

# Seminar

**Title:** Silicon Nanocrystals and Plasmonic Semiconductor Nanocrystals

**Speaker:** Prof. Brain A. Korgel  
The University of Texas at Austin, USA

**Time:** 2:30-5:30 (pm) Sep. 5, 2011 (Monday)

**Place:** Meeting room 308, IPE Mansion



## Abstract

This talk will cover two topics of recent interest in my group in the general area of synthetic colloidal nanocrystal chemistry. The first is on colloidal silicon (Si) nanocrystals. We have been working to develop a colloidal synthesis of Si nanocrystals for more than a decade and it is a challenging synthesis. We have recently developed a scheme for generating hydrophobic ligand-stabilized Si nanocrystals that can range in diameter from just under 3 nm up to as large as 90 nm. Photoluminescence from the nanocrystals can be tuned from red wavelengths out to the bulk band gap of Si at 1.1 eV (~1100 nm). The second topic is plasmonic semiconductor nanocrystals. Specifically, we have found the  $\text{Cu}_{2-x}\text{Se}$  nanocrystals exhibit a strong plasmonic optical resonance in the near infrared that can be photoexcited to generate sufficient heat to induce cell death in a medical context.  $\text{Cu}_{2-x}\text{Se}$  is an indirect band gap semiconductor but can have a very high free carrier concentration due to vacancies, which gives rise to the plasmonic absorption resonance. The thermal transduction efficiency of the  $\text{Cu}_{2-x}\text{Se}$  nanocrystals was measured in comparison to gold nanoshells and nanorods.

## Introduction

Prof. Brain A. Korgel received the Ph D in the University of California at Los Angeles in 1997. From 2007, he got the Matthew Van Winkle Regents Professorship in Chemical Engineering. He was the Associate Editor of the Journal of Crystal Growth and Materials Science and Engineering: R, member of the Editorial Advisory Board of Chemistry of Materials and the Journal of Colloid & Interface Science. Prof. Brain A. Korgel researched on nanotechnology that defined as the study of material properties and interactions on a nanometer length scale. His group focuses on investigating size-tunable material properties, and the rational self-assembly and fabrication of nanostructures with atomic detail. He had been published more than 170 papers in Science, Angewandte Chemie-International Edition, Nano letters, Journal of the American Chemical Society, ACS Nano and Physical Review Letters, etc.

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