correlation between CH_4 emissions and EC and pH indicated that CH_4 emissions could be involved in microbial processes. A positive correlation between CO_2 emissions and pH and EC in the low-OC soil or no connection in the high-OC soil suggested that CO_2 emissions could be involved in abiotic mechanisms. In summary, biochar addition can suppress CH_4 emissions while enhancing CO_2 emissions via biotic and abiotic mechanisms, respectively.

Keywords. biochar, greenhouse gas emissions, paddy soils, soil properties, soil organic carbon.

ICATSD2A.310

GREEN ZINC OXIDE NANOPARTICLES BASED ON PLANT LEAVES EXTRACT FOR CATALYTIC DEGRADATION OF ORGANIC DYES

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Abtract. In this study, we apply the green synthesis method of ZnO nanoparticles using *Blumea Lanceolaria* and *Syzygium Nervosum* leaves extract as an excellent photochemical catalyst for the decomposition of organic pollutants in water. The synthesized nanoparticles were tested by using various analytical techniques such as Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), energy-dispersive X-ray spectroscopy (EDX) and scanning electron microscopy (SEM) analysis. The bio-synthesized ZnO nanoparticles are single crystalline phase with a size range of 10 - 50 nm. Degradation of methyl blue (MB) and methyl red (MR) by the green ZnO nanoparticles as photocatalytic catalyst reached 74%.

Keywords. Green synthesis, ZnO nanoparticles, photochemical catalyst, methylene blue, methyl red.

ICATSD2A.311

SYNTHESIS OF HIERARCHICAL BINARY CORE-SHELL NANOCOMPOSITE CARBON MICROSPHERES@A-FE_2O_3 FOR ENHANCING ELECTROCHEMICAL BEHAVIOR

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Abstract. We report a facial strategy to synthesis of hierarchical binary core-shell Carbon microspheres@α-Fe_2O_3 (CMS@α-Fe_2O_3) nanocomposite. The structural and morphology properties of the products were characterized by X-ray diffraction (XRD), Scanning electron microscopy (SEM), Transmission electron microscope (TEM) and High-resolution TEM (HRTEM), Fourier transform infrared spectroscopy (FT-IR), Energy-dispersive X-ray spectroscopy (EDX) and nitrogen adsorption/desorption isotherms (BET). The XRD diffration of CMS@α-Fe_2O_3 indicates the highly crystalline of α-Fe_2O_3 in hierarchical binary core-shell CMS@α-Fe_2O_3 nanocomposite. Morphological characterizations show that the α-Fe_2O_3 shell layer grew on the surface of the carbon microspheres (CMS) to form the nanoscale heterointerfaces in the core-shell structure, demonstrating the efficacy of synthesized route. More importantly, CMS@α-Fe_2O_3 exhibited the higher electrochemical behavior compared to CMS. The enhanced electrochemical performance of CMS@α-Fe_2O_3 may be ascribed to the high surface area of its which facilitate the rapid transfer of electron into electrode during redox process.

Keywords. Binary core-shell nanocomposite, carbon microspheres@α-Fe_2O_3, electrochemical behavior.

ICATSD2A.312

STUDY TO EVALUATE THE EFFECTS OF CLIMATE CHANGE ON THE AMOUNT OF PERMEABILITY FOR GROUNDWATER RECHARGE IN LA NGA RIVER BASIN, LAM DONG PROVINCE

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Abstract. Climate change has been happening globally. In recent years, there have been many published studies on climate change adaptation solutions to water resources, but few in-depth studies on the effects of climate change on water resources at the La Nga river basin, especially on groundwater resources. Meanwhile, in the high-terrain areas of the La Nga river basin, where the water supply systems have not yet reached, people have exploited underground water sources for daily life, aquaculture, and production, especially for agricultural irrigation. Therefore, in our research, we focused on the variation in rainfall over periods such as: from 2016 to 2035; 2046 - 2065, and 2080 - 2099 to forecast the amount of rainwater replenishment for groundwater in this area objectively. The selected research method was the SCS method and the HEC - GeoHMS model was run on ArcGis software, combined with the climate change and sea level rise scenarios of the Ministry of Natural Resources and Environment (2016, MONRE). According to the forecast of the RCP 4.5, there will have an increase in rainfall (from 3061.6mm in 2013 to 3747.9mm in the period of the years 2080 – 2099) and in groundwater recharge (from 2324.4mm in 2013 to 2723.5mm in the period of the years 2080 – 2099) but at the same time, the permeability rate decreases. In 2013, the permeability rate is 75.4% and the forecast of that in 3 periods 2016 - 2035; 2046 - 2065; 2080 - 2099 is 73.7; 73.8; 72.7 (%), respectively with the reduction in permeability rate compared to 2013: 1.7; 1.6; 2.7 (%).

Keywords. Climate change, groundwater, permeability, SCS method, La Nga river basin.

ICATSD2A.313

RESEARCHING TO ASSESS THE LEVEL OF WATER SCARCITY IN RIVER BASINS IN LAM DONG PROVINCE IN THE CONTEXT OF CLIMATE CHANGE

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Abstract. Scarcity of water resources is one of the problems of worldwide concern, with Viet Nam currently being classified as a country without water. The province of Lam Dong alone, influenced by climate change, has caused a prolonged drought which has caused a severe decrease in water supply in the springs and rivers and so on. Exacerbated regional water shortages, resulting in many areas lacking water for use.Based on the local socio-economic development planning, the current situation of water use demand of different subjects, as well as the future trend of increasing water use demand in Vietnam, and based on a result of the investigation of the water availability of the river basins here, this study used the Smakhtin method in calculating and classifying the water stress index (WSI), to assess the scarcity of resources surface water resources of Lam Dong province according to socio-economic development planning scenarios in the context of climate change. The study shows that total water demand for all sectors by 2030 will increase by about 11%. Water shortages occur frequently in the dry season of the province in January, February, March, April and December, at the same time, Don Duong and Cat Tien are two districts that will experience moderate water pressure in the period of 2020 and 2030 under the impact of climate change and the uneven distribution of water resources in the region.

Keywords. Water Resources, Surface Water Resources, Water Stress Index, WSI, Lam Dong.

ICATSD2A.314

GREEN CONSUMER BEHAVIOR AND PURCHASE OF GREEN PRODUCTS AND SERVICES: A REVIEW ON IMPACTS OF GREEN EDUCATION, GREEN MARKETING, AND GREEN PRODUCERS

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Abstract. Green consumer behaviors (GCB) are expected to reduce environmental impacts while satisfying needs. Purchasing green products and services (PGPS) is a significant concern in green consumer behaviors. This paper aims to extend the discourse on GCB by exploring four critical issues, including the evolution of GCB thought and its relationships to the existing patterns of PGPS; the significant and insignificant factors directly impacting the PGPS; the potential of green education and marketing interventions that encourage the PGPS; and the role of green producers to PGPS regarding the green product's availability. An integrative review was applied for years between 2012 and 2022. Our findings highlight the importance of interventions of green education, green marketing, and green producers in driving PGPS in any context. This paper is conceptual and exploratory in nature, but the findings have implications for policymakers and practitioners concerning: (1) making clear laws and policies that are implementable and uncontroversial, (2) providing detailed information (and education) about green products and services and the implications of consuming (or failing to consume) such products or services to the environment, (3) the truth value of the green products/services claims and the responsibility of producers and retailers to increase the availability and trust of eco-labeled products and services while increasing consumers' knowledge and attitude toward eco-labeled products and services. Future research could focus on the highlighted gaps.

Keywords. Green consumer behavior (GCB), purchasing green products/services (PGPS), green/ eco-labeled products, green education, green marketing, green producer.

ICATSD2A.315

WATER BALANCE CALCULATION USING MIKE BASIN MODEL FOR DA NHIM RIVER BASIN, LAM DONG PROVINCE

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Abstract. Da Nhim river basin has a basin area of 2,161 km^2, the main stream is Da Nhim river, the river originates from the north of Gia Rich mountain (1,923m), Lac Duong district, Lam Dong province, near the border with the two provinces of Khanh Hoa and Ninh Thuan. The article introduces the results of applying the MIKE BASIN model to calculate the water balance for the Da Nhim river basin according to the current status of water use of different objects and according to the socio-economic development plan up to 2030 on research area. This study provides a number of scientific bases for the planning and exploitation of water resources in a rational way between supply and demand. The results show that, in the dry season (December, January, February, March) in the Da Nhim river basin, there is often a water shortage, the amount of water shortage is approximately 28.22 million m^3 at the time of 2019 and is estimated to be about 49.68 million m^3 by 2030.

