Fakulti Kejuruteraan Kimia

Research Title

MICROENCAPSULATION OF MALAYSIAN AGRICULTURAL PIGMENTS DURING THERMAL TREATMENT USING IONIC GELATION

Researcher's Name:	Dr. Siti Noor Suzila Bt Maqsood ul Haque
Contact Number:	019-2143500
Email Address:	suzihaque@uitm.edu.my
Area of Expertise:	Food engineering
Grant Availability:	Yes
Vacancy:	PhD
Requirement	1) Malaysian 2) Interested in research and willing to learn new laboratory techniques 3) Full time 4) Allowance: RM 1500 (PhD)

Summary of the potential project:

Food colorant is any dye, pigment or substances that gives addition of colour to food, beverages and any non food applications including pharmaceuticals. The main reasons to use pigment additives are to (i) enhanced the appearance of food to make it more attractive and appetizing,(ii) to compensate colour loss due to the exposure of light, air, temperature and storage conditions, (iii) acts as a provision of colour to colourless foodstuff and (iv) to allow consumers to identify the products by sight for example drugs in pharmaceutical industry . Recent consumer concerns about the safety of synthetic colourants have led to an increased use of natural colourants in food. However, natural alternatives are generally less stable to environmental factors such as heat, light and pH. Some agricultural products that have been used internationally as natural colorant are Pistacia lentiscus L. fruit (used in Mexico), Oriza sativa L. (India) , and Bixa orellana L. seeds (America) that were used in alcoholic and non alcoholic beverages, frozen dairy desserts, candy and many other food products. Malaysia has a wide biodiversity of many local agricultural products. Five coloured pigments (red, yellow, orange, purple and green) were identified to be the potential future natural colour source derived locally from dragonfruit, pineapple, papaya, pandan leaves and purple cabbage. The objective of this study is to study the effect of microencapsulate methods towards the colour stability of extracted anthocyanin through pigment colour fading measurement and degradation kinetics of the pigment values and to determine the antioxidant capacity of local fruits and vegetables through Ferric Reducing Ability of Plasma (FRAP) assay and 2,2-diphenyl-picrylhydrazyl (DPPH) free radical scavenging assay. Derivation of these pigments will be incorporated into food (for example cakes or supplement tablets) and non food products (dye for fabric material) as a comparison for its strengths and limitations.

UiTM di hatiku

Research Title

Adsorption/ desorption mechanism of modified 'terpolymer of acrylic acid, 2-acrylamido-2-methylpropane sulfonic acid' polymeric inhibitor (AA/AMPS)/ carbon nanoparticles (CNPs) in silicate scale squeeze treatment inhibition

Universiti Teknologi MARA | Fakulti Kejuruteraan Kimia

Researcher's Name:	Dr Rozana Azrina Sazali
Contact Number:	011-21538586
Email Address:	rozana592@uitm.edu.my
Area of Expertise:	Flow Assurance in oil and gas production - Scale
Grant Availability:	Yes
Vacancy:	MSc (Full Time)
Requirement	1) Open to all Nationality 2) Bachelor in Petroleum Engineering/ Bachelor in Chemistry/Bachelor in Chemical Engineering 3) Well verse in handling and analysis of spectroscopy instrument is an advantage 4) This research is industrial-driven problem. You will have the opportunity to collaborate with respective player in oil and gas industry. 5) Allowance: RM 1200 – RM 1500

Summary of the potential project:

Alkaline surfactant polymer (ASP) floods in sandstone reservoirs are associated with silicate scaling of production wells. One of the approaches in managing this scale is by applying SI down hole to production wells via continuous injection line. However, it involved a high dose of chemical (250-500 ppm) and research had shown that none of scale inhibitors (SI) deployed can totally inhibit this scale from occurring.

Therefore, it is vital to enhance the squeeze treatment program by 'modifying' scale inhibitor (A5) with nanoparticles i.e. the carbon nanoparticles (CNPs) will help to prolong the squeeze lifetime with much lower minimum inhibitor concentration (MIC) of inhibitor deployed. In this project, CNPs is introduced to enhance the delivery of A5 (i.e. placement) and/or to assist in the "binding" of A5 to the rock surfaces.

