



| Technique | Key Uses | Key Benefits | Equipment Highlights |
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| Scanning Auger Microscopy (SAM) | <ul style="list-style-type: none"> • Microanalysis in the upper few atomic layers • Elemental analysis from Be to U at ≤ 0.1 at. % • May provide chemical-state information in favourable cases | <ul style="list-style-type: none"> • High spatial resolution from a well-focused electron beam, point analyses and 'line scans' • Depth resolution on the order of a few atomic layers • Secondary electron imaging and elemental mapping • Relatively fast semi-quantitative analyses • Compositional depth profiles in instruments equipped with ion guns | <ul style="list-style-type: none"> • Perkin Elmer PHI 670 Auger Nanoprobe in Class C Radioisotope Laboratory • Schottky field-emission electron gun for high brightness and spatial resolution • Ion gun for sputter removal of surface layers and Zalar Rotation for high performance depth profiling • In-situ fracture stage for fracturing samples under ultra-high vacuum (minimal surface contamination) • Noran EDX system for X-ray analysis (B to U) |
| Scanning Electron Microscopy (SEM) and Energy/Wavelength Dispersive X-Ray (EDX/WDX) Microanalysis | <ul style="list-style-type: none"> • High spatial resolution image of surface morphology • Elemental analysis from C to U at ≤ 0.1 at. % | <ul style="list-style-type: none"> • Exceptional spatial resolution and depth of field • An effective physical image of the sample when detecting secondary electrons • Atomic number contrast in sample when detecting backscattered electrons • Quick semi-quantitative elemental analysis | <ul style="list-style-type: none"> • JEOL 5400 SEM with EDX, capable of light element detection, for analysis of inactive materials • JEOL 840A SEM with Noran EDX system housed in Class C Radioisotope Laboratory • A shielded JEOL 840A SEM, in a licensed facility, with a Noran EDX system and two WDX spectrometers for characterization of highly radioactive materials |
| Secondary Ion Mass Spectrometry (SIMS) | <ul style="list-style-type: none"> • Depth profiling • Ion imaging • Quantitative microanalysis, with <i>ppm</i> sensitivity, using appropriate standards | <ul style="list-style-type: none"> • <i>ppm</i> sensitivity • Isotopic analysis • Detection of all elements, including hydrogen • Compositional depth profiles with excellent depth resolution • Ion imaging with sub-micron spatial resolution | <ul style="list-style-type: none"> • CAMECA IMS 6F ion microanalyzer modified to accommodate radioactive materials • Instrument housed in Class B Radioisotope Laboratory • Both Cs^+ and duoplasmatron (oxygen) ion sources • Can be operated as either an ion microprobe or ion microscope |