Keywords. Da Nhim river basin, MIKE BASIN, water balance, LamDong.

ICATSD2A.316

ANTIOXIDATION PROPERTIES OF ENZYMATIC HYDROLYSATE PEPTIDES FROM TUNA DARK MUSCLE PROTEIN ISOLATE

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Abstract. Peptide is one of the biological active substances, one of which is its antioxidant properties. It is considered as a safe additive in antioxidant preservation in foods. However, this property only depends on the source as well as the size of the peptide fragment. This study aimed to generate and separate several peptide fractions by enzymatic hydrolysis of proteins to study their antioxidant properties. Protein isolate is extracted from the by-product of tuna dark muscle was enzymatic hydrolysated using Alcalase at (pH 8, 55 °C and ratio enzyme to substrate 1 wt %) for 1-9 hours. The cut-off segmentation technique was performed to obtain groups of peptide segments (> 10 kDa, 3-10 kDa and < 3 kDa) using filter under centrifugation at 13000g for 30 min. Weight percentage of group 3 - 10 kDa was the largest (32-42 wt%) whereas group of above 10 kDa was the lowest (47- 24 wt%) depending on the hydrolysis time. The DPPH free radical scavenging activity, the total reducing capacity and the antioxidizing activity according to the Fenton reaction of the hydrolyzate in ascending, respectative, and they decreased sharply at hydrolysis time in less than four hours, after which they did not change significantly with prolonged hydrolysis time. The peptide fraction with molecular weight above 10 kDa had the highest DPPH free radical scavenging activity (1.3-2.1 mM DPPH), presenting reduced capacity (47-95 mg/L equivalent vitamin C) and antioxidant activity according to the Fenton reaction (42-70%). The control (peptide mixture, unfractionated) and the 3-10 kDa fraction group had antioxidant activity equivalent to and higher than that of a peptide below the level of 3 kDa, except in a few cases factionated from hydrolysates 6 and 9 hours, peptide solution below 3 kDa has higher activity ($p < 0,05$).

Keywords. antioxidation, alcalase, DPPH, hydrolysate, Fenton reaction, total reducing capacity.

ICATSD2A.317

CONTINUOUS SPRAY DRYING SYNTHESIS OF MESOPOROUS BOEHMITE/MELAMINE COMPOSITE SPHERE TO ENHANCE CO_2/N_2 SEPARATION PERFORMANCE

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Abstract. A novel mesoporous boehmite/melamine (Boeh/Me) spherical composite was successfully prepared by a spray drying system from a mixture of boehmite sol and melamine. The presence of melamine species in the obtained Boeh/Me composite spheres was confirmed by EDX-SEM, FTIR, and TGA analysis. This led to a gradual decrease in porosity over the resulting composite materials in comparison with the raw boehmite counterpart as increasing the fed melamine dose. As expected, at 25 °C and 1 bar, the modified sample with 5% mole of melamine (Boeh/Me#2.5) showed the highest CO2 adsorption capacity (19.2 $cm^3 g^{-1}$), which was higher than that of the original boehmite sample around 46.1%. This is attributed to formation of adsorptive affinity between N-derived functional groups (-NH_2 and -CN) inside the melamine structure and the adsorbate. Consequently, the CO_2/N_2 separation factor on the Boeh/Me#5.0 achieved 113.3, approximately 3-fold higher than that on the boehmite sample (38.2). The results suggest that continuous spray drying is a potential approach for synthesis of the mesoporous Boeh/Me composite spheres for scale-up production.

Keywords. Spray drying, Mesoporous boehmite/melamine composite sphere, CO2 separation, separation factor

ICATSD2A.318

STUDY ON THE INFLUENCE OF ENZYME DEGUMMING METHOD ON SELF-DYED SILK

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Abstract. Silk is a natural fiber of protein released by silkworms, each single filament is made up of two long continuous fibroin (brins) fibers accounting for 66%− 88% of the silk mass, surrounded by sericin for 11%− 32%. To increase softness, shine, and elasticity of silk yarns, the sericin was partially or completely removed through the degumming process by various substances such as soap, Na_2CO_3, acids, enzymes, supercritical CO_2, etc... In this study, self-dyed silk yarns were degummed using enzyme to investigate the effectiveness of degumming parameter process to weight loss and color intensity. Self-dyed silk or colored-silk is the result of a new green-dyeing method, and non-wastewater. This dyeing method based on feeding silkworms with mulberry leaves supplemented the Rhodamine B dyestuff, then the silkworms spinned their color-cocoons. X-rite color i5 colorimeter, Scanning Electron Microscope (SEM), Fourier transform infrared spectroscopy (FT-IR) were respectively used to evaluate the color intensity, the treatment efficiency, and the structural characterization of treated self-dyed silk. The results showed the higher of enzyme concentrations and treatment time, the higher weight loss ratio and the lower of color intensity. In addition, degumming self-dyed silk with enzyme retained the color on silk better than it with Marseille soap. The results were also for reference to selecting the appropriate treatment process for this new material.

Keywords. Self-dyed silk, degumming, enzymes.

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EFFECTS OF BIOCHAR ON METHANE EMISSIONS AND RICE GROWTH FROM PADDY SOILS

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Abstract. Biochar has the potential to be can be an optimal solution for sustainable rice production by lowering greenhouse gas (methane) emissions and boosting rice growth. However, the effects of biochar may vary, depending on the organic carbon concentration in paddy soils. The current study aimed to examine the effects of biochar on CH_4 emissions and the growth of paddy rice. Two soils with varying levels of organic carbon (OC) were taken, mixed with biochar at 0, 1,5, 3, 6, and 12%, and planted with rice in a greenhouse for two seasons. Methane emissions, relative quantification of methanogenic 16S rRNA gens, methanotrophic pmoA genes, rice biomass, and soil properties were all assessed. The results showed that high biochar rates reduced methane emissions through mechanisms related to the suppressed activities of methanogenic communities while stimulating activities of methanotrophic communities. Biochar also promoted rice growth for some reasons involved in improved soil properties. Nevertheless, rice growth can be inhibited when the C/N ratio, controlled by biochar application rates, exceeded a threshold of 30, which occurred in the low-OC soil applied with 12% biochar. The effects of biochar on CH_4 emissions and rice growth were more profound in the low-OC soil than in the high-OC soil. In brief, plant residue-derived biochar can be a dual-benefit option for lowering greenhouse gas emissions while improving rice growth for sustainable agricultural development.

Keywords. biochar, methane emissions, microbial mechanisms, rice growth, soil properties.

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RECOVERY OF PHOSPHORUS FROM DRIED SEWAGE SLUDGE FOR FERTILIZER FORMULATIONS

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Abstract. Phosphorus (P) is indispensable nutrient in agriculture, essential for nutrition of mankind. To close the P loop, P must be recovered during wastewater treatment in Germany by the end of this decade. Other EU countries will follow with similar regulations. As part of an Interreg NW-Europe project, several pilot-scale processes were tested by industrial and research partners to validate them in industrial settings. At the University of Liège, the PULSE (Phosphorus University of Liège Sludge Extraction) process was developed. It consists of sludge drying, which is essential for good process performance, leaching with hydrochloric acid, reactive extraction to remove unwanted metals such as iron and heavy metals, and fractional precipitation. Since sewage sludge changes properties during storage, the mobile pilot plant was operated at three different locations with fresh sewage sludge from wastewater treatment. To adapt the operating parameters of PULSE to the specifics of the respective sludges, they were optimized with the aid of simulations, based on cascaded option trees. A key point is the thermodynamic description of the aqueous speciation equilibria, of the reactive equilibria during extraction and of those describing precipitation. In particular, the model allows considering different models for the non-ideality of electrolyte solutions up to concentrated systems. The simulation tool can also be used to fit unknown parameters such as the equilibrium constants of reactive extraction. It was shown that the model is able to describe well all equilibria at the different process steps in the system. On the other hand, the optimal operating parameters could be confirmed experimentally. Finally, it was shown that the process can be operated well at pilot scale. The product obtained after precipitation was tested by the project partners and showed good performance as a fertilizer component in pot trials and could be easily incorporated into the granulation of a commercial fertilizer formulation.

