HELIUM ION MICROSCOPY – A NEW TOOL IN THE SCIENTIST’S TOOLKIT

The Helium Ion Microscope: Technology Introduction and Product Update
Dr. Mohan Ananth, Carl Zeiss SMT, Inc.

The helium ion microscope has been described as an impact technology offering new windows into nanoscale imaging. Combining a high brightness ion source with unique sample interaction dynamics, the helium ion microscope provides images offering unique contrast and complementary information to existing charged particle imaging instruments such as the SEM and TEM. Formed by a single atom at the emitter tip, the helium probe can be focused to below 0.25nm offering the highest recorded resolution for secondary electron images. The small interaction volume between the helium beam and the sample also results in images with stunning surface detail. We will introduce the helium ion technology and explore some of the unique information this technology provides. We will share our vision for this product and give an update on how this tool is being used by researchers worldwide.

Application of the Helium Ion Microscope to Biological Sciences
Dr. Daniel Pickard, National University of Singapore

The Helium Ion Microscope (HIM) is a new imaging technology based on high brightness and stable Gas Field Ion Source (GFIS). We have applied this novel technology across a broad spectrum of multidisciplinary applications to assess its utility and advantages over alternative techniques. One area where our investigations have gained significant traction is in the imaging of biological specimens. The utility of this instrument in addressing topics of the biological sciences is due in part to the HIM’s high spatial resolution. However, in the context of biological specimens, it is the ability to image non-conductive samples without the application of a metal (or other conductive) overcoat and without the need of a background gas (both of which degrade resolution and surface details) which has proven to be a distinguishing attribute. In terms of scientific problems that are being investigated, we have initiated studies in cellular biomechanics where we are exploring the detailed organization of the actin cytoskeleton in cell motility, in bacterial pathogenesis where we are studying the bacterial invasion of epithelial cells and how the bacteria bind to the epithelial cells in the invasion process, and in health effects on engineered nanoparticles where we are tracking the transportation and aggregation/disaggregation of nanoparticles within exposed rodents.