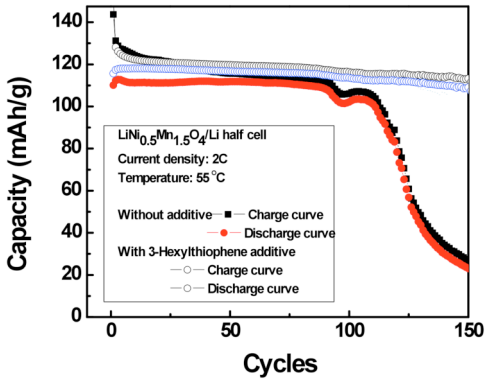
NANOHOUR

Wednesday, April 21, 2010 3:00 pm
Beckman Institute - Room 3269

Compartmentalized Solutions for Electronic Self-Healing

Dr. Susan Odom
Department of Chemistry

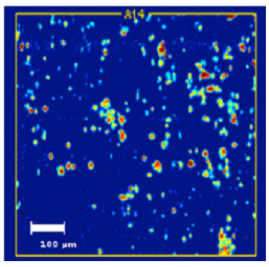
Compartmentalized solutions have been used for the storage of delivery materials for triggered release. A variety of methods can be used to prepare polymer-coated liquid cores from the nanoscale to microscale for a variety of applications. Materials for delivery include pharmaceuticals for directed drug delivery, ink for carbonless copy paper, and self-healing polymers. This presentation presents an extension of using encapsulated cores for the restoration of conductivity in damaged electronic materials. Materials studied include microcapsules containing precursors to charge transfer salts, monomers for oxidative polymer synthesis, and suspensions of carbon-based materials. These microcapsules have been studied for the restoration of cracked circuitry components and for failing battery electrodes. Current results will be presented along with experimental design for autonomic testing.



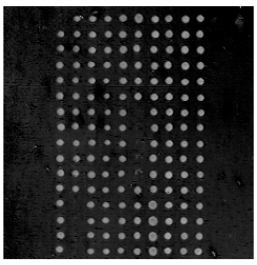
Applications using Label-Free Biosensor Imaging: Cell-Based Assays and Microarray Spot Quality Analysis

Sherine George
Department of Bioengineering

Since many pharmaceutical therapies are derived from materials with agricultural origins, there is a need for high throughput, simple, and quantitative methods for rapidly assessing the effects of plant extracts upon cancer cells. In this work, a label-free photonic crystal (PC) biosensor assay is used to monitor the density of cell attachment to the sensor surface, and to quantify changes in attached cell density induced by the introduction of extracts from medicinal plant. This image-based detection approach is used to identify plant extracts with cytotoxic effects on a pancreatic cancer cell line, using as few as 500 cells per well.



Label-free image of pancreatic cancer cells in a well



Label-free image of a section of a DNA microarray slide

In a second application, we focus on microarrays. Microarrays continue to remain an important genetic tool for applications like gene expression profiling. However, they are often limited by their susceptibility to quality related issues. Currently, very few methods are available for the quality analysis of a printed array before hybridization. Many of these methods use fluorescent labels to visualize the spots. We have demonstrated the capability of acquiring label-free images of printed DNA microarray slides prior to hybridization. We report on the use of these images for generating spot level quality information (for eg. morphology, intensity, size) and the use of this information as a means to filter out bad spots for improved microarray hybridization data reliability.

Coffee and cookies will be served