Keywords. circular economy, equilibrium modelling, heavy metal, phosphorous recycling, reactive extraction, sewage sludge.

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RESEARCH ON POLYPHENOLS EXTRACTION AND ANTIBACTERIAL CAPACITY FROM *CYPERUS ROTUNDUS* L. ROOTS

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Abstract. The study was conducted to optimize the material drying conditions in the preservation process and to limit the impact on the polyphenol content after the extraction process. The extraction conditions of polyphenols, such as ethanol concentration, solvent ratio and extraction time were also optimized. The extract was then tested for its antibacterial activity using disk diffusion method. As a result, the polyphenol content in the Cyperus rotundus L. roots dried at a temperature of 60^{o}C for 150 minutes was higher than those dried at other temperatures. Raw material to solvent ratio of 1/20 (w/v), ethanol concentration of 50% and the extraction time of 20 minutes were found to be the optimum extraction conditions, in which the highest polyphenol content of 36.91 (mg GAE/g DW) was obtained. The extract was effective against Staphylococcus aureus and Escherichia coli at a minimum concentration of 160 mL/mL and 640 mL/mL, respectively.

Keywords. polyphenol, Cyperus rotundus L., antibacterial, extraction.

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SUSTAINABLE BIOECONOMY OR CO_2-ECONOMY: WHAT DOES THE FUTURE HOLD?

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Abstract. After defossilization, chemical products can be obtained via two main routes. Carbon can be obtained by direct sorption of carbon dioxide from the atmosphere. An alternative is the use of biomass. While capturing carbon dioxide from the atmosphere and activating it for chemical reactions requires large amounts of energy, biomass production uses solar energy but requires large areas of fertile land that compete with food production. Thus, the two pathways differ significantly in their requirements and limitations. Which pathway should the chemical industry invest in?

Applying chemical engineering principles such as balances for energy demand, land area, food production, and atmospheric CO_2 levels provides fundamental insights into detailed consequences. The grand challenges of humanity and planetary boundaries are considered as boundary conditions. For example, it must be recognized that we not only need the renewable-energy transition. In addition, we need to actively remove carbon dioxide from the atmosphere to stop sea-level rise, otherwise, for example, large parts of the Mekong River Delta, one of the global rice baskets with an average elevation of only 0.8 m above current sea level, could be flooded by the South China Sea by the end of the century, according to the IPCC's worst-case scenarios.

As a result of the assessments, it is clear that atmospheric carbon dioxide is not the optimal carbon feedstock, as high energy demand will significantly slow the renewable-energy transition and lead to excessive annual additional costs in OECD countries. Only a bioeconomy is economically feasible. This, in turn, requires a significant shift in dietary habits to stay within planetary boundaries. The assessment also shows that first generation biomass should be used, leading to simple processes and creating synergies with food production.

Keywords. BECCU, bioeconomy, biomass, biomaterials, carbon feedstock, CO_2-economy, DACCU, food security, planetary boundaries, scenarios, sustainability.

ICATSD2A.323

STUDY ON PRACTICAL APPLICATION OF ADVANCED OXIDATION PROCESS (AOP) AND REVERSE OSMOSIS (RO) MEMBRANE FOR TREATMENT OF HIGH-STRENGTH WASTEWATER

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Abstract. Treatment of high-strength wastewater generated from industries is essential due to a variety of recalcitrant compounds normally existing. In this study, a high-strength wastewater treatment plant (WWTP) in Vietnam with a capacity of 200 m3/day was investigated to demonstrate the performance in satisfying the stringent discharge standard (i.e., Vietnam national technical regulation on industrial wastewater, QCVN 40:2011/BTNMT, level A). The treatment comprises of 2 main steps including (i) physico-chemical pretreatment by Fenton-related advanced oxidation process (AOP) accompany with coagulation, and (ii) membrane system by microfiltration (MF) and reverse osmosis (RO). The pre-treatment processes were operated based on optimal conditions which were experimentally determined to ensure the feeding of membrane filtration. For RO membrane system, the plate frame RO (PFRO) and spiral wound RO (SPRO) were used for 2-stages treatment to obtain high-quality permeate, while the high pressure (HP PFRO) module was employed for recovering of concentrated streams. The treatment efficiency was evaluated by the removal of COD, heavy metals, and the water recovery rate. Results showed that during 5 months on-site operation under optimal conditions, significant COD removal efficiency of 26.23%, 19.64%, and 99.62% were found at Fenton, coagulation, and SPRO units, respectively. The heavy metal concentration (i.e., Cu, Fe, Zn, Mn, Cr) measured in the output of WWTP also satisfied the allowable discharge levels. In addition, high recovery rate of permeate can be obtained from different RO modules (i.e., PFRO 56%, HP PFRO 9.11%, especially SPRO > 80-90%) due to the differences of feeding flows. The stability of treatment efficiency and the ability to satisfy the discharge regulation were also presented. Thus, this study can be used as a technical database for operation and management of the WWTP. It also demonstrated the potential of wastewater reuse which may help to overcome the operational cost and achieve the sustainability.

Keywords. High-strength wastewater; Advanced oxidation process; Fenton; RO membrane; Water recovery rate.

ICATSD2A.324

TUNING THE VISIBLE LIGHT-SENSITIVE REDUCED GRAPHENE OXIDE (rGO) BY A FACILE ANNEALING ROUTE

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Abstract. In this study, graphene oxide (GO) materials were synthesized via a productively oxidation modified Hummer's method. Strong oxidant agents $KMnO_4$, $K_2S_2O_8$ were used to oxidize the graphitic plate precursor into graphene oxide. The as-synthesized GO products were reduced by thermal method at various regimes of heat. Interestingly, the light absorptive characteristic edge of the as-synthesized GO product reveals that a significant blue-shifted absorption of the GO material occurs as thermal treatment processes applied. The blue-shifted absorption of the GO material is probable attributed to the reduction of ketone, carboxyl and hydroxyl groups of the GO, which is so-called reduced graphene oxide (rGO). To be clearly evidenced, the modern physical and chemical techniques such as X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and transmission electron microscope (TEM) were applied to characterize the crystalline structure and morphology of the as-synthesized materials. As the results, electron microscopic images reveal the material effectively exfoliated into 1D GO sheets. On the other hand, the crystalline structure of GO and rGO were clearly confirmed by XRD and FTIR. Moreover, the rGO materials were efficiently tuned visible light absorptive edges by thermal method. The visible light-sensitive property of the rGO material is mainly concerned with improving photocatalytic reactive performance.

Keywords. Graphene, graphene oxide, reduced graphene oxide.

ICATSD2A.325

THE RELATIONSHIP BETWEEN SEA SURFACE TEMPERATURE AND SURFACE AIR TEMPERATURE IN THE SOUTH OF VIETNAM AND BUILDING EXCESSIVE HEAT WARNING INDEX

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Abstract. This study investigated the correlation coefficient between the sea surface temperature (SST) and the surface air temperature (SAT) in the South of Vietnam (SVN) to search for regions where their SST had a good relationship with the SAT in SVN. The data of gridded global SST, SST in the Niño regions and in the tropical Indian Ocean region, and SAT data of 42 weather stations in SVN from 1978 to 2018 were used in this study. Based on the regions found, a principal component analysis was performed to identify the components gave a good relationship with SAT in SVN. The analysis results indicated three regions satisfying the research objectives. The results of principal component analysis of SST by grid cells in these regions showed that the first principal component (PC1) of SST in the tropical Indian Ocean region gained the best relationship with SAT in SVN. The result of the exploratory factor analysis revealed that this PC1 was related to SST in an area in the central equatorial Indian Ocean from 55^{o}E to 95^{o}E longitude and from 6^{o}N to 4^{o}S latitude, or PC1 was related to the time oscillations of the SST in this region. By standardizing this component, an index of SST variability in the central equatorial Indian Ocean region was obtained. This indicator can be used to warn SAT in SVN.

Keywords. sea surface temperature, surface air temperature, climate variability, ENSO, principal component analysis.

