

**Organizer: Eric Stach**  
(Additional Fees are Required)

**X-11 METALLOGRAPHIC INTERPRETATION FOR  
MEDICAL DEVICES**

*INSTRUCTORS: GABE LUCAS AND FRED SCHMIDT*

**8:00 AM, LA CIENEGA ROOM**

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Due to the special challenges you face in the medical device industry, traditional materials testing methods do not work without modification. Test limitations caused by the smaller components used in medical devices and other factors require more advanced and more accurate metallographic examination techniques. Upon completion of this course, you should be able to select the appropriate preparation procedures for specific materials, reveal the true microstructure through choosing the correct etchant, and characterize the resulting microstructure. The afternoon session will present examples of metallography of device failures including fractographic analysis.

**X-12 FAILURE ANALYSIS AND EVIDENCE  
PRESERVATION BY METALLOGRAPHY**

*INSTRUCTOR: FRED SCHMIDT*

**8:00 AM, PECOS ROOM**

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Metallography often plays a major role in the forensic materials evaluation of "failures" and can be the basis for controversial opinions. Sometimes improper handling of artifacts in evidence, improper specimen preparation, and even improper polishing/etching can create false optical and SEM effects and observations. Actual examples will be discussed in the context of general materials, ferrous and non-ferrous metals, coatings, and ceramic materials. The affirmative use of acetate replication and other modeling (replica) materials will be discussed as preservation methods. The methods will be compared to the ASTM guides. The audience may bring examples from their practice for discussion.

**X-13 HOW TO ORGANIZE AND RUN A FAILURE  
INVESTIGATION**

*INSTRUCTOR: DANIEL DENNIES*

**8:00 AM, MESILLA**

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The initial steps of a failure investigation set the direction and either ensures a successful investigation or dooms it to failure. This course provides the steps to organize a failure investigation and ensure success. Failure investigation is an integral component of any design or manufacturing business, large or small. However, a poorly organized failure investigation may not provide the necessary information to solve a manufacturing problem or assist a redesign. This course teaches a proven systematic approach to failure investigation, utilizing examples from industry. It is a learning platform for personnel from all disciplines: materials, design, manufacturing, quality and management.

**X-14 LIVE CELL IMAGING USING FLUORESCENCE  
METHODS**

*INSTRUCTOR: SIMON WATKINS*

**8:00 AM, PICURIS ROOM**

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Microscopic imaging tools are one of the principal methodologies that may be applied to the living system. This day-long workshop concentrates on live cell imaging using fluorescence methods, focusing on optimization of the entire microscope system. This includes optimization of the stand with the addition of automation and optimized objectives and detectors. Lectures on the fluorescent proteins will be presented as well as discussions of the merits of newer methods such as TIRF and multiphoton imaging. Demonstrations using cutting edge integrated systems from the major manufacturers will conclude the lectures: hands on experience of the power of live cell imaging approaches.

**X-15 IMAGING AND ANALYSIS WITH A VARIABLE PRESSURE (VPSEM) OR ENVIRONMENTAL SEM (ESEM)**

*INSTRUCTOR:* BRENDAN J. GRIFFIN

8:00 AM, CIMARRON ROOM

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This short course aims to take the challenge out of imaging in variable pressure SEM mode. We will sequentially address VPSEM column components and operation, electron (SE and BSE), light (CL) imaging and X-ray analysis strategies and detectors for both biological and materials samples. Procedures for monitoring instrument performance and optimising image quality will then be presented. Examples of the novel charge-related contrasts available in VPSEM will also be discussed. The appropriate use of hot, cool and cold stages is included. The course will conclude with invited manufacturer presentations on new developments. A CD with lecture PDFs is provided.

**X-16 3-DIMENSIONAL ELECTRON MICROSCOPY (3DEM) IN LIFE AND MATERIAL SCIENCE—IN-DEPTH TUTORIAL ABOUT TOMOGRAPHY—BASICS AND METHODS**

*INSTRUCTORS:* JUERGEN M. PLITZKO AND

BRAM KOSTER

8:00 AM, SAN MIGUEL ROOM

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This short course will explain the basics of tomography, the experimental setups and instrumental prerequisites for three-dimensional work, and the actual solutions. Bright field-, energy-filtered, and STEM tomographic methods for biological applications under low-dose cryo-conditions will be described and explained in detail, as well as their younger “offsprings” in material science. Since all tomographic methods are based on different reconstruction algorithms, and elaborate image processing and visualization routines, these will be included in this tutorial as well. We intend the course to be of interest to both beginners and already-experienced users of electron tomography.

**X-17 DIGITAL IMAGING 101: SCIENTIFIC IMAGING WITH PHOTOSHOP**

*INSTRUCTOR:* JOHN MACKENZIE

8:00 AM, GALISTEO ROOM

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The workflow for digital imaging using Adobe Photoshop for display, prints, reports, posters, and publication will be presented. The course will demonstrate that gamma correction is critical for achieving publication quality prints. We will discuss how to acquire the best digital image for a given sample. Resolution issues will be discussed in detail. We will discuss best practices for archiving images, as well as formats and standards. We will emphasize several issues that must be understood in order to produce high quality images every time on any printer. We will discuss the most affordable solutions and discuss methods of obtaining true metrics of performance.

**X-18 DIGITAL IMAGING 102: IMAGE PROCESSING AND ANALYSIS**

*INSTRUCTOR:* JOHN RUSS

8:00 AM, AZTEC ROOM

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An intensive step-by-step illustration of the various steps involved in enhancing images for presentation and extracting numeric data from them for analysis. The emphasis will be on comparison between various approaches applied to representative images, with little theory. Morning: A survey of the principal techniques for image processing will cover spatial domain operations, showing their use for removal of random noise, correction of nonuniform brightness, enhancement of edges and local detail, etc. Afternoon: Thresholding of images, and processing of the binary images using morphological operations, will be used to delineate features of interest for measurement. Feature-specific measurements provide data on object density (or color), position, size and shape.