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# IIUM Research, Innovation & Invention Exhibition 2010 (IRIIE 2010)

## ENHANCING QUALITY RESEARCH & INNOVATION for SOCIETAL DEVELOPMENT

(e-mail,news,micro-blog,etc)

## P-37 Bioremediation of oil spills in soil

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Oil spillage can cause a critical environmental impact on soil. Thus, many technologies have been developed for treating land contaminated by petroleum products. In this project, crude oil contaminated soil will be treated by bioremediation using oil-utilizing bacterial consortium. The bacterial consortium will be isolated from the crude-oil contaminated soil samples, and the best hydrocarbons degrading organisms will be selected for developing the bioremediation process. Water sludge with known composition will be used as nutrient source for the degradation process. The highest growth and hydrocarbon-degradation rate bacteria with the optimum process parameters will be used for the design of the bioremediation process.

## P-39 In-situ method to monitor surface reaction / oxidation at high temperature

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The formation of external $Cr_2O_3$ scale is important to obtain the oxidation resistance of Fe-Cr alloys at high temperatures. It is well known that the critical concentration of Cr to form protective external scale of $Cr_2O_3$ in humid condition is higher than that in dry condition, and the criterion of this concentration is expressed as Wagner's equation. To determine this concentration experimentally, a lot of mass gain data and metallographic surveys are required. An in-situ method of continuous monitoring of surface oxygen potential by oxygen concentration cell using stabilized zirconia has been developed and applied to the oxidation of Fe-Cr alloy in order to check the protectiveness of the scale. In our previous work, the oxygen chemical potential on growing oxide scales during high temperature oxidation of Fe, Ni, and Co were successfully measured. In this study, the surface oxygen potentials of Fe-0~17 wt% Cr alloys in Ar-21%$O_2$ gas as dry condition and Fe-10~22 wt% Cr alloys in Ar-20%$O_2$-20%$H_2O$ gas as humid condition were measured at 1073 K up to 20 ks.

In dry condition, the surface oxygen potentials of Fe with more than 10 wt% Cr alloys were close to the oxygen potential of atmosphere immediately after the heating period. It indicates that protective $Cr_2O_3$ scale formed on these alloys at early stage of oxidation. However, the surface oxygen potentials of these same composition alloys were lower in humid condition than that in dry. By this method, the protectiveness of scales formed on Fe-Cr alloys can be evaluated in-situ in a few hours.

## P-42 Molecular Characterization of Malaysian Ginger (Zingiber officinale Rosc.)

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The genetic polymorphisms among Zingiber officinale Rosc. (= halia) from Bukit Tinggi (BT), Tanjung Sepat (TS and Sabah (SB) cultivars of were studied using a single microsatellite oligo-primers: (CATA)5, (GATA)5 and (GAC)6 as DNA molecular markers in the polymerase chain reaction (PCR). Seven polymorphic bands were obtained from the PCR products, with in average about 2.334 polymorphic bands per primer, leading to a polymorphic rate of 17.9 %. Jaccard's coefficient of similarity varied from 0.562 to 0.875, indicative of close genetic relatedness among the genotype studied. UPGMA clustering indicated that the BT ginger cv. more related genetically to the TS cv. compared to the SB ginger. A putative new gene was observed from the DNA sequencing of the polymorphic bands of TS

cultivar, with the upstream region of DNA sequence contained of a guanine–rich core sequence (GGGCGG); enhancer (CCAAT); promoters (TATA box) and starting site (ATG). Our results showed the presence of genetic diversity among three Malaysian ginger cultivars by using microsatellites DNA.

## P-43 Synthesis and Structural Studies of 2-[3-(4-methoxybenzoyl) thioureido]phenyl propionic acid and 2-[3-(4-methoxybenzoyl) thioureido]-3-(1H-indole-3-yl) propionic acid

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Two 4-methoxybenzoylthiourea of propionic acid namely 2-[3-(4- Two 4-methoxybenzoylthiourea of propionic acid namely 2-[3-(4-methoxybenzoyl)thioureido]phenylpropionic acid (I) and 2-[3-(4-methoxybenzoyl) thioureido]-3-(1*H*-indole-3-yl)propionic acid (II) have been successfully synthesized. The compounds were analyzed and characterized by elemental analysis, infrared spectroscopy and X-ray crystallography. Both compounds crystallized in orthorhombic crystal system with space group $P_{21\ 21\ 21}$, a = 5.0364(13) Å, b = 16.716(4) Å, c = 23.040(6) Å and Z = 4 and $P_{bcn}$, a = 18.247(4) Å, b = 14.083(3) Å, c = 14.736(3) Å and Z = 8, respectively. As in most carbonoylthiourea compounds, the molecules adopts *trans-cis* configuration with respect to the position of 4-methoxybenzoyl and the propionic acid moieties against the thiono S atom across their C-N bonds. Molecule (I) is associated with one methanol molecule as molecule of recrystalization.

## P-44 Understanding Emotion: Cognitive Science Perspective

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Psychologist and neuroscientist have long tried to unlock the neural code of the humanâ€™s brain with intensive research carried out to model the brain for purpose of understanding human perception. The Electroencephalogram (EEG) signals can estimate the cortical activities using scalp potential measurements targeted at areas of interest and were used in this project to understand and analyze human perceptions rather than using expensive and bulky functional magnetic resonance imaging (fMRI) machine. These EEG signals were used to understand the location of brain activities for different affective states. In the project four basic emotions of happy, sad, fear and calm were detected and analyzed. Features were extracted based on the kernel density estimate (KDE) and Mel Frequency Cepstral Coefficient (MFCC). The Multi Layer Perceptron (MLP) is then used as classifiers to verify and identify the different emotions from the EEG signals both in Time and frequency domain. Experimental results show the potential of using these techniques to detect and analyze the four basic emotions from the EEG signals with reasonable accuracy. Many potential applications can be developed based on such novel technique in detecting and analyzing the emotion based on EEG signals.

## P-45 Temperature Control Circuit for Surface Acoustic Wave (SAW) Resonators

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Surface Acoustic Wave (SAW) resonators are key components in oscillators, frequency synthesizers and transceivers. One of the drawbacks of SAW resonators are that its piezoelectric substrates are highly sensitive to ambient temperature, resulting in performance degradation. This work proposes a simple circuit design which stabilizes the temperature of the SAW resonator, making it independent of temperature change. The temperature control circuit consists of a comparator, temperature sensor and heater. Several different SAW resonators were tested using this circuit. Experimental results indicate that