ICATSD2A.326

ESTABLISHING THE FORMULA FOR FOAM – EMULSION FROM USING LABLAB BEAN AQUAFABA AND XANTHAN GUM AS EGG/MILK REPLACEMENT

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Abstract: Many food scientists now have the current study trend of using aquafaba as an egg/ milk replacement in processing foam products. The objectives of this work were to establish a foam–emulsion cream formula from lablab bean aquafaba combined with aloe vera gel, and xanthan gum to replace eggs/milk in making cold desserts. The aquafaba was obtained by boiling beans with water with the 1:6 (w/w) ratio and then filtering to collect the viscous liquid. After that, it was frozen at -4^{o}C to carry out further investigations. The liquid obtained from cooking beans is called "aquafaba". This solution was treated with pH (acid citric) and table salt (NaCl) to examine properties such as foaming ability, foam stability, and foam hardness. Then, the foam system was continuously combined with sugar, aloe vera gel, canola oil, and xanthan gum to form an emulsion. Properties of emulsion such as emulsifying ability, emulsion stability, and emulsion hardness then were measured. The result was investigated for the formula to be the replacement for eggs/ milk such as the pH of aquafaba was adjusted to 5 using acid citric, adding the following ingredients such as 0.5% of xanthan gum, 20% of sugar, 0.6% of corn starch, 0.5% of aloe vera gel and 4% of canola oil (% of aquafaba volume). This research has shown that the lablab bean aquafaba could replace eggs/milk in making plant-based cold desserts, reducing the livestock industry's burden and global food securityplied to the development of biscuits for consumers who are on a diet or have gluten intolerance syndromes.

Keywords: Aquafaba, Egg replacement, Emulsifiers, Lablab bean, Milk-free whipping.

ICATSD2A.327

APPLICATION OF QSPR-BASED MODELS FOR CALCULATING OF THE STABILITY CONSTANTS OF METAL-THIOSEMICARBAZONE COMPLEXES

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Abstract. A series of new twenty-two metal-thiosemicarbazone complexes (ML_2) were developed on the basis of the quantitative structure-property relationship (QSPR) models. The study used the semi-empirical quantum with new version PM7 and PM7/sparkle for optimizing the structure of complexes and calculating quantum molecular descriptors; meanwhile, the molecular descriptors (0-3D) were calculated on the QSARIS tool. The QSPR models were built on a data set including 74 values of the stability constants ($\log\beta_{12}$) by using the multivariate linear regression (MLR) and artificial neural network (ANN) methods. The quality of the built QSPR models was fully evaluated by the statistical values of the OECD principles and the criteria of Tropsha. The built QSPR models consisted of the three variables and the best $QSPR_{MLR6}$ models received the results as R^2_{train} = 0.985; $Q^2_{CV\text{-}LOO}$ = 0.981; RMSE = 0.503. Besides, the $QSPR_{ANN}$ I(3)-HL(6)-O(1) model was generated from the descriptors of $QSPR_{MLR3}$ models and got good results as R^2_{train} = 0.998; Q^2_{test} = 0.997; $Q^2_{validation}$ = 0.998. The results from the models can be used to find out the new derivatives for applications in the fields of analytical chemistry, environment, and medicine.

Keywords. Artificial neural network, multivariate linear regression, QSPR, stability constants $\log\beta_{12}$, thiosemicarbazone.

ICATSD2A.328

RESEARCHES AND DEVELOPMENTS OF CELL-PLASTICS MADE OF GREEN ALGAE

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Abstract. Currently, construction of sustainable carbon-recycling society is strongly required. Although plastics are important materials to maintain societies, petroleum-based plastics emit CO_2 gas in one direction from underground into atmosphere. Additionally, the plastic waste is inadequately treated, resulting in a substantial number of plastics being released into the environment as micro- and nano-plastics. Bioplastics such as polybutylene succinate are being researched and developed as alternatives plastics; however, they could not replace petroleum-based plastics yet due to their complex production processes and high cost. Then, cell-plastics made of unicellular green algae are been researched and developed as alternative bioplastics. Herein, we will explain the recent progresses regarding to cell-plastics.

Keywords. SDGs, Green algae, Plastics

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DEVELOPMENT OF PROTEIN DISPLAYING SYSTEM WITH CARBON MATERIAL

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Abstract. Carbon materials have eminent properties such as easy fabrication and efficient chemical modification. This research purpose is to develop and construct new biological system with techniques to modify the properties of carbon materials relating to pore sizes, carbon material size and chemical group. Especially, the modification of the chemical groups on the surface is efficient to make up the system. Herein, with the techniques, we tried to set up a specific protein-displaying system on the carbon material surface. In this presentation, we will explain the results and reasons for discussion regarding to specific protein-displaying system on carbon materials.

Keywords. Protein, carbon-material, chemical bond

ICATSD2A.330

EVALUATION OF BIOLOGICAL DIVERSITIES IN A SINGLE STRAIN *SACCHAROMYCES CEREVISIAE* REGARDING TO CARBON-ASSIMILATING ACTIVITY

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Abstract. Microbial isolation is required to perform pure cultivation. Although the isolated microbes popularly show well-repeatability for biological properties such as growth and material productivity, those display the scattered biological properties after heavy repeated cultivation. Herein, our research tried to evaluate its scattered properties in limited media with budding yeast *Saccharomyces cerevisiae* BY4741 as a laboratory strain. The strains with high specific growth rate were isolated in the limited media changed carbon source from saccharide to sugar alcohol. Additionally, the biological properties of isolates were compared to those of BY4741 wildtype. Then, we will refer to the diversity after repeated cultivation and report the evaluation about the biological scattered properties.

Keywords. Saccharomyces cerevisiae, carbon source, transcriptomics

ICATSD2A.331

WEARABLE ENZYMATIC URIC ACID BIOSENSOR FOR APPLICATION TO MONITORING OF SKIN CONDITION

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Abstract. Chronic wounds increase the burden of medical costs due to dressing changes for patients and affect the quality of life. From the perspective of convenience and low cost, wearable sensors are being developed for would care. Considering the increased burden of medical costs on patients and the impact on lifestyle convenience, wearable sensors should be highly functional and inexpensive. In this study, we fabricated and tested enzymatic uric acid biosensor on a thin polyethylene terephthalate (PET) sheet. Uric acid is well-known a major biomarker of wounds. A silver reference electrode and a carbon working electrode were formed on the PET material of an adhesive bandage. An enzyme of 1 mg (3.40 U) of uric acid oxidase was immobilized on the working electrode. The carbon electrode is reduced by the catalytic reaction of hydrogen peroxide products from the oxidation of uric acid using chronoamperometric detection at low potentials. The response and selectivity of the biosensor for uric acid measurement and the results of continuous measurement will present. By applying the sensor to continuously measure the condition of the wound site, this research is expected to reduce medical costs due to reduce frequent dressing changes and alleviate patient stress.

Keywords. wound sensor, wearable, glucose, glucose oxidase, uric acid, uricase.

ICATSD2A.332

NOVEL TECHNOLOGIES FOR SUSTAINABLE ENGINEERING CHANGING AND PRODUCING MATERIAL RESOURCES

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Abstract. People in the world are experiencing big change in social systems owing to sustainability considerations, which brought the paradigm shift in the development and utilization of energy systems from petroleum to electricity for the reduce of carbon dioxide emission. There have been proposed various technologies for sustainable energy, but there has been no practical technologies for sustainable materials substitutable of polymers synthesized from petroleum.
Lignin is one of the natural resources contained in coniferous trees up to 30% in weight, but it has not been utilized as a useful material up to now in contrast to the wide application of celluloses. Lignin is constructed by the complex crosslinking of polyphenol moieties, whose aromatic structures have potentials abilities as the materials for thermostable and high strength petroleum alternative materials with high added values. Recently we have developing various techniques for producing polymeric resins with thermal and mechanical stability as those of super engineering plastics from the lignin.
Insulating materials are one of the key technologies for the production of next-generation electric devices because they will be driven at higher voltages and their complex shapes cannot be coated using current techniques. Therefore, the development of insulating materials with thermostability and facile electrodeposition ability is crucial for the production of high-performance next-generation electric devices. Combination of polyimide/lignin/inorganic fillers gave excellent insulating ability whose lifetime is about 10^4 times longer than that of conventional materials.
Thermo- or photo- responsible materials are applicable as micro-actuators with low energy consumption, which can be synthesized from biodegradable materials.
Those materials are applied to various technologies to reduce environmental load as sustainable engineering.

