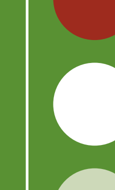
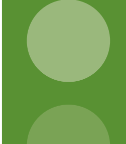
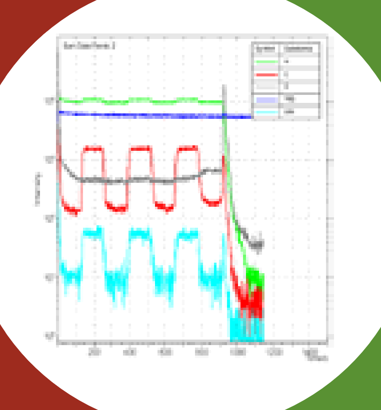
CAMCOR

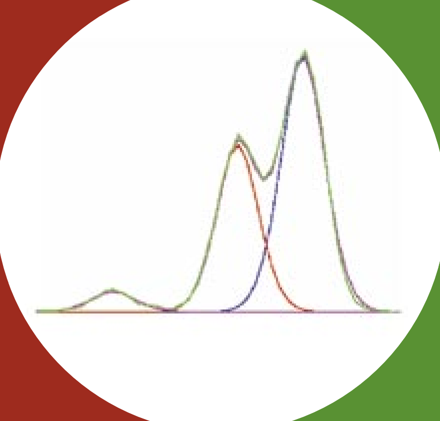
Surface Analysis Facility University of Oregon





ToF SIMS
XPS
AFM





Director:
Stephen Golledge, Ph.D.
http://materialscience.uoregon.edu/camcor.htm

The Surface Analytical Facility

is a component of the Center for Advanced Materials Characterization in Oregon (CAMCOR).

The CAMCOR facilities comprise a comprehensive suite of capital-intensive instrumentation for the characterization of cutting-edge materials, operated by dedicated expert personnel. The facilities are available to academic and industrial researchers.

CAMCOR Mission Statement

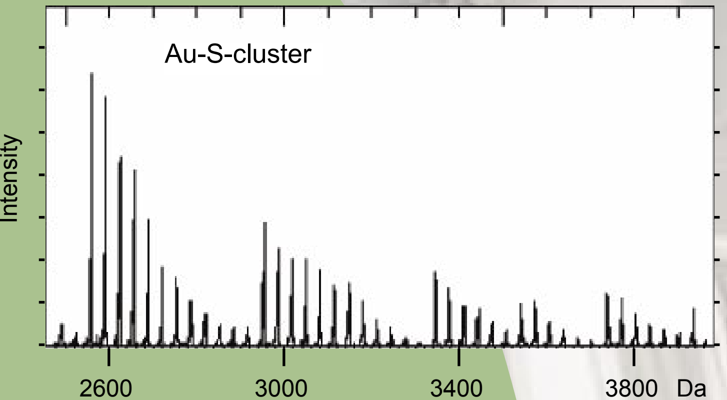
- To provide state-of-the-art materials characterization facilities to researchers at regional academic institutions and companies
- To foster collaborative interactions between faculty and researchers at academic institutions and industries
- To provide short courses and workshops on characterization techniques and provide hands-on training facilities for the participants

