

Save the date: April 17-18, 2013

Northwestern University, Evanston, IL

Wednesday, 4/17/13 - Scientific Sessions

Location: Norris University Center, McCormick Auditorium, First Floor, 1999 Campus Drive, Evanston, IL 60208

7:45–8:15 a.m.

Registration; Continental Breakfast

8:15 a.m.

Introductory Remarks: Prof. Vinayak Dravid, Materials Science & Engrg., Northwestern University; Director, NUANCE

8:15–8:30 a.m.

Welcome: Jay T. Walsh, Vice President for Research, Northwestern University
Stephen Minne, Sr. Director, Application Development & Training, Bruker Nano Surfaces

8:30–9:10 a.m.

Keynote/Plenary Address: *A Chemist's Approach to Nanofabrication: Towards a "Desktop Fab"*
Prof. Chad Mirkin, Northwestern University, Evanston, IL

SESSION I: PHOTOVOLTAICS AND GREEN ENERGY

Session Chair: Prof. Mark Hersam, Northwestern University, Evanston, IL

9:15–9:55 a.m.

Probing Local Dielectric Properties: From Ambient Protein Monolayers to High Temperature Reactions

Prof. Dawn Bonnell, University of Pennsylvania, Philadelphia, PA

10:00–10:40 a.m.

Functional Imaging of Nanostructured Solar Cells

Prof. David Ginger, University of Washington, Seattle, WA

10:45–11:00 a.m.

Coffee Break

SESSION II: QUANTITATIVE NANOSCALE MEASUREMENTS

Session Chair: Prof. Vinayak Dravid, Northwestern University, Evanston, IL

11:05–11:45 p.m.

Translational Studies of Quantitative Cellular Biomechanics in Pulmonary Endothelium

Prof. Joe Garcia, Institute for Personalized Respiratory Medicine, University of Illinois, Chicago, IL

12:00–1:00 p.m.

Lunch - Norris Center (Registered guests and Speakers only)

1:00 – 2:00 p.m.

Poster Session: Norris Center, Louis Room, 2nd Floor, 1999 Campus Drive, Evanston, IL 60208

2:05–2:45p.m.

Force Nanoscopy of Living Cells

Prof. Yves DuFrene, Université Catholique de Louvain, Belgium Institute of Condensed Matter and Nanosciences

SESSION III: ULTRA HIGH RESOLUTION IMAGING

Session Chair: Prof. David Ginger, University of Washington, Seattle, WA

2:50–3:30 p.m.

Multi-Harmonic Atomic Force Microscopy for Quantitative Mapping of Local Properties

Prof. Arvind Raman, Purdue University, West Lafayette, IN

3:35–4:15 p.m.

Multi-Parametric Force Mapping of Biological Systems to Molecular Resolution

Prof. Daniel Mueller, Swiss Federal Institute of Technology, Switzerland

4:20–4:35 p.m.

Coffee Break

SESSION IV: NEW PROBE INSTRUMENTATION-FROM HIGH SPEED TO CHEM ID

Session Chair: Dr. Stephen Minne, Bruker Nano Surfaces

4:40–5:20 p.m.

Moving Spatially Resolved Ambient Surface Sampling/Ionization – Mass Spectrometry to the Nanoscale: Approaches and Challenges

Prof. Gary J. Van Berkel, Oak Ridge National Laboratory, Oak Ridge, TN

5:25–6:05 p.m.

Advance of Scanning Probe Technology in Industrial Applications

Chanmin Su, Director of Technology, Bruker Nano Surface Division, Santa Barbara, CA

6:10–6:25 p.m.