Keywords. Lugnin, Super engineering plastics, electrodeposition, stimuli responsive material

ICATSD2A.333

SYNTHESIS AND ADSORPTION PROPERTIES OF NITROSO COMPOUNDS ON TITANIUM OXIDE

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Abstract. Titanium dioxide has been used as catalyst support, and it is also being developed as a non-platinum catalyst supported on carbon. Titanium dioxide has been reported to exhibit high durability and catalytic activity in polymer electrolyte fuel cells. However, methods to characterize the adsorption of molecular oxygen on these fuel cell catalysts have not been fully established, limiting further development of the catalysts. In order to understand the adsorption of oxygen molecules on oxide-based electrocatalysts, we thus envisioned the utilization of organic molecules as probe molecules that adsorb on titanium dioxide This study conducted synthesis and adsorption experiments of aromatic nitroso and acyl nitroso compounds on Rutile TiO_2. Adsorption experiments of the synthesized probe candidate molecules on Rutile TiO_2 in various solvents were performed, and the time dependence of the amount of adsorption on Rutile TiO_2 was systematically analyzed. It was found that only the 3,4-$(OMe)_2$ nitrosobenzene adsorbed in *o*-dichlorobenzene and chlorobenzene solvents among the examined molecules and solvents. The adsorption amounts significantly depended on the solvent used in the experiments. In addition, FT-IR measurements after adsorption experiments revealed the presence of ***N–O*** bond adsorbed on TiO_2. The adsorption experiments using the organic probe molecules derived in this study are expected to be utilized for understanding the oxygen adsorption properties of metal oxides, including titanium dioxide and other electrocatalysts utilizing oxides.

This research is supported by New Energy and Industrial Technology Development Organization (NEDO).

Keywords. adsorption, FT-IR, nitroso compounds, rutile TiO_2, titanium dioxide.

ICATSD2A.334

ADSORPTION OF AROMATIC CARBOXYLIC ACIDS AND PHENOLIC COMPOUNDS ON TITANIUM OXIDE

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Abstract. TiO_2 has been widely used as a promising photocatalyst, and further development of its catalytic function has been developed by surface modification with organic molecules. The purpose of the present study is to determine the adsorption amount of various aromatic carboxylic acids and phenolic compounds on TiO_2 and reveal the adsorption structures. Adsorption experiments of aromatic carboxylic and phenolic compounds having various substituents on TiO_2 were carried out in aqueous and DMF solutions at room temperature. The adsorption amounts on TiO_2 were determined by UV-Vis measurement of the solution phase, and the adsorption structures were analyzed by FT-IR spectroscopy. In DMF solutions, the adsorption amounts on TiO_2 were found to depend on the functional groups on the aromatic compounds while the presence of bulky substituted groups reduced the adsorption amounts. In aqueous solutions, the aromatic compounds having more carboxylic and/or hydroxylic groups showed higher adsorption amounts. The FT-IR analysis revealed that the adsorption structures in aqueous and DMF solutions were similar, suggesting adsorption via carboxylic and/or phenolic substituted groups. In conclusion, the adsorption amounts of various aromatic compounds on TiO_2 were determined and it was suggested that the adsorption on TiO_2 proceeded via carboxylic and/or phenolic substituted groups whereas bulky substituted groups reduced the adsorption amounts. This research is supported by New Energy and Industrial Technology Development Organization (NEDO).

Keywords. Adsorption, aromatic compounds, TiO_2.

ICATSD2A.335

PREPARATION OF ISOCYANIDE MONOLAYERS WITH BASIC FUNCTIONAL GROUP ON GOLD SURFACE AIMING FOR CATALYTIC APPLICATION

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Abstract. Basic organic compounds behave as catalysts in many carbon-carbon bond formation reactions, which are key reactions for synthesis of useful medicines and their intermediates. In the present study, monolayers of an isocyanide molecule with basic functional group was prepared on gold surface for the purpose of immobilization of a basic molecular catalyst. The monolayers were prepared by utilizing the formation phenomenon of self-assembled monolayers (SAM). The prepared structures were analyzed by X-ray photoelectron spectroscopy (XPS). In particular, preparation method to obtain a high-density monolayer of aromatic isocyanide molecule with dimethylamino group was investigated. When the preparation of a monolayer of the 4-Isocyano-*N, N*-dimethylaniline was conducted by immersion of a gold surface in 0.50 mM ethanol solution at 25°C for 15 hours, a molecular density of 1.6 molecules/nm^2 was obtained. In contrast, when the monolayer was prepared by immersion at a concentration of 5.0 mM at 60°C for 90 hours, formation of a monolayer with higher molecular density of 2.6 molecules/nm^2 was confirmed. These results suggest that formation of high-density monolayer of aromatic isocyanide molecule with dimethylamino group requires preparation conditions with high concentration and temperature, which if probably necessary for intermolecular interactions and ordered molecular orientation. It is expected that the monolayers prepared based on the present study will be applied to many catalytic reactions for synthesis of useful medicines and their intermediates.

Keywords. Catalyst, gold surface, nanotechnology, self-assembled monolayers.

ICATSD2A.336

MECHANICAL PROPERTIES OF GELATIN-BASED FILMS PLASTICIZED WITH DEEP EUTECTIC SOLVENT

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Abstract. Growing concerns about the impact of non-degradable plastics on environment is triggering the exploration of more sustainable alternatives. Gelatin is one of the popular candidates to use for the manufacture of bioplastics as alternative materials for food packages. In the research, deep eutectic solvent of choline chloride and glycerol were used for the preparation of gelatin bio-films by thermal-compression molding. The film preparation condition was optimized by using Box-Behnken design and response surface methodology based on the best mechanical properties of the film and lowest energetic requirements including lower compression load, time, and temperature. The gelatin biofilm prepared with deep eutectic solvent was compared with films made using only glycerol or choline chloride. FTIR was used to analyze the chemical changes of the films. The films of gelatin with deep eutectic solvents presented higher tensile strength, elongation at break comparing to the films with only glycerol or choline chloride.

Keywords. Gelatin, deep eutectic solvents, biofilms, mechanical properties.

ICATSD2A.337

ASSESSING AGRICULTURAL DROUGHT IN SEREPOK RIVER BASIN USING MULTIPLE DROUGHT INDICES

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Abstract. Drought is a natural hazard that has a detrimental impact on natural resources, the economy, society, and it is difficult to define, as are other occurrences. Since the end of 2014, the Serepok River basin has been severely impacted by drought caused by weather changes and land use changes. So that, the selection of drought index through the MODIS data, determine the appropriate rating scale and assess the impact of drought are considered extremely important in drought evaluating on Serepok basin. In the study, we used remote sensing and meteorological observation data to evaluate drought indices such as Vegetation Condition Index (VCI), Vegetation Health Index (VHI), Land Surface Water Index (LSWI), and Temperature Vegetation Dryness Index (TVDI); and provide an appropriate drought index for the the period from 2010 to 2020 in the Serepok basin. The results reveal that for wild plants, planted forests, and agricultural land, the correlation between NDVI and LST of the TVDI index yields the clearest results ($r > 0.9$). Due to minimal natural cover, Gia Lai and Dak Lak provinces are regarded the worst impacted places in the basin; in Dak Nong and Lam Dong provinces, good coverage mixed with a humid climate to normal results.

Keywords. Drought indices, Serepok basin, Temperature Vegetation Dryness Index (TVDI).

