Applications of Synchrotron X-ray Imaging to Biological and Environmental Sciences

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ABSTRACT

X-ray microscopes are unique tools for the investigation of biological and environmental specimen. They employ a variety of contrast modes (e.g., absorption-, phase-, fluorescence-, dark field contrast) to obtain unique information about a specimen, ranging from high-resolution 3-D images of biological ultrastructure to element-specific images harboring molecular-scale chemical information. A family of imaging beamlines is being developed at the NSLS-II at Brookhaven National Laboratory to cover a broad range of energy and spatial scales. Recent applications to biological and environmental sciences will be presented with an emphasis on X-ray Fluorescence Microscopy.

BIOGRAPHY

Ryan Tappero earned a B.S. in Soil Science and a M.S. in Soil Chemistry at Cal Poly, San Luis Obispo, and a Ph.D. in Environmental Soil Chemistry at the University of Delaware in the laboratory of Dr. Donald L. Sparks. His research focuses on the transformation, speciation and bioavailability of trace elements in soil and the rhizosphere, and the mechanisms of uptake, metabolism and tolerance in plants. After conducting postdoctoral research at the National Synchrotron Light Source (NSLS) under the direction of Dr. Lisa Miller, he assumed the position of Spokesperson and Lead Scientist at Beamline X27A. Ryan works to develop synchrotron-based X-ray imaging methods and apply them to problems in biogeochemistry. At the National Synchrotron Light Source-II (NSLS-II), he serves as the Lead Scientist for the XFM beamline, an X-ray Fluorescence Microscope optimized for the biological, geological and environmental science communities. He is also a development team member for the Tender-Energy Spectroscopy (TES) beamline at NSLS-II.