

Biological Sciences Tutorials

ORGANIZER: ALICE DOHNALKOVA

X-41 CRYO-FLUORESCENCE: A TOOL FOR CORRELATIVE CRYO-LIGHT AND CRYO-ELECTRON MICROSCOPY

ORGANIZER: CINDI L. SCHWARTZ

Tuesday, August 5, at 10:30 AM
La Cienega Room

Cryo-electron microscopy visualizes vitrified cellular ultra-structure in a near-to-native state, but is plagued by low contrast, electron beam damage, and difficulty locating specific regions of interest. This is particularly true for smaller structures or spatially rare events. Unlike fluorescence microscopy where proteins can be tagged by GFP and other labels, high-density labels for cryo-EM are still under development. This tutorial will cover the basic use of a new tool, the cryo-light microscope stage, which now allows one to image fluorescence at cryo-temperatures and correlate these regions/events of interest for later visualization in the electron microscope. Samples that are amenable to this technique will be discussed.

X-42 LIVE CELL IMAGING LIMITATIONS

ORGANIZER: SIMON WATKINS

Monday, August 4, at 2:00 PM
La Cienega Room

This tutorial will discuss the limits and potentials of live system imaging from the single molecule to the whole animal. What is easy, what is hard, what is impossible. What is rational and what is just plain silly. Examples of what is practical will be given.

Physical Sciences Tutorials

ORGANIZER: GREGORY THOMPSON

X-51 ELECTRON BACKSCATTER DIFFRACTION: OPERATION AND APPLICATIONS

ORGANIZER: DAVID FIELD

Tuesday, August 5, at 9:00 AM
La Cienega Room

Electron backscatter diffraction (EBSD) has gained tremendous popularity in the past couple of decades. With improvements in sensor technology and computing speed, EBSD mapping is approaching real time (similar to slow scan microscopy), and *in-situ* studies and three-dimensional data collection are now possible (even routine). These possibilities open new opportunities and challenges for EBSD users. This tutorial focuses upon the physics of backscatter diffraction and the type of data that are obtained, as well as applications such as phase analysis, observation of *in-situ* structure evolution, and the collection and analysis of three-dimensional data sets.

X-52 ELECTRON-PROBE MICROANALYSIS (EPMA): AN OVERVIEW FOR BEGINNERS AND A STATUS REPORT FOR EXPERTS

ORGANIZER: PAUL CARPENTER

Wednesday, August 6, at 10:30 AM
La Cienega Room

Electron-probe microanalysis (EPMA) couples the imaging capabilities of a scanning electron microscope with quantitative analytical capabilities. Significant advances in hardware and software have resulted in better system stability, analytical sensitivity (especially for light elements), spatial resolution, and automation capabilities. X-ray compositional mapping has blossomed with the new high throughput SDDs in concert with WDS. New cathodoluminescence detectors have improved spectral and imaging capabilities. Advances in correction algorithms have resulted in the ability to analyze stratified samples and particulates with improved accuracy. This overview will summarize the techniques and provide ideas for future research and applications.

X-53 LORENTZ MICROSCOPY—A VERSATILE TECHNIQUE FOR STUDYING MAGNETIC MULTILAYERS, ELEMENTS AND NANOWIRES

ORGANIZER: JOHN CHAPMAN

Tuesday, August 5, at 10:30 AM
La Cienega Room

A rich diversity of magnetic phenomena is observed when magnetic thin films are either laminated or patterned into small elements or wires. Not only does the domain structure change, but so does the structure of the domain walls. Transmission electron microscopy, through Lorentz microscopy, has played a pivotal role in understanding these changes. This tutorial will review the principal imaging techniques in use, with illustrations taken from magnetic nanosystems of current interest. The importance of *in-situ* experimentation, generally involving field variation, and of combining experimental data with that obtained from modelling, will be stressed.

Joint Tutorials

ORGANIZERS: ALICE DOHNALKOVA AND GREGORY THOMPSON

X-60 STEREOLOGICAL CHARACTERIZATION OF THE GEOMETRY OF THREE DIMENSIONAL MICROSTRUCTURES

ORGANIZER: ROBERT. T. DEHOFF

Wednesday, August 6, at 2:00 PM
La Cienega Room

Geometry of microstructure, an important factor in determining performance in both material and life science, is usually deduced from two dimensional samples of the structure obtained by sectioning the material or by observing projected images of thin sections or external surfaces. [Another alternative, serial sectioning, will not be discussed here.] Stereology connects geometry measured on two dimensional images and the geometry of parent three dimensional microstructure in both a quantitative and unbiased manner. This tutorial will presents the list of geometric properties that can be defined unambiguously for arbitrary microstructures, review methods for quantitatively estimating these properties, discuss sampling processes required to avoid bias, and explore possible applications.

X-61 IMAGEJ, A USEFUL TOOL FOR IMAGE PROCESSING AND ANALYSIS

ORGANIZER: JOEL B. SHEFFIELD

Wednesday, August 6, at 9:00 AM
La Cienega Room

ImageJ is a Java-based image processing program developed at the NIH. It is freely available, open source, and has a community of over 1,000 participants who contribute plugins, macros, and general suggestions to a dynamic user community. It will run on many platforms, from Macintosh

to Unix to Windows. The program has many applications, and is a valuable resource for users in diverse fields from education to complex analysis. The symposium will introduce the basics of the use of ImageJ, and present examples, ranging from basic to complex, of applications of the core program, and then the development of plugins and macros for specific purposes. Specific topics for discussion include: applications to education, use of the program for a central microscopy facility, approaches to co-localization analysis, Fourier analysis, image segmentation, and 3-D visualization. The tutorial will then be open to the discussion of topics raised by the attendees.

X-62 JOB HUNTING FOR SCIENTIFIC PROFESSIONALS

ORGANIZER: BEV MALEEFF

Tuesday, August 5, at 1:30 PM
La Cienega Room

You're a technologist seeking a more senior lab position, or a grad student ready to embark on your professional career. What do you do to present yourself as a potential valued employee? The purposes of this tutorial are to provide guidance for preparing a professional curriculum vitae, offer ways to prepare for an interview, and describe how to conduct yourself during the interview. A mock interview will be conducted with some "do's and don'ts" to illustrate the points being presented.