Nanoimaging

At 4D LABS, we focus on accelerating the design, development, demonstration, and delivery of advanced functional materials and nanoscale devices. Our flexible business model was designed to provide academic and industrial researchers with convenient, cost-effective access to our $50-million institute.

The 4D LABS Nanoimaging Facility provides access to high resolution nanoscopic characterization of materials. This facility is home to world class equipment including scanning electron microscopes (SEM), scanning transmission electron microscopes (STEM), and scanning probe microscopes (SPM) that enable researchers to complete in-depth investigations of material properties, including crystallinity, defects, and microstructure. Several tools are specialized for working with soft materials. For samples that need to be imaged at cryogenic temperatures, we offer a multi-functional SEM equipped with a cryogenic stage and load-lock. Our screening SEM provides rapid imaging and elemental analysis capabilities at lower magnifications. Complementing the analytical capabilities are Focused Ion Beam systems for fabricating small devices.

Users of the Nanoimaging Facility are fully supported by our globally recognized research and engineering team specializing in high resolution electron and scanning probe microscopy. They have the benefit of our full time facilities manager and new users receive complete on-site training in the operation of instruments and mastery of techniques.

Since 2005, the Nanoimaging Facility at 4D LABS has been providing the best in nanoscopic expertise with cost effective use of equipment at a conveniently local facility. 4D LABS gives researchers an unparalleled, collaborative environment to solve real-world material science problems and help BC industry stay competitive. Have a materials research challenge? Call us to see how we can help.
Technical Capabilities - list of tools at nanoimaging.4dlabs.ca

Scanning Electron Microscopes (SEM) and FIB
- FEI Helios Dualbeam (SEM/FIB) with Cryo Capability (0.8 nm)
- FEI Strata Dualbeam (SEM/FIB) (3 nm)
- FEI/Aspex Explorer SEM for rapid sample screening (20 nm)

An SEM is able to display surface features that are less than 5 nanometers in size using an electron beam scanning the sample. The elemental composition can be determined through energy dispersive X-ray spectroscopy (EDS) to analyse X-ray emissions.

Scanning Transmission Electron Microscopes (STEM)
- FEI Tecnai Osiris with Super-X EDS (200 keV X-FEG)
- FEI Tecnai G2 (200 keV FEG)
- Hitachi 8000 (200 keV LaB₆)

An STEM exploits the shorter wavelengths of accelerated electrons to resolve materials down to the sub-nanometer range. It allows the investigation of internal structure, including crystallinity and defects with compositional analysis via techniques including EDS, electron energy loss spectroscopy (EELS), high angle annular dark field, and energy filtered imaging.

Scanning Probe Microscopes (SPM)
- Atomic Force Microscope (AFM) or
- Scanning Tunneling Microscope (STM)
- Near-Field Scanning Optical Microscope (NSOM)

SPMs are used to create atomic-resolution topographic maps of material surfaces which may include electronic properties. They are capable of image resolution down to the atomic level and can also be used to manipulate atoms or molecules.