The objectives of this research are (i) to study the adsorption of A5 onto CNPs and the rock formation; (ii) to determine the inhibition efficiency of A5/CNPs formulation in inhibiting silicate scale; and (iii) to characterize the produced silicate scale precipitation in the presence of A5/CNPs blends.

The adsorption of A5 on the CNPs and the A5/CNPs inhibition efficiency is quantified as a function of time whereby the characterization of silicate scale formed in the presence of A5/CNPs blends and its efficiency will be carried out by SEM, XRD, FTIR studies.

It is expected that a good dispersion of CNPs in the chemical blend can increase the adsorption of A5 on the rock surfaces due to the exposure of the higher surface area to A5 which consequently could mitigate the silicate scale deposition.

New developed A5/CNPs to be deployed in squeeze treatment is a significant discovery in resolving the silicate scale problem in ASP fields in the most economical way i.e. much lower MIC and longer squeeze lifetime.

Research Title
Synthesis of unsupported mesoporous nickel-cobaltites for thermo-catalytic decomposition of biomethane

Universiti Teknologi MARA | Fakulti Kejuruteraan Kimia

Researcher's Name:	Nor Faeqah Idris
Contact Number:	0125631964
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Area of Expertise:	Reaction Engineering
Grant Availability:	Yes
Vacancy:	MSc
Requirement	1) Malaysian 2) Degree in Chemical Engineering/ Environmental Engineering/ Industrial Chemical Technology 3) Full time 4) Allowance: RM 1800

UiTM di hatiku

Summary of the potential project:

Carbon nanomaterials are generally synthesized by carbon arc discharge and laser ablation methods which is low yield in carbon, as low as 30 wt%. Thus, decomposition of biomethane is a new promising method to improve the nanocarbon yield. However, currently, the decomposition of biomethane is conducted at high temperature above 1200°C, which posed a risk towards safety and operational cos t . Therefore, heterogeneous unsupported mesoporous nickel-cobaltites will be investigated in this study via a facile coprecipitation method to alleviate high reaction temperature in biomethane decomposition. Furthermore, the kinetics and mechanisms study on unsupported catalyst for biomethane decomposition is rarely reported. Nickel-cobaltites unsupported catalyst will be prepared using ammonium carbonate as a precipitating agent via co-precipitation method. The as-prepared nickel-cobaltites will be characterized by using X-Ray diffraction, energy dispersive X-ray spectroscopy, scanning and transmission electron microscopy, Xray photoelectronspectroscopy, N2 adsorption and temperature programmed reduction analysis. The catalytic performance of the catalysts is evaluated for biomethane decomposition at various reaction temperatures and the properties of reaction temperature dependent nanocarbon will be investigated in detail. The effect of reaction temperature on the crystalline, morphological and

graphitization properties of the deposited nanocarbon will be studied as well. The NiCo2O4 catalyst is expected to be highly pure phase and porous, and the yield of carbon nanotube is expected to be increased. The significance of this research is the development of new low cost nickel-cobaltites unsupported catalyst for biomethane decomposition at low reaction temperature, the study of catalyst kinetic mechanism and the investigation of carbon temperature-dependent properties.

Research Title
Hybrid membrane development for sequestration and biocatalytic reduction of CO2

Universiti Teknologi MARA
Fakulti Kejuruteraan Kimia

Researcher's Name:	Dr Fauziah Marpani
Contact Number:	018-2013401
Email Address:	fauziah176@uitm.edu.my
Area of Expertise:	Biocatalytic membrane Enzyme technology Membrane separation
Grant Availability:	Yes
Vacancy:	PhD
Requirement	1) Open to all Nationality 2) MSc (Chemical Engineering) or related 3) Allowance: RM 2300 4) Good command in English 5) Additional remuneration based on performance 6) Full time

Summary of the potential project:

Development of polymer based membrane for sequestration, hydration and biocatalytic reduction of carbon dioxide into other chemical precursors.