Primary Surface Analytical Instrumentation Available

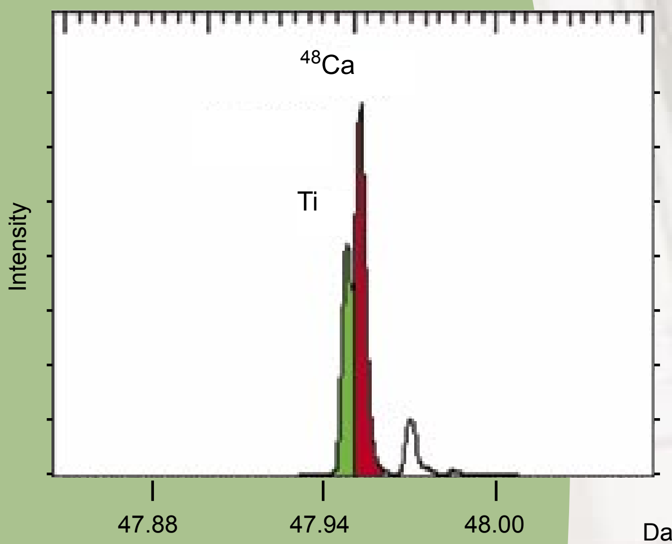
- Time-of-Flight Secondary Ion Mass Spectrometry: ION-TOF IV with polyatomic primary ion source and depth profiling capability
- X-Ray Photoelectron Spectroscopy: Kratos Hsi with monochromatized Al and non-monochromatized Al and Mg sources
- Atomic Force Microscopy: Nanoscope IIIa

Time-of-Flight Secondary Ion Mass Spectrometry (ToF SIMS)

- A mass spectrum of the outermost 15Å of a surface
- Identification of structural units present at the surface (e.g. monomeric components and repeat units)
- Fingerprint identification of polymers
- Information on surface degradation and contamination
- Spatial imaging of the surface chemistry



Part of a mass spectrum from a C12 thiol self-assembled monolayer on gold



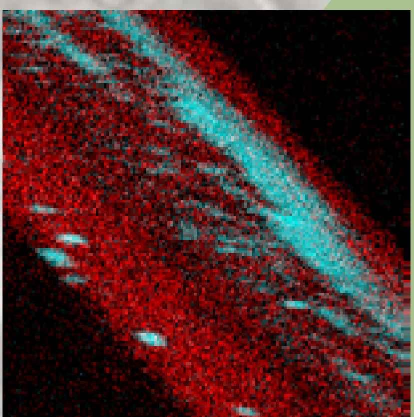
Mass resolution in this spectrum from an insulating mineral sample is sufficient to resolve the ^{48}Ti and ^{48}Ca peaks, which differ in mass by 0.005 a.m.u.

The CAMCOR facilities house a wide array of other analytical techniques and supporting instrumentation, including: Transmission and Scanning Electron Microscopy, Electron Probe Microanalysis, Spectroscopic Ellipsometry, X-Ray Diffractometry, Profilometry, Nuclear Magnetic Resonance, and much more. For more information visit our Website at: **http://materialscience.uoregon.edu/camcor.htm.**

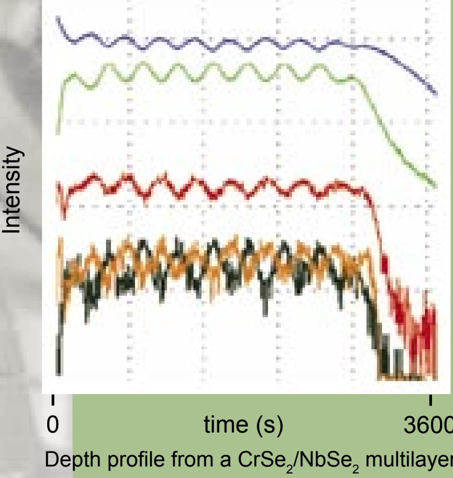
Let us help you solve your materials characterization problems!

Time-of-Flight Secondary Ion Mass Spectrometry (ToF SIMS)

- A full mass spectrum from every pixel of an image
- High mass resolution
- Extremely high analytical sensitivity
- Destructive depth profiles several thousand Å into the sample



Overlaying the fluorine ion map (blue) on the oxygen ion map in a SIMS image shows the fluorine impurity distribution in an organic material viewed in cross section. The image is 100x100 microns.



