College of Engineering and Physical Sciences
Department of Chemistry

Departmental Seminar

Wednesday, April 30, at 2:30 pm
MacN 101

Prof. Yujun Shi
University of Calgary
Calgary, AB
Email: shiy@ucalgary.ca

Title: "Monometallic to Multimetallic High-entropy-alloy Nanoparticles – Fabrication, Characterization, and Applications"

Abstract: Metal Nanoparticles (NPs) have found a wide range of applications in catalysis, sensing, nanophotonics, magnetic data storage, and nanomedicine due to their unique electronic, optical, and magnetic properties. The properties of the metallic NPs depend heavily on their size, shape, and configuration within the NPs. In this talk, I will present our recent work on the fabrication of monometallic, bimetallic, and multimetallic high-entropy-alloy NPs using the top-down dewetting method of metallic thin films. The liquid-state pulsed laser-induced dewetting (PLiD) and solid-state thermal dewettting methods have both been used to produce monodispersed metallic NPs with long-range order. The size and shape control in the produced NPs will be discussed. For example, the NPs produced via PLiD are, in general, more spherical than those via thermal dewetting. For the bimetallic NPs, the configuration in the produced NPs depends heavily on the binary phase diagram of the two component elements. We have shown that Au-Ag alloyed NP were produced, whereas phase-segregated Pt-rich core/Au-rich shell NPs were formed. In addition, the capability of PLiD to produce quinary high-entropy-alloy NPs has been demonstrated in our recent proof-of-principle study. After the formation of metallic NPs using the dewetting techniques, their structural, optical, and electrochemical properties were characterized. Finally, the application of the fabricated monometallic NPs for the semiconductor nanowire growth will be presented.

Biography: Dr. Yujun Shi is Professor in the Department of Chemistry at the University of Calgary in Canada. She received her BSc and MSc in Chemistry from Soochow University in China, and her PhD from the University of Western Ontario (now Western University) in Canada. After her postdoctoral work in the Steacie Institute for Molecular Sciences at the National Research Council of Canada with an NSERC Visiting Fellowship, Dr. Shi joined the Department of Chemistry at University of Calgary as an Assistant Professor in 2003. Her research focuses on the fabrication, characterization and applications of metal nanoparticle and their arrays, development of semiconductor nanostructures, and understanding the chemical vapor deposition at a molecular level.

Coffee & Timbits will be served at 2:15 pm