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Agricultural & Biological ENGINEERING

Thesis Defense

Speaker: Yi Fang

Title: Raman Spectroscopy for Cancer Cell Stage Differentiation in 2D and 3D Breast Cancer Models

Major Professor(s): Joseph Irudayaraj

Date: Friday, July 13, 2012

Time: 8:30am

Location: ABE 212

Abstract:

Since Raman Scattering was discovered in 1929 by Sir. C.V. Raman, it has been used for a variety of applications in biology, environment, and chemistry. In this work, Raman spectroscopy was used for cancer cell stage differentiation in 3D Breast cancer cell models where the cells are more similar to those in real tissues. Raman scattering spectra collected from the 2D and 3D cell cultures were processed by R software first before PCA and LDA were adopted for evaluating the differentiation ability. Finally, a band assignment step was applied for speculating the biological differences between the two cell stages.

Results show that Raman spectroscopy can be used differentiate cancer cells in different stages of tumorigenesis with high sensitivity and specificity based on the different biochemical signatures from the biomolecular structures of the cells.

Application:

From this research we have developed a new method for cancer cell stage definition and differentiation, which can be a useful technique for cancer staging in a clinical setting. By using 3D model, it is more likely that precise molecular components inside the cell are revealed in the context of the environment compared to the 2D model.