UiTM di hatiku

Research Title
Green Synthesis of Flexible Biopolymer Materials

Universiti Teknologi MARA | Fakulti Kejuruteraan Kimia

Researcher's Name:	Dr Ana Najwa Mustapa
Contact Number:	012-3678154
Email Address:	anajwa@uitm.edu.my
Area of Expertise:	Separation Processes, Materials and Environment
Grant Availability:	Yes
Vacancy:	MSc (Full time)
Requirement	1) Open to all nationality 2) Minimum CGPA > 2.75 3) Allowance: RM 1500 4) Interested and willing to learn new laboratory techniques, good ability to face challenges, creative, good interpersonal and communications skills. 5) Willing to do Research Attachment in Universidad de Valladolid, Spain. Research materials, travelling cost and fee for attending conference and seminar will be sponsored.

Summary of the potential project:

Hydrogel is defined as three-dimensional network structures obtained from a class of synthetic and/or biopolymers. The gels are usually obtained by drying wet gels using freeze and ambient atmospheric drying. Nevertheless, these technique causes collapsed on most part of the pore volume. As consequences, the dried gels appear wrinkled-like, severely crack and possessing very poor surface area, porosity, light and visibility properties. These limitations may reduce process development efficiency, for example drugs loading and delivery, optical transparency and catalytic activity. A unique properties of CO2 at supercritical condition i.e. high diffusivity, low viscosity and zero surface tension can be exploited as the most feasible drying technology to produce aerogels without damaging the original three-dimensional structure of the gels and improve their physical/chemical properties. In this study, a new hybrid biopolymer aerogels made of a hybridization of organic materials will be synthesized and dried by supercritical CO2. The physical and chemical properties of the synthesized hybrid aerogels will be examined and compared to other ordinary methods i.e. freeze and ambient atmospheric drying. Investigation on the physical-chemical, textural and thermal properties of the new hybrid aerogels are significant in emerging new functional materials. In addition, study on the principle of new drying technology i.e. supercritical drying in production of biopolymer-based hybrid aerogels is foreseen could embark and motivate further application of the technology comprehensively in other fields such as food packaging, electronics, cleaning, catalyst, pharmaceuticals and biomedical.

Research Title
Development of Metal–Organic Framework (MOF) Membrane-based Calorimetric Sensor for Detection of Toxic Metal Ions

Universiti Teknologi MARA | Fakulti Kejuruteraan Kimia

Researcher's Name:	Dr. Nur Hidayati Othman
Contact Number:	011-23515139
Email Address:	nurhidayati0955@uitm.edu.my
Area of Expertise:	Membrane separation technology, Adsorption, Functional nanomaterials, Graphene-based materials
Grant Availability:	Yes
Vacancy:	MSc
Requirement	1) Open to all Nationality 2) Bachelor Degree 3) Interested in research and willing to learn new laboratory techniques 4) Full time 5) Allowance: RM 1200- RM 1500

UiTM di hatiku

Summary of the potential project:

Heavy metals are typically detected and quantified using sophisticated analytical equipment. Many efforts have been made to develop portable heavy metals detection unit such as colorimetric sensor and optical sensor due to their naked-eye recognition nature. Pyridine and thiol are actively used as active probe molecules for the detector but it has limited sensitivity and low detection range(20-100nM of metal ions concentrations) due to weak stimuli response. Thus, these materials can be functionalised with mesaporous materials to rapidly trap heavy metal. Functionalisation with metal organic framework (MOF) is expected to improve the sensitivity and detection rate of heavy metals due to uniform and large framework pore structure of MOF. Cheap polymeric membrane will be used as a substrate to support the active probe molecules. As the properties of membrane substrate and dip coating parameters play a significant role in producing thin and homogeneous deposition of active probe molecules layer, the effects both factors need investigated simultaneously.

