Fall 2016 Joint Colloquium
Materials Department & Materials Research Laboratory

Professor Beth Guiton
Dept. of Chemistry
University of Kentucky

Friday, November 4th, 2016
11:00 am, Elings 1601

Investigating Nanostructure Synthesis Using *In Situ* TEM

We are working to develop a real-time understanding of the mechanistic steps taken during crystalline growth or transformation *via* a combination of complementary approaches which incorporate (1) knowledge gained from nanostructure syntheses we perform in the lab, with (2) *in situ* observations of key transformations implemented in real-time using ultra-high resolution transmission electron microscopy (TEM). Our *in situ* experiments include directly performing synthetic steps in the TEM, as well as determining the structural phase transformations of materials under post-synthetic processing conditions. Further, based on an unexpected observation made during one of these *in situ* measurements, we have developed a new approach to directly synthesize arrays of crystallographically well-defined nanoscale interfaces. Several examples will be presented to illustrate our approach, including: the real-time observation of the solid-state reaction of an individual nanowire; a post-synthetic structural phase transformation within an individual nanorod; and finally, the creation of new nanostructured architectures using liquid metal nanodroplets.

Bio

Beth S. Guiton is an Assistant Professor in the Department of Chemistry at the University of Kentucky (UK). After earning a B.A. in Physical Natural Sciences, and an M.Sci. in Chemistry from the University of Cambridge (United Kingdom), she earned an A.M. in Chemistry from Harvard University where she developed the first synthesis for vanadium dioxide nanowires, and a Ph.D. in Materials Science and Engineering from the University of Pennsylvania, using high resolution microscopy to investigate solid-state nanoscale materials, such as spontaneously-forming nanochessboard structures. After graduating, she was a Eugene P. Wigner Fellow at Oak Ridge National Laboratory, where she worked on high-resolution spectroscopic methods which included mapping the spatial distribution of localized surface plasmon modes. Guiton began her faculty appointment at UK in 2010 establishing a research program combining her interdisciplinary interests, using microscopy to address fundamental questions of solid-state and materials chemistry. Her group has employed local probe techniques, such as *in situ* heating in the transmission electron microscope to address questions regarding synthetic mechanisms during the creation of nanomaterials, and the precise positions of atoms and interfaces as they relate to material properties. While at UK, Guiton has also received a number of accolades which include the 2015 UK College of Arts & Sciences *Undergraduate Research Mentoring* award, a 2014 *Teacher who Made a Difference* award, a 2015 *NSF Early CAREER Award*, and recently being named an *Emerging Investigator in Materials Science* by Materials Research Express.

http://www.chem.uky.edu/research/guiton/index.php

Hosted by Ram Seshadri.