



# Multidimensional Microscopy - Correlative Approaches

presented by  
**Midwest Microscopy and Microanalysis Society  
(M<sup>3</sup>S)**

A local affiliate of the Microscopy Society of America and the Microanalysis Society

**Friday, November 21<sup>st</sup>, 2014**

**Baxter Healthcare Corporate  
Headquarters, Deerfield, IL**  
(Directions and map below)

**Please RSVP by Tuesday, November  
18th**

**Email your contact information to:  
Alan Nicholls  
([nicholls@uic.edu](mailto:nicholls@uic.edu))**

**Onsite Registration Fee:**

**Meeting Free for M<sup>3</sup>S members, \$20.00 for non-members, \$5.00 for students  
(Fee includes M<sup>3</sup>S membership for 2015)**

**We welcome vendor participation. Tables are available for \$100. Please contact Alan Nicholls ([Nicholls@uic.edu](mailto:Nicholls@uic.edu)) for details.**

**8:00 - 9:00AM                      Registration**

**9:00 - 9:15AM                      Welcome and Opening Remarks**

**9:15 - 10:00AM      **Understanding the Effects of Wear Particles: Lessons Learned from Postmortem Retrievals****

***Dr. Deborah Hall, Robbins and Jacobs Family Biocompatibility and Implant Pathology, Laboratory of the Department of Orthopedic Surgery, Rush University Medical Center - MAS Tour Speaker***

Total hip and knee replacements have been successful in treating the disability caused by severe osteoarthritis. However, over time joint prostheses do wear and even loosen, producing particulate wear debris. Analysis of postmortem retrieved prostheses, their surrounding tissues, and select remote organs have been most beneficial to understanding the mechanisms of wear and potentially adverse tissue reactions associated with particulate debris. The purpose of this lecture is to highlight the contributions of three postmortem retrieval studies to the current understanding of the generation and dissemination of particulate wear debris and the potential effects on local tissues and remote organs. Joint prostheses, thoracic and abdominal organ samples, and bone marrow cores were obtained postmortem from patients who had previously undergone hip or knee replacement surgery.

Undecalcified plastic embedded sections of the implants with surrounding bone as well as paraffin embedded hematoxylin & eosin stained sections of the organs and marrow samples were prepared and studied using light and scanning electron microscopy. Wear particles in the tissues were identified using polarized light, energy dispersive x-ray analysis and laser Raman microprobe spectroscopy. The bearing surfaces of the implants were examined with

## Multidimensional Microscopy – Correlative Approaches

light microscopy at magnifications of 10-50X. The results of the first retrieval study revealed that design changes in third generation cementless acetabular components significantly reduced backside wear of the polyethylene bearing surface and the incidence of osteolysis in periacetabular bone ( $p \leq 0.014$ ). The second retrieval study identified systemic distribution of metal and polyethylene particles to the liver, spleen and abdominal lymph nodes of patients with total hip and knee implants. The results of the third study indicated that prosthetic wear can disseminate from the local site of generation to bone marrow throughout the body. These results stress the importance of reducing particle generation at both bearing and non-bearing surfaces of joint replacement prostheses. Wear particles were shown to be disseminated to remote organs and throughout the marrow and retained for the life time of the joint replacement patient. Improved prosthetic designs and material wear properties can lengthen implant durability and aid in minimizing the amount of wear particles produced.

**10:00 – 10:30AM** 3View

*Steve Nagy, Account Manager, Gatan Inc.*

**10:30 – 11:00** Break – Visit with Vendors

**11:00 – 11:30AM** RISE microscope (combined Raman and FESEM)

*Edward Principe, Product Manager, Tescan*

**11:30– 12:00PM** Correlative X-ray Microscopy

*Arno Merkle, Sr. Manager, Research Market Segment, Carl Zeiss X-Ray Microscopy*

**12:00– 12:30PM** Multidimensional Imaging Approaches for Understanding the Cellular Microenvironment

*Kevin Eliceiri, Laboratory for Optical and Computational Instrumentation, University of Wisconsin*

**12:30 – 1:45PM** Lunch – Visit with Vendors

**1:45– 2:15PM** Single Particle Reconstruction and Electron Tomography

*Desiree Benefield, Morgridge Institute for Research, University of Wisconsin*

**2:15 – 2:45PM** Atom Probe Tomography

*Isabelle Martin, Application Engineer, Cameca*

**2:45 – 3:15PM** Pharmaceutical Intellectual Property Litigation and the Power of Correlative Microscopy

*Steve Goodman, Chief Scientific Officer, Microscopy Innovations, LLC*

**3:15 – 3:30PM** Break

**3:30 – 4:00PM** Correlative Light and Electron Microscopy – Hardware and Workflow Approaches

*Gregor Heiss, PME – Correlative Microscopy, FEI*

**4:00 – 4:30PM** Atom Probe Tomography

*Dieter Isheim, NUCAPT, Northwestern University*

## Multidimensional Microscopy - Correlative Approaches

### Directions to Baxter Corporate Headquarters: 1 Baxter Parkway, Deerfield Illinois, 60015

**From South (O'Hare Airport):** I-294 (Tri State Tollway) north to the merge with I-94 (west) towards Milwaukee. North on I-94 to Lake Cook Road exit. Turn left (west) to first light, Saunders Road. Turn right on Saunders to Baxter Parkway. Turn right on Baxter Parkway. Keep to the right. Follow the special event parking signs in the garage. See Deerfield Campus Map and proceed to "Cafeteria, Auditorium, Reception" building on ground level.

**From South (Edens):** North to the merge with I-94 (west) towards Milwaukee on Edens Spur. Exit on Deerfield Road. Turn left (west), then take left on Saunders Road. Turn left on Baxter Parkway. Keep to the right. Follow the special event parking signs in the garage. See Deerfield Campus Map and proceed to "Cafeteria, Auditorium, Reception" building on ground level.

**From North (Milwaukee):** From I-94 east, going south towards Chicago exit at Lake Cook Road exit. Turn right (west) to first light, Saunders Road. Turn right on Saunders to Baxter Parkway. Turn right on Baxter Parkway. Keep to the right. Follow the special event parking signs in the garage. See Deerfield Campus Map and proceed to "Cafeteria, Auditorium, Reception" building on ground level