ICATSD2A.338

COMPARISION OF INDOOR AIR QUALITY BEFORE AND AFTER VENTILATION RENOVATION: A CASE STUDY FOR TWO TUBE HOUSES IN HO CHI MINH CITY, VIET NAM

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Abstract. Indoor air pollution directly affects the quality of the living environment and the health of its occupants. The narrower living space with less ventilation will increase the accumulation of pollutants. The study is conducted in two tube houses to improve indoor air quality by ventilation renovation. Three TSI EVM_7 monitors are used to measure the parameters of CO_2, $PM_{2.5}$, CO, temperature, and humidity for 72 hours outdoors, living room, and kitchen. Indoor air quality is determined based on WHO standards combined with a survey of occupants' living habits to determine the causes of indoor air pollution. The results show that the CO_2, CO, and $PM_{2.5}$ at some point in time exceed the acceptable standards (CO_2 in the kitchen, CO in the living room, and $PM_{2.5}$ in both houses). Besides, a survey of the house structure was also carried out to evaluate the ventilation capacity of the two tube houses. Then some of the renovation solutions include installing exhaust fans and cooker hoods in suitable locations, using motor covers, and changing some living habits of occupants. Through ventilation renovations, air quality after 6 months of renovation, in the living room of Tube house 1 CO_2 decreased from 475.21-419.36 ppm, CO from 0.15-0.0199 ppm, PM2.5 from 0.0616-0.04728 mg/m^3; in the kitchen CO_2 decreased from 923.86 - 730.76ppm; CO from 1.05 - 0.18ppm, $PM_{2.5}$ from 0.06 - 0.04 mg/m^3. In House 2, CO_2 decreased from 623.11-393.36 ppm, CO from 3.35-0.097 ppm, $PM_{2.5}$ from 0.05-0.034 mg/m^3 in living room. For kitchen $PM_{2.5}$ decreased from 0.063-0.049 mg/m^3, CO_2 and CO decreased from 1079.599- 935.62ppm and 0.096-0.076ppm, respectively. The results show that applying the above measures has initially contributed to improving indoor air quality and minimizing health risks for occupants.

Keywords. Indoor air pollution, ventilation, tube house.

ICATSD2A.339

REMOVAL OF COD AND NITROGEN IN LEACHATE BY USING ATTACHED GROWTH COMBINED WITH ANOXIC PROCESS

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Abstract. There are several methods to remove COD and nitrogen from leachate from sanitary landfills. Currently, leachate is treated by combining physical, biological, and chemical methods, which results in rather high treatment costs. The main objective of this study was to develop an attached growth process associated with anoxic to remove COD, nitrogen in leachate from landfills in Vietnam. The study was carried out at laboratory scale. There are three separate tanks. The anoxic tank had a volume of 25 litters. The second tank had a volume of 43 litters and installed with Bio-Cord fibers, which were made from polypropylene material to create good conditions for microorganisms to fix and develop. The settling tank had a volume of 15 litters to separate activated sludge, which was returned to anoxic tank by a pump.

The process of aerobic and anoxic biological treatment were used in research to treat leachate with COD of 3,410 – 5,550 mg/L, $N\text{-}NH_4^+$ of 750 – 1,400 mg/l, TKN (Total Kjeldahl Nitrogen) of 840 – 1,412 mg/L, TN (Total Nitrogen) of 830 – 1,415 mg/L. Tests were done at the various average organic loading rates of 0.63 kg COD/m^3.day; 1.14 kg COD/m^3.day and 1.22 kg COD/m^3.day. At organic loading of 1.14 kg COD/m^3.day, removable efficiency of COD increased significantly and achieved the highest efficiency. However, removable efficiency of nitrogen got the highest value at organic load 1.22 kg COD/m^3.day. Removal efficiency COD, $N\text{-}NH_4^+$; TKN; TN at organic loading of 1.14 kg COD/m^3.day were 81.7%; 92.2%; 85.9%; 87.7%, respectively. Working conditions were pH between 8.0 and 8.5, alkalinity from 3200 to 4700 mg$CaCO_3$/L, VSS in aerobic tank maintained from 2100 to 302mg/L.

Keywords. Leachate landfill, biocord, remove Nitrogen, anoxic, attached growth.

ICATSD2A.340

PHOSPHORUS RECOVERY FROM SEWAGE SLUDGE IN VIETNAM BY WET CHEMICAL METHOD: ACID LEACHING STAGE

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Abstract. Phosphorus (P) is a finite mineral resource and is especially necessary for agricultural production. Leaching of P from sewage sludge plays an important role in the P recovery process. Wet chemical leaching was performed using different types of acid solutions, including H2SO4, HCl, and HNO3. Sludge from rubber latex processing wastewater treatment plant was used in this study as a P-rich source in Vietnam. Acid leaching was carried out on two types of sludge, biological and chemical sludge, resulting from chemical P precipitation. The conditions including pH, reaction time, and solid to liquor ratio were studied in the laboratory to show the influence of these factors on leaching efficiency for both sludges. The content of P and metals in the leaching solution was analyzed by using Inductively coupled plasma optical emission spectroscopy (ICP-OES). The highest P leaching efficiency observed was about 90% and 82%, for biological and chemical sludge, respectively. This way achieved using H2SO4 for leaching at a pH of 0.1, a leaching time of 90 minutes at room temperature, and a 1:20 (g/ml) solid to liquor ratio. The results showed that there was no difference in the optimal acid leaching conditions, but there was a difference on phosphorus leaching efficiency for different sludge types. The leaching solution will continue to be separated from impurities including Ca, Fe, Al, and heavy metals by the selective precipitation method. The research process is simulated through Matlab and Aqion-PRO tools to compare, adjust and fit the coefficients to achieve the highest efficiency of P recovery.

Keywords. Leaching, extraction, wet chemical, phosphorus recovery, biological sludge, wastewater treatment.

ICATSD2A.341

INFLUENCE OF AGEING AND DEPTH-DEPENDENT PROPERTIES ON COMPOSITION AND CHARACTERISTICS OF MUNICIPAL SOLID WASTE LANDFILL, CASE STUDY AT LANG DAI COMMUNE, DAT DO DISTRICT

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Abstract. Improper landfill management can cause numerous negative effects on environmental in developing countries. In Vietnam, there is up to 80% of unsanitary landfills. Although, some of them had closed, it can bring serious environmental problems. It also leads to increase pressures on the goal of 90-95% of landfills which are rehabilitated by 2025 following the national solid waste (SW) management strategy. Currently, the studies on the composition and properties of solid waste in the landfills, especially the closed unsanitary landfills, so it makes difficult to choose an appropriate plan to renovate and restore the unsanitary landfills. This study aimed to find out the influence of ageing and depth- dependent properties on buried solid waste composition and its properties at Lang Dai landfill, Dat Do district, Ba Ria- Vung Tau province. Solid waste samples were collected at 23 pits. A total of 57 samples were taken at 03 different floors to analyze the composition and characteristics including density, moisture, ash, volatile solids and heavy metals. The result shows that the rate of biodegradable organic matter is about 2-6%, and the residual waste (soil, sand, humus) and plastic account for 55 – 67% and 27 – 34%, respectively. The heavy metals contamination isnot happened. In summary, the management agency does not need to improve and recover the environment of Lang Dai landfill area, and the landfill can be utilized to grow inedible agricultural crops.

Keywords. Age, composition of waste, depth, disposal area, solid waste, age, depth, characteristics of waste, composition of waste, landfill.

