

Summer Research Program 2011/2012

Project Title

Synthesis and characterization of nano-metallic polymeric hybrid materials via photo and chemical initiation

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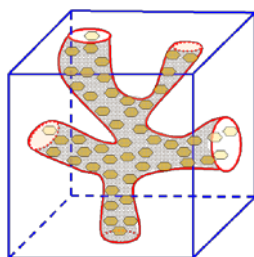
Objective

Examination of the formation of metal nanoparticles in crosslinked polymer matrices.

Description

Polymer-metal nanocomposites have applications which include medical and optoelectronic devices. This project will focus on the synthesis of hybrid polymer silver nanocomposites via photo initiated reduction of silver salts. The simultaneous formation of the polymer with the silver nanoparticles (AgNP) will help stabilize them and prevent their agglomeration. This will be monitored via the Plasmon resonance peak using Ultra Violet Visible spectroscopy (UV-Vis). This research will also concentrate on determining the location of the AgNPs within the copolymer matrix, allowing further understanding into the mechanisms of these systems. While the polymerization is underway, surface-enhanced Raman spectroscopy (SERS) will monitor the silver binding to the polymer backbone, confirming the location of the AgNPs. Other techniques that will be used to analyse the nanocomposite system will include Dynamic Mechanical Thermal Analysis (DMTA), Infrared spectroscopy (FTIR), Ultra Violet Visible Spectroscopy (UV-Vis). Further to this, the nanocomposite system's improvement in conductivity due to the nanoparticle formation will be investigated.

The Student should possess a keen interest in polymers, in particular nanocomposite systems and their applications. An ability and eagerness to learn new techniques is a must.



Schematic of predicted structure of directed metal nanoparticle formation by reaction-induced phase separation.