



**MICROSCOPY SOCIETY OF NORTHEASTERN OHIO, INC.**  
An affiliate society of the Microscopy Society of America and the  
Microanalysis Society

**MSNO WINTER MEETING**

**Wednesday, February 20th, 2013, 4:30 – 8:30 p.m.**

**Case Western Reserve University, Clapp Building, Room 108**  
**2080 Adelbert Road, Cleveland, OH 44106-7078**

<b>Registration</b>	<b>4:30 – 5:30 PM</b>	
<b>Presentation 1</b>  <b>Paul G. Kotula Ph.D.</b>  <b>Sandia National Laboratories</b> <b>Albuquerque, New Mexico</b>	<b>5:30 - 6:15 PM</b>	<b>Progress with Spectral Imaging and Data Analysis: From Spores to Atoms</b>
<b>Dinner</b>	<b>6:15 - 7:15 PM</b>	
<b>Presentation 2</b>  <b>LaShanda Korley, Ph.D.</b>  <b>Macromolecular Science and Engineering Dept</b> <b>Case Western Reserve University</b>	<b>7:15 – 8:00 PM</b>	<b>Lessons from Nature: Tuning Mechanics in Polymeric Materials</b>
<b>Business Meeting</b>	<b>8:00 – 8:30</b>	

**Dinner will be \$20 for members, \$25 for non-members and \$5 for student members, \$10 for student non-members. Preregistration is available at [www.msneo.org](http://www.msneo.org), or registration and payment at the door will also be available please make reservation ahead.**

## **Paul G. Kotula Ph.D.**

### **Progress with Spectral Imaging and Data Analysis: From Spores to Atoms**

Spectral imaging, where complete spectra are acquired from a series of points in 2- or higher dimensions, has matured from a fringe area of microanalysis to a standard approach in the last 15 years. Additionally, a number of data analysis tools have been developed to take full advantage of these rich data sets. This presentation will cover advances in microscopes, detectors and data analysis methods covering bulk to atomic resolution in areas as diverse as the analyses of bacterial spores and ordered oxides with a number of intermediate stops along the way.

#### **Bio:**

Paul Kotula is a staff member at Sandia National Laboratories in Albuquerque, NM. He received his B.S. from Cornell University and Ph.D. from the University of Minnesota, both in Materials Science and Engineering. Paul is an Adjunct Professor at North Carolina State University and has authored or co-authored over 90 journal articles on a wide variety of topics involving electron microscopy and microanalysis in the physical and biological sciences, as well as three patents and two book chapters. Paul has helped build a research program on spectral imaging and multivariate statistical analysis. This technology development was central to his involvement in the FBI's investigation of the 2001 anthrax attacks. The software developed from this work for X-ray microanalysis is commercially and non-commercially available and is now in over 500-labs worldwide. Paul won an R&D 100 Award in 2002, two Best Analytical Techniques paper awards in the journal *Microscopy and Microanalysis* (2003, 2006) and the Heinrich Award for Outstanding Young Scientist from the Microbeam Analysis Society.

**LaShanda Korley, Ph.D.**

## **Lessons from Nature: Tuning Mechanics in Polymeric Materials**

An understanding of the architecture and deformation behavior of natural materials gives clues to the unique interplay between structure, hierarchy, and function and influences the rational design of mechanically-tunable materials. I will highlight three recent areas of research in the group involving nature-inspired strategies for mechanical enhancement.

One important lesson from nature is the use of composite structures to impart improved mechanical behavior and enhanced functionality using nanofillers. A relatively unexplored expansion of this bio-inspired, nanoscale filler approach to high performance materials is the incorporation of responsive, multi-functional reinforcing elements in polymeric composites with the goal of combining superior mechanical behavior that can be tuned with additional functionality, such as sensing and bioactivity. We have fabricated stimuli-responsive nanocomposites utilizing these strategies with potential for therapeutic delivery and chemical/biological protection. In the case of self-assembled small molecule fillers, transmission electron microscopy (TEM) was utilized to visualize the three-dimensional scaffold, which reinforced the elastomeric matrix. For electrospun polymer composites, scanning electron microscopy (SEM) revealed the nanofiber diameter of the reinforcing, fiber network and detailed the cross-sectional structure and interfacial bonding of the nanocomposite.

Layered structures are prevalent in nature and offer a unique opportunity to probe interfacial effects, confinement, and mechanics in polymeric systems. We have utilized multilayer coextrusion to investigate the relationship between structural development and deformation behavior of block copolymers (BCPs) and semicrystalline polymers under confined conditions with impact in health care technology and packaging. Atomic force microscopy (AFM) allows us to visualize the layered structure, while confocal microscopy provides insight into the microdeformation pathway. In block copolymer systems, TEM provides evidence of the confined BCP microstructure in the layered platform.

Nature's building blocks – peptides – have also been incorporated as energy-absorbing elements in elastomeric materials. Our initial studies have addressed design strategies for hierarchical assembly and the influence of the interfacial region on mechanical behavior. These bio-inspired elastomers are currently being explored for cell scaffolding and coating technology. AFM provides information regarding the microstructure of the hierarchically-assembled peptide hybrids, which connects to the observed mechanical response.

Bio:

LaShanda Korley is Climo Assistant Professor in the Department of Macromolecular Science and Engineering at Case Western Reserve University. She received her Ph.D. in Chemical Engineering from MIT in 2005 and entered the Case Western faculty in 2007 following postdoctoral training at Cornell University. She is the recipient of CAREER (2010 ) and BRIGE (2008) awards from the National Science Foundation. In 2011, she was selected as one of eighteen DuPont Young Professors.

## Coming Meetings into 2013

**2013 May 15** – This will be a full day meeting and will be held at John Carroll University partnering with SAS/ACS/AVS in a similar format to the previous two years: One main talk and then split to 3 parallel sessions.

If you wish to present a talk or poster please contact Amir Avishai (Amir.Avishai@case.edu)

**2013 Fall** – Will take place at Kent university, One of the speakers will be Dr. Owen Lovejoy

We would like to remind you all that we have opened a [web group page on LinkedIn \(MSNO\)](#). Some of you have already found out and signed up. Please help us with this endeavor by encouraging local contacts you have to join in to discuss microscopy and spectroscopy related questions. We hope this will enable everyone follow up on the local activity. If you have any information you wish to post regarding local workshops webinars you are well come to post it there.