ICATSD2A.342

POTENTIAL HEAVY METAL CONTAMINATION OF GROUNDWATER IN CA MAU PROVINCE, VIETNAM

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Abstract. Ca Mau is the southernmost coastal province of Vietnam, located in the Mekong Delta region. It is bounded by the Gulf of Thailand and the East Sea of Vietnam, with a natural area of 5,329km². Large parts of the land *area* in *Ca Mau* lie less than 1.5 *m above sea level*. This study provides an overview of the potential heavy metal contamination of groundwater in Ca Mau Province. Groundwater samples of 21 sampling sites were collected over 7 consecutive periods from March 2018 to March 2021. Each sample was analyzed for five heavy metals including Fe, Mn, Cu, Pb, and As. Sampling and sample handling techniques were performed based on the Standard Methods for the Examination of Water and Wastewater. This study also used ArcView (ArcGis) tool to produce distribution maps of heavy metal contamination. Among all five heavy metals (Fe: 0 ÷ 9.48 mg/L; Mn: 0 ÷ 0.31 mg/L; Cu: 0 ÷ 0.24 mg/L; Pb: 0 mg/L; As: 0 mg/L) examined in the study area, the concentrations of Fe were the highest, while the concentrations of Pb and As were the lowest that was lower than the limit of detection. The results showed that Fe concentrations in some sites exceeded the permissible thresholds of the National Technical Regulation on Ca Mau the southernmost coastal province of Vietnam, located in the Mekong Delta region. It is bounded by the Gulf of Thailand and the East Sea of Vietnam, with a natural area of 5,329km². Large parts of the land area in Ca Mau lie less than 1.5 m above sea level. This study provides an overview of the potential heavy metal contamination of groundwater in Ca Mau Province. Groundwater samples of 21 sampling sites were collected over 7 consecutive periods from March 2018 to March 2021. Each sample was analyzed for five heavy metals including Fe, Mn, Cu, Pb, and As. Sampling and sample handling techniques were performed based on the Standard Methods for the Examination of Water and Wastewater. This study also used ArcView (ArcGis) tool to produce distribution maps of heavy metal contamination. Among all five heavy metals (Fe: 0 ÷ 9.48 mg/L; Mn: 0 ÷ 0.31 mg/L; Cu: 0 ÷ 0.24 mg/L; Pb: 0 mg/L; As: 0 mg/L) examined in the study area, the concentrations of Fe were the highest, while the concentrations of Pb and As were the lowest that was lower than the limit of detection. The results showed that Fe concentrations in some sites exceeded the permissible thresholds of the National Technical Regulation on groundwater quality. In general, the distribution of Fe and Cu concentrations was almost similar, decreasing in the coastal area in contrast to the distribution of Mn increasing in the coastal area. These conclusions about the distribution of heavy metal concentrations in groundwater can be used to propose solutions as well as policies for effective groundwater quality control and socio-economic development activities in Ca Mau Province. In general, the distribution of Fe and Cu concentrations was almost similar, decreasing in the coastal area in contrast to the distribution of Mn increasing in the coastal area. These conclusions about the distribution of heavy metal concentrations in groundwater can be used to propose solutions as well as policies for effective groundwater quality control and socio-economic development activities in Ca Mau Province.

Keywords. Heavy metal contamination, Groundwater, Concentration, Distribution.

ICATSD2A.343

THE ROLE OF CITRUS FIBER ON THE TEXTURE OF GLUTEN-FREE, SUGAR-FREE, AND BUTTER-FREE BISCUITS FROM LABLAB BEAN, PUMPKIN, AND BANANA

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Abstract. In the trend of sustainable food system development, the implementation of a healthy diet through the use of whole foods, local foods, and plant-based foods to prepare food at the restaurant is being cared for. The objective of the study was to investigate the role of citrus fiber in the structure of biscuits made from peas, whole pumpkin, and porcelain banana puree to develop a line of butter, sugar, and gluten-free biscuits. Mixture formulas (MF) including pea flour: pumpkin powder: porcelain banana puree are 1:1:1, 2:1:1, and 3:1:1, respectively (by mass % MF). Citri-Fi 100 (100% Citrus Fibre) was investigated at levels 0 and 0.25 (mass % MF) respectively. The water content is additionally calculated to ensure that the dough samples have the same moisture content of 35 - 36%. Structural properties of 6 cake recipes, in which the cake control sample was the sample without the addition of Citri-Fi 100, were recorded. Determine the cake structure by measuring the penetration force on the Brookfield CT3 4500 structure measuring device, the color of the cake is determined by the Minotab CS-10 colourimeter. The results show that Citri-Fi 100 plays an important role in creating the structure for butter-free, sugar-free, gluten-free biscuits from beans, pumpkin, and bananas. The cake recipe with a mixing ratio of 2:1:1 and 0.25% Citrus Fibre shows that the cake has the right structural properties. It is noteworthy that the color ΔE of the 3 recipes with 0.25% citrus fiber added did not have any significant difference compared with the color of the control cake (premium biscuits Coffee Joy - Indonesia has the values as follows: $L^* = 50.52$; $a^* = 9.27$; $b^* = 26.9$). The finding of this work could be applied to the development of biscuits for consumers who are on a diet or have gluten intolerance syndromes.

Keywords: free-sugar biscuit, free-gluten biscuit, free-butter biscuit, lablab bean, pumpkin, banana.

ICATSD2A.344

EPIGENETICS - THE CONNECTION OF NUTRITIONAL SCIENCE AND MODERN MEDICINE: A REVIEW

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Abstract. Following the way genetics think, the traits and characteristics of all organisms of the previous generation are passed on to the next generation through genes. However, in recent decades, with strong scientific and technical development, researchers have discovered a prominent genetic "abnormality" in the genes of liver and nerve cells. They are not inherited "strictly" like other genomes with mutations depending on the environment, food, or lifestyle. From there, a new concept of genetics in science emerges, epigenetics. Specifically, DNA methylation and histone protein modification make genes active or inactivated, influencing traits including health and disease, including the mechanism of cancer formation. This paper aims to describe the concept, give typical examples, systematize some achievements and introduce some expectations for future contributions of epigenetics.

Keywords. Epigenetics, behavior, nutritional science, modern medicine, genetics.

ICATSD2A.345

EFFECTS OF GREEN SOLVENT EXTRACTION ON PHENOL COMPOSITION AND BIOACTIVITIES OF VIETNAMESE CORIANDER LEAVES *(Persicaria odorata)*

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Abstract. *Persicaria odorata* is commonly consumed as a vegetable and a medicine herb in Vietnam and some countries in the Southeast Asian region. This study aimed to determine effect of three green solvents (ethanol EtOH, EtOH 80%, and water) on phytochemical constituents, and bioactivities of leaves of the plant. All extracts were analyzed for qualitative analyses of phytochemicals (alkaloid, saponin, tannin, and triterpenoid), quantification of total phenolic content and total flavonoid content, and evaluation of reducing power, antioxidant, anti-α-glucosidase, anti-tyrosinase, anti-inflammatory activities. The results showed that the highest extraction yield was EtOH with 7.86%, followed by EtOH 80% and water. The phytochemical analyses showed the presence of alkaloids, saponins and tannins in both EtOH and EtOH 80% extracts. Total phenolic content of the EtOH 80% extracts (207,590 ± 14,315 mg GAE/g) was significantly higher ($p < 0.05$) than that of the EtOH extract, while total flavonoid content (9,5 ± 2,121 mg QE/g) of the water extract was considerably lower compared to the EtOH 80% extract (126,000 ± 7,071 mg QE/g). The EtOH 80% extract had the highest free radical scavenging capacities ABTS (59,318 ± 1,038) and unique reducing power among the extracts. This extract also had strong anti-α-glucosidase, and anti-inflammatory activities. None of the extracts had anti-yrosinase activity. In conclusion, the green solvent leaf extracts of *Persicaria odorata* was a rich source of phytochemical constituents, had strong anti-α-glucosidase, and anti-inflammatory activities activity. Therefore, this plant leaves could be used for development nutraceutical ingredients.

Keywords. Vietnamese coriander *Persicaria odorata*, phytochemicals, anti-α-glucosidase, and anti-inflammatory, antioxidant activity.

ICATSD2A.346

PURIFICATION AND CHARACTERIZATION OF NOVEL THERMOSTABLE ALKALINE AMYLASE FROM *Streptomyces sp.* RBXK3

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Abstract. Microorganisms play an important role in the breakdown of organic compounds in nature and are the object of enzyme production in the world. In particular, amylase is one of the three commonly used groups in the industrial enzymes, and it is always necessary to select high activity microbial amylases that can work under extreme conditions. Notably, actinomycetes are the potential targets for industrial amylase production. In this study, thermostable amylase from *Streptomyces* sp. RBXK3 was purified and had a molecular weight of about 24 kDa. The optimum condition of starch hydrolysis was at high temperature of 65°C and pH 9.5 in the presence of 1.0 mM Na^+. The enzyme exhibited high thermal stability with ~90% of the relative activity remained after 30 minutes of incubation at 85°C. V_{max} and K_m values were also determined as $1.38x10^9$ U/mg and 6.05 mg/ml, respectively. The amylase from *Streptomyces* sp. RBXK3 showed superior performance in a thermal-alkaline condition unlike the majority of those from other actinomycetes and thus could be applied in many different fields.

Keywords. *Streptomyces*, alkaline amylase, thermostable amylase, purification, biochemical characterization.

