Acquisition of an Imaging X-Ray Photoelectron Spectrometer for Materials Research

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A group of investigators at Duke University were granted funding to purchase an imaging X-ray photoelectron spectrometer (XPS) for the shared use of faculty. No such instrumentation existed at Duke University for shared use. A significant number of the core investigators have used XPS at other institutions. The Kratos AXIS Ultra allows X-ray photoelectron spectroscopy of both conductors and insulators with an energy resolution of <1 eV and a spatial resolution of ≥2 μm. This instrument is critical for the research of ten faculty at Duke University in the following departments: Biochemistry (Hellinga), Biomedical Engineering (Chilkoti and Reichert), Materials Science and Engineering (Zauscher and Clark), Electrical Engineering (Massoud), and Chemistry (Craig, Grinstaff, Liu, and Pirrung). The instrument will be located in the newly inaugurated Materials Analysis and Fabrication Facility in the Levine Science Research Center at Duke University, and it will be used in diverse projects that require high-resolution, surface-sensitive chemical spectroscopy and chemical state imaging including: (1) self-assembled monolayers on gold and silicon, (2) micropatterned biological ligands on biomaterials fabricated by soft lithography, (3) ultrathin polymer films created by grafting and surface-initiated polymerization, (4) dendrimer-functionalized surfaces, and (5) characterization of the surface modification steps involved in dip pen lithography of carbon nanotubes, conducting polymers, and of biomolecules on surfaces.