Research Title
Advanced/Conventional Transesterification of plant oil from Elais Guineensis to biodiesel

Universiti Teknologi MARA
Fakulti Kejuruteraan Kimia

Researcher's Name:	Dr.-Ing Amizon Azizan
Contact Number:	019-5167240
Email Address:	mijonmy@gmail.com
Area of Expertise:	Oxygen transfer rate in shake flask, Liquid distribution in shake flask, biofuel
Grant Availability:	No
Vacancy:	MSc
Requirement	1) Open to all Nationality 2) Fresh graduate is welcome 3) Full time/part time 4) In search of grant, otherwise, own start up

Summary of the potential project:

To use the palm potential due the abundance and future prospect for exports of biodiesel to the world market.

UiTM di hatiku

Research Title
Synergistic effect during microwave pyrolysis of food waste towards combustibility of biochar and bio-fuel using microwave pyrolysis technique

Universiti Teknologi MARA | Fakulti Kejuruteraan Kimia

Researcher's Name:	PM Dr Siti Shawalliah Idris
Contact Number:	012-3882579
Email Address:	shawal075@uitm.edu.my, shawal_idris@yahoo.com
Area of Expertise:	Waste to wealth, renewable energy
Grant Availability:	No
Vacancy:	PhD (Full Time)
Requirement	1) Open to all Nationality 2) MSc by research in relevant area. ** If student is interested in doing MSc, preferable obtained BEng in Chemical Engineering. 3) Familiar with modelling and experimentation and instrumental analysis 4) Equipment is readily available

Summary of the potential project:

This research work concerns about investigating the conversion of food waste to bio charcoal as fuel source. Microwave pyrolysis of food waste is complex process due to the dependency of the process over numerous parameters namely mass/volume input, composition, moisture content, temperature profile, dielectric properties, power level and products yield. The products obtained namely bio charcoal will be characterised and analysed for the combustibility analysis. The model of the microwave pyrolysis food waste is necessary in order to represent the physical system under various parameters, continuous and different operation conditions. It is expected the model developed will be able to predict the yield of products under various conditions and able to improve the nonuniform temperature profiles within food waste. An experimentation investigation of the above parameters and its modelling will be performed to determine the performance of bio charcoal produced as renewable energy source.

Research Title
CO2 Capture, CO2 Conversion, Reactive separation

Universiti Teknologi MARA
Fakulti Kejuruteraan Kimia

Researcher's Name:	Dr Fauziah Marpani
Contact Number:	018-2013401
Email Address:	fauziah176@uitm.edu.my
Area of Expertise:	Biocatalytic membrane Enzyme technology
Grant Availability:	Yes
Vacancy:	MSc (Full Time)
Requirement	1) Open to all Nationality 2) BSc Chemical Engineering, with CGPA at least 2.85 3) Allowance: RM 1200- RM 1500 (depending on performance) 4) Critical thinking, fluent english writing, honest, discipline 5) Lab work will be conducted only maximum 8 months intensively, chances of graduating on time. Remuneration will be given based on quality of paper published.

Summary of the potential project:

Enzymatic catalysis in membrane in the application of CO2 capture and direct conversion

Universiti Teknologi MARA
Fakulti Kejuruteraan Kimia

Research Title
Mechanism of Clay Minerals Conductivity Diminution Using Hydroxide Solution

Researcher's Name:	Wan Zairani Wan bakar
Contact Number:	019-2636695
Email Address:	zairani@uitm.edu.my
Area of Expertise:	Petroleum Engineering/electrochemical
Grant Availability:	Yes
Vacancy:	MSc (Full Time)
Requirement	1) Open to all Nationality 2) Bsc or B.Eng with CGPA 3.0 and above in Petroleum Engineering/Chemical Engineering/Chemistry/Physics or related disciplines. 3) Allowance: RM 1500 4) Good English command

Summary of the potential project:

Previous studies had reported that cation exchange capacity (CEC) of clay minerals (in powder form) can be reduced via hydroxide precipitation. The CEC is directly related to clay minerals conductivity. In this research we will investigate the mechanism of conductivity diminution on shaly sand plug (contain clay minerals) by means of CEC reduction using different hydroxide formulations.

UiTM di hatiku