ICATSD2A.347

CONTINUOUS SPRAY DRYING SYNTHESIS OF MESOPOROUS BOEHMITE/MELAMINE COMPOSITE SPHERES WITH IMPROVED CO2/N2 SEPARATION PERFORMANCE

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Abstract. A novel mesoporous boehmite/melamine (Boeh/Me) spherical composite was successfully prepared by a spray drying system from a mixture of boehmite sol and melamine. The presence of melamine species in the obtained Boeh/Me composite spheres was confirmed by EDX-SEM, FTIR, and TGA analysis. Compared to the pristine Boehmite sample, the porosity of the composites gradually decreased when increasing the melamine amount, but the CO_2 uptake amounts over the composites were still improved. The highest CO_2 adsorption capacity (19.2 cm^3 g^{-1}) was obtained when 5 mol% of melamine was added into the boehmite (Boeh/Me#5), which was 46.1% higher than that of the original boehmite sample at 25 °C and 1 bar. This is attributed to the formation of adsorptive affinity between N-derived functional groups (-NH_2 and -CN) inside the melamine structure and the CO_2. As a result, the CO_2/N_2 separation factor and CO_2/N_2 selectivity using the ideal adsorbed solution theory (IAST) on the Boeh/Me#5 sample were 113.3 and 3182, respectively, approximately 3-times and 9.2-times higher than those on the boehmite sample. The results suggest that continuous spray drying is a potential approach for scale-up production of mesoporous Boeh/Me composite spheres as CO_2-selective adsorbents.

Keywords. Boehmite/melamine spherical composite, continuous spray drying, CO_2/N_2 IAST selectivity, enhanced CO_2 adsorption performance.

ICATSD2A.348

SENSORY PROPERTIES OF COMMERCIAL 3-IN-1 INSTANT COFFEES: THE PROFILING WITH RATE ALL THAT APPLY (RATA) USING CONSUMERS

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Abstract. The 3-in-1 instant coffees are consumed widely in Vietnam as much as Vietnam coffee filters. This kind of products is convenience to use and the price is cheaper than other coffees. In this study, we choose seven 3-in-1 commercial instant coffees. In this study, the sensory descriptors were developed by seven panelists and fifty consumers used Rate-all-that-apply (RATA) methods to evaluate the sensory properties of those products. The goal of this study is (1) to determine sensory properties of seven 3-in-1 instant coffees and (2) fifty consumers evaluated the products using a lexicon consisting of 24 sensory attributes using RATA with 9 point scales. The sample preparation was fixed a volume of 70 ml to serve consumers. The study was carried out by 50 consumers, which are 48 % male and 52% female. With the fifty four percentage of consumers was expected higher sweetness (44%) and greasiness (42%) and lower bitterness taste (14%). To explore the RATA profiling's data, principal Component Analysis (PCA) was used to classify the coffee in 2 main groups. Group 1 is attached with sensory properties as: *caramel, roasted bean, burnt, butter, milk powder, solubility* while Group 2 is *vani, rancid, sourness, saltiness, coconut flavor, cocoa, stability of creama, thickness of creama, greasiness, sweetness, biterness, harsh, strongness, woody, yellow, sweet aftertaste and viscosity.* The results showed that the difference of groups depended on ingredients of products and potential to improve sensory properties of 3-in-1 instant coffees.

Keywords. *Vietnam, instant coffee, Robusta, Arabica, RATA.*

ICATSD2A.349

ANTIBACTERIAL ACTIVE OF EXTRACTS FROM APPLE LEAVES ZIZIPHUS MAURITIANA

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Abstract. Apple leaves *Ziziphus mauritiana* is a bioactive-rich resource in food, functional food, and pharmaceutics. The study evaluated the antibacterial activity of extracts such as acetone, n-hexane, and ethyl acetate from apple leaves on Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus using the agar diffusion method. DSMO 5% and antibiotic gentamycin were the control agents. The results showed that the antibacterial diameter of extracts such ass acetone, n-hexane, and ethyl acetate on four bacterial strains was 18.67 ± 0.58 to 7.05 ± 0.50 mm. The antibacterial diameter of ethyl acetate extract against four bacterial strains got the highest value (12.83 ± 0.29 to 18.67 ± 0.58 mm) than difference extracts. The minimum inhibitory concentrations of acetone, n-hexane, and ethyl acetate on four bacterial strains were 3.125 mg/mL ≤ MIC ≤ 6.25 mg/mL. Apple leaves is a potential for application in food, functional food, and pharmaceutics.

Keywords. Apple leaves, antibacterial active, extracts, MIC, *Ziziphus mauritiana.*

ICATSD2A.350

APPLICATION OF WASTE DOLOMITE COUPLED WITH FELDSPAR FOR SOIL AMENDMENT

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Abstract. In Thailand, many areas have a soil-degraded problem from deforestation and excess use of chemical fertilizer. To recover the soil quality, dolomite applied in cement and steel industries, can be used in agricultural purposes for soil amendment. However, there still is some waste dolomite left from the process. Furthermore, feldspar, normally used in glass and ceramics industries, is chosen as a mixture to improve soil fertility but the amount of feldspar and dolomite used in this function is still low. Therefore, the aims of this study are to apply and to evaluate the effects of the waste dolomite coupled with feldspar as a soil amendment on the soil qualities like pH, soil-bulk density, electrical conductivity (EC) and soil texture. The concentration of feldspar and dolomite are ranged from 0-12% and 10-25% by weight, respectively. From the results show that the soil quality has been improved in that pH can increase in all ratios from 4.758 up to 6.482. However, EC has increased from 0.126 dS/m for soil to 21.3-40.5 dS/m for the mixture. The bulk density of soil is reduced from 1.121 g/cm^3 to 0.899-1.062 g/cm^3 to have more space for air and water for all mixtures. The soil texture has changed in the better quality from clay to sandy loam, loamy sand, and sandy clay loam which are suitable for plant growth. Finally, waste dolomite and feldspar can improve the better waste management method and reuse the low-value waste and gain more profit of the project for soil amendment.

Keywords. Dolomite, feldspar, soil amendment, waste management.

ICATSD2A.351

FUNGICIDAL ACTIVITIES OF COPPER NANOPARTICLES ON MAGNAPORTHE ORYZAE, RHIZOCTONIA SOLANI, AND PHYTOPHTHORA CAPSICI

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Abstract. Fungal organisms are the most common causal agents of plant diseases. An *in vitro* study was performed to investigate fungicidal activities of copper nanoparticles against several plant pathogenic fungi including *Magnaporthe oryzae*, *Rhizoctonia solani*, and *Phytophthora capsici*. We synthesized copper nanoparticles using chemical reducing method, then added to potato dextrose agar at the concentrations of 100, 500, and 1000 ppm. Fungal colonies were placed in the center of agar plates. Fungal inhibition radius was calculated to evaluate antifungal efficacy of copper nanoparticles. The results indicated that copper nanoparticles produced with the size of 70-74 nm inhibited efficiently all studied fungi strains at the concentration of 1000 ppm. *Rhizoctonia solani* was more sensitive with copper nanoparticles than other fungi, that its mycelial growth was depressed significantly with 100 ppm copper nanoparticles applied. In conclusion, copper nanoparticles demonstrated a potential application to eliminate plant fungal pathogens.

Keywords. Copper nanoparticles, *Magnaporthe oryzae*, *Rhizoctonia solani*, and *Phytophthora capsici*.

ICATSD2A.352

OPTICAL SENSOR BASED ON 2D- HALIDE PEROVSKITE NANOPARTICLE FOR ANALYTICAL CHEMISTRY

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Abstract. In recent years, the optoelectronic field has paid attention to halide perovskites due to their optical properties, including high photoluminescence quantum yield and adjustable emissions. Controlling the dimensionality of halide perovskites is one of the effective ways to increase stability. Large organic compounds having a positive charge and a long alkyl chain are used in the process of creating quasi-two-dimensional (2D) and three-dimensional (3D) perovskites. Two-dimensional perovskites are well suited for emission applications and have great resistance to moisture. In this presentation, we demonstrate the novel optical sensors based on 2D halide perovskite, which was synthesized from octadecylamine-iodine and PbI_2 (CuCl) via grinding-sonicating technique, for detecting putrescine and spermidine (quercetin and rutin). The change of the fluorescence intensity of the sensors can be determined by either the fluorescence spectroscopy or smartphone. The fluorescence quenching mechanism of the prepared sensor was discussed.

Keywords. 2D-perovskite; optical sensor; quenching; analyte.


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