Closing Remarks:

Dr. Gajendra Shekhawat, Research Associate Professor, Materials Science & Engrg., NU

Dr. Chanmin Su, Director of Technology, Bruker Nano Surfaces

Seeing at the Nanoscale with NUANCE

Exploring the Future of Nanotechnology
Using SPM & Related Techniques



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Thursday, 4/18/13 - Demonstration Sessions – (4) 1-hr (concurrent) sessions repeated 4X

Location: Norris University Center, Louis Room, Second Floor, 1999 Campus Drive, Evanston, IL 60208

7:45–8:15 a.m. Continental Breakfast

8:15–9:45 a.m. Overview Presentation

10:00–12:00 p.m. Demonstration Sessions: BioScope Catalyst, MultiMode 8, Dimension Icon & Dimension

1:00–3:00 p.m. Demonstration Sessions: BioScope Catalyst, MultiMode 8, Dimension Icon & Dimension

BioScope Catalyst (Combined AFM and Optical Imaging)

Presenter: James Shaw, Bruker Nano Surfaces

The BioScope™ Catalyst™ Atomic Force Microscope (AFM) is the highest performance life science AFM on the market. Designed for operation on an inverted light microscope, the Catalyst can be fully integrated with a wide variety of optical techniques (bright field, phase contrast, DIC, and epi- and confocal fluorescence, etc.) and offers researchers unique opportunities for combined AFM and optical imaging experiments. In this session, we will demonstrate the power of Bruker's exclusive MIRO (Microscopy Image Registration and Overlay) Software. Optical images can be used in real-time to guide the AFM probe to regions of interest on a sample for high resolution imaging and/or nanomechanical properties measurements. We will also demonstrate the new Nanomechanical Tool Box that allow researchers to measure mechanical properties of biological specimens through either single force spectroscopy, force volume, or Peak Force Capture at ease. The new improved software capability allows batch processing of single force indentation curves or real-time display of elasticity or adhesion maps.

Multimode 8: Quantitative Nanomechanical Measurement

Presenter: Eric Rufe, Bruker Nano Surfaces

This tutorial will use the Multimode 8 to demonstrate the use of PeakForce Tapping mode to measure quantitative mechanical properties. PeakForce QNM enable the user to simultaneously measure modulus, adhesion, dissipation and deformation data while imaging topography at high resolution. Direct force control keeps the imaging force low, which limits indentation depths to deliver non-destructive imaging. This allows material properties to be characterized over a wide range to address samples in many different research areas. Quantitative mechanical data are derived from the measured force interactions by fitting appropriate indentation model along with accurate calibration of cantilever spring constant and tip radius. The technique will be demonstrated with different polymer samples, along with a discussion of direct and indirect calibration methods.

Dimension Icon (Nanoelectrical Measurements)

Presenter: Senli Guo, Bruker Nano Surfaces

This tutorial will give an overview of the recent advances in SPM-based electrical characterization methods or configuration, including the PeakForce TUNA, PeakForce KPFM and Photoconductive AFM. The capabilities and benefits of the new methods will be illustrated and explained. Typical results collected on a variety of research samples by these methods will be displayed. The operation of these new approaches will be demonstrated on the Dimension Icon, the latest generation of AFMs from Bruker. Practical aspects such as sample preparation, tip selection, experimental parameters and measurement environment will also be discussed upon request.

Dimension FastScan-Bio (High Speed Imaging of Biological Dynamics)

Presenter: John Thornton, Bruker Nano Surfaces

This tutorial will use the Dimension FastScan Bio AFM to demonstrate the use of high speed imaging in life sciences. This instrument is designed to break long-standing barriers to providing routine high-resolution research of biological dynamics, with temporal resolution up to 3 frames per second for live sample observations. These breakthroughs allow high-resolution and high-speed scanning for the observation of molecules, proteins, DNA, RNA, living cell membranes and tissues, and many other dynamics studies.

Imaging in fluid will be shown for both TappingMode and PeakForce imaging. Special attention will be given during this tutorial to show the user interface and hardware features which enable the ease of use for high speed imaging for biological applications. Some of these items include a seamless user interface for panning and zooming, along with a real-time movie maker and closed fluid cell. A background of high speed imaging will be discussed along with refinements to the FastScan Bio instrument for this application area.