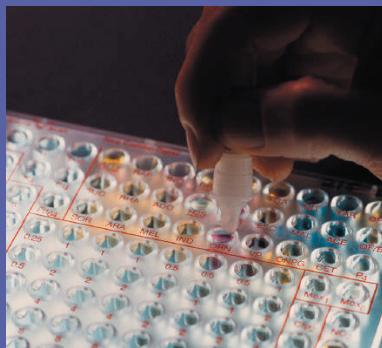

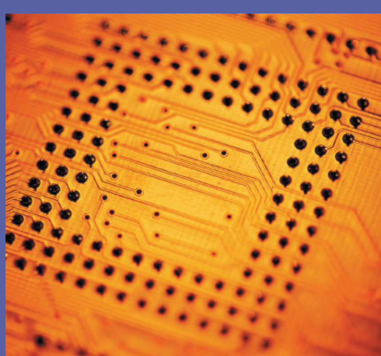

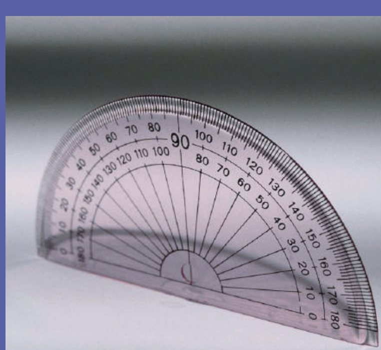

10TH SOUTHERN SCHOOL ON MATERIAL SCIENCE AND COMPUTATIONAL CHEMISTRY

APRIL 22 – 24, 2010

INTERDISCIPLINARY CENTER for NANOTOXICITY

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Microstructural studies of deformation and damage mechanisms in thermoplastics

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The use of polymeric materials in the automotive industry is continuously increasing and is more cost effective than metals and ceramics. A better understanding of the mechanical behavior and characterization of the microstructure can provide insight into the development of polymers with improved strength and toughness. This study describes the deformation and fracture study of three commercially available thermoplastics, polypropylene (PP), polycarbonate (PC), and acrylonitile-butadiene-styrene copolymer (ABS). The specimen were subjected to tensile stress and intentionally stopped at three elongation values (low, medium, and high) using tensile testing machine and sectioned into different regions. Scanning electron microscope (SEM) and optical microscope (OM) was extensively used to study the micro structural changes among the different regions of the samples at each extension in order to characterize the process of crack initiation and propagation. Other techniques, gel permeation chromatography (GPC), x-ray diffraction (XRD) and differential scanning calorimetry (DSC) were also employed to determine the molecular weight and crystallinity of the specimen.

Selective detection of breast cancer cells using multifunctionalized gold nanoparticle based colorimetric and Two-Photon Scattering assays

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Breast cancer is the most common cancer among women and it is the second leading cause of cancer deaths in them today. Early and accurate diagnosis is the key to have an effective and ultimate successful treatment of the disease. Driven by the need, in this presentation, we report for the first time a simple colorimetric and highly sensitive two-photon scattering (TPS) assay for highly selective and sensitive detection of breast cancer SK-BR-3 cell lines at a 100 cells/mL level using a multifunctional (functionalized with monoclonal anti-HER2/c-erb-2 antibody and S6 RNA aptamer-conjugated) oval-shaped gold nanoparticle-based nanoconjugate[1]. These functionalized nanoparticles are mixed with the breast cancer SK-BR-3 cell line, a distinct color change occurs and two-photon scattering intensity increases by about 13 fold. Control data with the HaCaT noncancerous cell line, as well as with MDA-MB-231 breast cancer cell line, clearly demonstrated that our assay was highly sensitive to SK-BR-3 and it was able to distinguish from other breast cancer cell lines that express low levels of HER2. The mechanism of selectivity and the assay's response change has been discussed. Our experimental results reported here open up a new possibility of rapid, easy, and reliable diagnosis of cancer cell lines by monitoring the colorimetric change and measuring TPS intensity arising from multifunctional gold nanosystems.