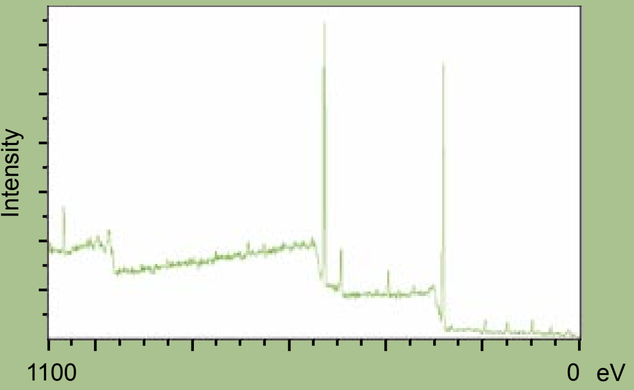
Depth profile from a $CrSe_2/NbSe_2$ multilayer

Our ToF SIMS instrument features:

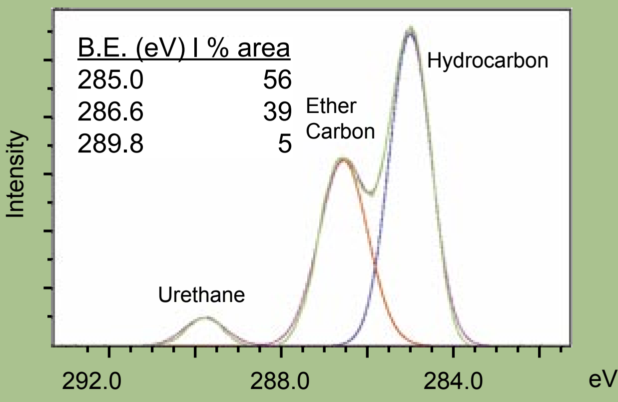
- Polyatomic primary ion source with maximum 50 kHz repetition rate
- Cs^+ and O_2^+ ion sources for depth profiling Oxygen flood source
- Electron gun for charge neutralization
- Ion-induced secondary electron imaging
- Sample heating and cooling capablity

X-Ray Photoelectron Spectroscopy (XPS)

- Quantitative analysis of all elements (except H and He) present in the outermost 100Å of a surface in concentrations > 0.3 atomic %
- Nondestructive elemental depth profiles of the outermost 100 Å
- Destructive elemental depth profiles several thousand Å into the sample
- Information on lateral variation in composition (resolution≈150μm)
- Information about the molecular environment (oxidation state, bonding atoms, etc.)
- Identification of organic groups using derivatization



Survey scan of a NiP layer on Si. Surveys can be used to determine composition and allow rapid identification of contaminants.



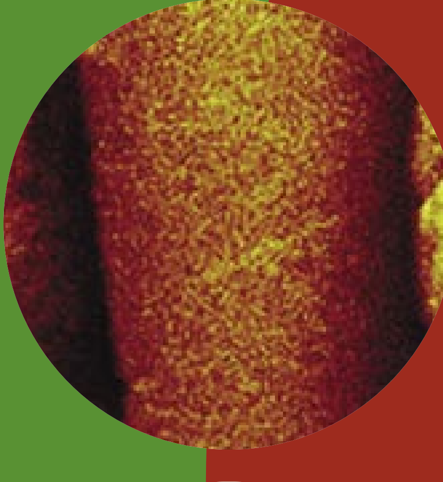
Peak fitting high-resolution spectra allows quantitative identification of functional groups

Atomic Force Microscopy (AFM)

- Imaging of surface atoms with a lateral resolution of 10Å and a vertical resolution of 0.1Å
- Analysis under water and in controlled environments
- Atomic-scale surface manipulation and modification
- Quantitative measurement of surface roughness
- Biorecognition imaging (with functionalized tips)

Representative Surface Analytical Applications

- Failure Analysis
- Adsorbents
- Drug Delivery
- Catalysis
- Surface Modification
- Patterned Chemistries
- Depth Profiling
- Corrosion
- Biomaterials
- Impurity Analysis
- MEMS
- Nanoscale Materials



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