357a Probing the Chemistry and Structure of Interfaces Utilizing Synchrotron Based Surface Science

Joseph L. Lenhart and Daniel Fischer

Sandia National Laboratories and the National Institute of Standards and Technology have engaged in collaboration to build an advanced surface science beam line at the National Synchrotron Light Source at Brookhaven National Laboratories. The objective of this research is to develop analysis capabilities that can probe interfacial regions with improved chemical resolution, chemical sensitivity, and spatial resolution over existing techniques. The new beam line which is currently being refurbished will perform at an energy range of (1000 to 8000) eV and have two capabilities, Near Edge X-ray Absorption Fine Structure (NEXAFS) and X-ray Photoelectron spectroscopy (XPS). Progress and initial measurements on the new beam line will be highlighted. Research is also being conducted on an existing low energy NEXAFS beam line (180 to 1200 eV). This energy range is appropriate for core level transitions in low Z elements (carbon, nitrogen, oxygen, and fluorine). Examples will be presented utilizing the low energy beam line to probe interfacial regions in photolithographic films, thin organic films, metal oxide bilayers, and epoxy composites. The synchrotron light source provides high intensity and variable energy incident radiation, which will enhance, signal, peak resolution, spatial resolution, and depth-profiling capabilities compared to standard laboratory instruments.