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Scanning Microscopies 2014

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Michael T. Postek, National Institute of Standards and Technology (United States)
Tim K. Maugel, University of Maryland, College Park (United States)

Introduction

The SPIE Scanning Microscopies 2014 symposium (Conference 9236) brought microscopists from all aspects of scanning microscopies, from scanned optics and probes to scanned particle beams, together in a single forum to discuss current research and new advancements in the field. For the first time, in 2014 Scanning Microscopies was co-located with SPIE Photomask Technology in Monterey, California, United States. The co-locating of the two conferences was very synergistic because of the reliance of the photomask industry on scanned microscopies, so two joint sessions were designed to take advantage of potential technology transfer between the two conferences.

The Scanning Microscopies conferences have been typically instrument- and technique-intensive. With that in mind, two joint sessions with the Photomask Technology symposium (Conference 9235) were designed to "cross-pollinate" between the two conferences. Invited presentations of joint conference interest were offered, such as: "3D Monte Carlo modeling of the SEM: Are there applications to photomask metrology?" (9236-1), "Three-dimensional SEM metrology at 10nm" (9236-16), "Assessing the viability of multi-column electron-beam wafer inspection for sub-20nm defects" (9236-14), and "Photomask linewidth comparison by PTB and NIST" (9236-15). In addition, there were a number of general, tutorial-like, invited presentations, such as: "Rigorous quantitative elemental micro-analysis by scanning electron microscopy/energy dispersive x-ray spectrometry (SEM/EDS)" (9236-17) and "Does your SEM really tell the truth? Part 3" (9236-4), which discussed some of the basics of measurement and energy dispersive x-ray microanalysis in the scanning microscope.

This year, Scanning Microscopies 2014 awarded Dr. David C. Joy, Distinguished Professor of the University of Tennessee and Distinguished Scientist of the Oak Ridge National Laboratory, the **2014 Professor Sir Charles Oatley Memorial Award**: "*In recognition of his extraordinary contributions to scanning microscopy (electron and ion), including high resolution SEM, low voltage SEM, helium ion microscopy, electron- and ion-beam- specimen interactions, and SEM applications to semiconductor and magnetic materials. His tireless efforts to educate, inform, and inspire his students and colleagues have enormously advanced the field of microscopy*."

The Scanning Microscopy 2013 conference was quite successful, but this year the number of papers exceeded those from the previous DSS conference by nearly a factor of two. A diverse offering of papers covering forensics applications, scanning electron microscopy, helium ion microscopy, scanned probe microscopy, scanned optical microscopy and particle beam microscopy, and electron beam interaction modeling were presented. The "Microscopy for STEM Educators" workshop, initially introduced at DSS 2012, continued in 2014. The

session consisted of presentations on the successful implementation of microscopy in the classroom. In a follow-up session, teachers were able to use a table-top scanning electron microscope and atomic force microscope to examine material they had brought with them. The “Microscopy for STEM Educators” workshop provided the opportunity for an introduction to analytical techniques traditionally only available in the research laboratory, and to see unprecedented images of everyday materials, to expand teachers’ understanding of what is possible in the laboratory and classroom. The workshop was broken into a series of presentations and a laboratory session. The presentations discussed the successful applications of advanced scientific instrumentation to engage the learners and promote next-generation science standards inquiry. Following the “Microscopy for STEM Educators” workshop, teachers had the opportunity to visit the Exhibit Hall, where they were encouraged to ask questions of the manufacturers and take advantage of the handouts.

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