Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

# Transmission Electron Microscopy Facility

CNL's Transmission Electron Microscopy (TEM) Facility is located at the Chalk River Laboratories. The Philips CM30 is a computer-controlled, intermediate voltage electron microscope. It operates at accelerating voltages up to 300 kV and is used for the analysis of microstructures down to the nanometre level. It is often described as an analytical microscope because of the large amount of information that can be obtained using a wide variety of available analytical techniques. These techniques include:

- Conventional Transmission Electron Microscopy (CTEM)
- Scanning Transmission Electron Microscopy (STEM)
- Convergent Beam Electron Diffraction (CBED)
- High Resolution Transmission Electron Microscopy (HRTEM)
- Energy Dispersive X-ray Analysis (EDX)

Although the CM30 can be operated over a range of accelerating voltages up to 300 kV, it is most often operated at 300 kV. At 300 kV, the microscope can increase specimen penetration, improve image resolution, raise electron probe densities, reduce beam spreading, diminish inelastic scattering, enlarge peak/background ratio for EDX and also enhance the field of view in diffraction space.

The optics of the CM30 are designed to provide high-quality high resolution in both TEM and STEM modes of operation. Because of the electrons transmitted through the specimens in the CM30; it is an excellent machine for investigations involving defects introduced by radiation damage that cannot be studied directly by other analytical machines.

Combined with a Focussed Ion Beam machine that can make TEM specimens from site-specific areas, the CM30 is an invaluable piece of equipment for materials research and development.

The Transmission Electron Microscopy Facility currently collaborates with CANMET on next generation nuclear programs. The TEM Facility is also partnering with Canadian universities. There is a Ph.D. program in place with McMaster University, as well as collaboration with Queen's University on the study of radiation
damage on garter spring material.

Best achievable:

TEM
0.23 nm point image resolution
1.60 nm nanoprobe beam size
11.0 nm microprobe beam size

STEM
1.60 nm point image resolution
1.60 nm STEM beam size