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

## ENHANCING QUALITY RESEARCH & INNOVATION for SOCIETAL DEVELOPMENT

## PP-154 Floating Porous Ceramics for High Density Cell Culture in Stirred Bioreactors

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Floating porous ceramics has been successfully developed using protein foaming-consolidation method. This method allows the control of porosity not only by the varied concentration of protein but also by managing the foaming process. Slurries of alumina powders and yolk was prepared by stirring the mixture and the resulting slip was poured into cylindrical shaped molds. Subsequently, they were subjected to drying for foaming and/or consolidation. Foaming process condition determined mean pore size and pore distribution. The dried green bodies of the samples were then burned to remove the pore creating agent followed by sintering at 1550°C for 2 h. Pore size distribution measurement showed that macropores of the sintered alumina porous bodies increased with the increased time and temperature of the drying process and were found in the range 50 - 800 μm. SEM measurement also confirmed this observation. Less foamed samples show lower shrinkage but higher compressive strength. A shrinkage of as low as 7.8% was observed for the sample dried at 110ºC but it increased significantly to 29.3% when dried at 180ºC. The compressive strength of the 110ºC's sample was 5.72 MPa at 43.6% porosity and it decreased to 4.57 MPa at 50.4% porosity when foamed at 180ºC. Density varied from 0.9 to 1.5 g/cm3 depending on the preparation condition. These results have opened a novel preparative way for porous ceramics especially alumina-based porous materials designed for biomedical applications such as cell culture in stirred bioreactor, drug delivery, bone implant etc.

## PP-159 Damageless Digital Watermarking Using Complex-Valued Artificial Neural Network

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Several high-ranking watermarking schemes using neural networks have been proposed in order to make the watermark stronger to resist attacks. However, the current system only deals with real value data. Once the data become complex, the current algorithms are not capable of handling complex data. In this paper, a distortion free digital watermarking scheme based on Complex-Valued Neural Network, CVNN in transform domain is proposed. Fast Fourier Transform, FFT was use to obtained the complex number (real and imaginary part) of the host image. The complex values form the input data of Complex Back-Propagation (CBP) algorithm. Because neural networks performs best on detection, classiï¬□cation, learning and adaption, these features are employed to simulate the Safe Region (SR) to embed the watermark, thus, watermark are appropriately mapped to the mid frequency of selected coeï¬ƒcients. The algorithm was appraised by Mean Squared error MSE and Average Difference Indicator ADI. Implementation results have shown that this watermarking algorithm has high level of robustness and accuracy in recovery of the watermark.

## PP-161 Intelligent Sliding Mode Control using Natural Logarithm Sliding Surface

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In automotive, engine mount is a component used to support the car engine on the chassis and at the same time isolates engine vibration. Ideally engine mount system should isolate engine vibration caused by engine disturbance force in engine speed range and prevent engine bounce from shock excitation. Nowadays, active engine mounting system has been considered as the next generation of engine mounts.