



MAJOR EQUIPMENT

Major equipment for Robert P. Apkarian Integrated EM Core Users

Located at two sites at Emory University's main campus, the Robert P. Apkarian Integrated Electron Microscopy Core (IEMC) provides services and training on conventional transmission electron microscopy (TEM), cryo-transmission electron microscopy (Cryo-TEM), single particle cryo-electron microscopy (SP-Cryo-EM), cryo-electron tomography (Cryo-ET), conventional scanning electron microscopy (SEM), and cryo-high resolution scanning electron microscopy (Cryo-HRSEM). The IEMC supports academic, clinical, and industry users. Its focus and technical expertise aim to generate structural data from biological and non-biological specimens to support research in basic, biomedical, and material sciences and engineering.

IEMC - Emerson Site

Three Transmission Electron Microscopes. The IEMC – Emerson site houses TEMs suitable for imaging biological and non-biological specimens prepared using a number of methods both at room temperature and under cryo-conditions.

- **JEOL JEM-2200FS**, 200 kV with in-column Omega filter and phase plates (Zernike and hole-free). This field emission TEM is set up for the semi-automated data acquisition of both single particle cryo-TEM data and tilt series for cryo-electron tomography. It is equipped with two direct electron detection devices (Direct Electron DE20 and Gatan K2) for high resolution imaging and a Gatan US4000 CCD camera for screening.
- **JEOL JEM-1400** 120 kV LaB₆ TEM with a Gatan US1000 CCD camera. Capable of all modes of TEM, including tomography of sectioned materials, cryo-TEM and conventional TEM. Semi-automated data acquisition is available for testing cryo-TEM grids and a Minimum Dose System (MDS) allows for imaging of beam-sensitive samples. The beam blocker allows for electron diffraction experiments.
- **Hitachi HT-7700** 120 kV TEM with Tungsten filament and AMT CCD camera. Capable of all modes of TEM, including tilt imaging and electron diffraction. A motorized goniometer allows +/- 70° sample tilting.
- **Holders for Cryo-EM** image acquisition: two Gatan 626 holders for untilted data collection and 2 Gatan 914 holders for acquisition of tilt series (tilted data).

Two Scanning Electron Microscopes (SEMs). Topcon DS-130F and Topcon DS-150F Field Emission SEM/STEM with BSE (back-scattered electron detection), capable of in-lens and below-lens conventional SEM, and in-lens cryo-HRSEM. The Topcon DS-130F is fitted with an Oxford Instruments, INCAx-sight x-ray detector to carry out Energy-Dispersive Spectroscopy (EDS) for elemental analysis. Capable of accelerating voltages from 0.5 kV - 30 kV, with Schottky field emission sources and Gatan CT-3500 cold stages.

Coating systems. For the application of metal films on support surfaces and samples.

- **Denton DV-602 Turbo Magnetron** Sputter system with a chromium target for metal film coating of specimens in preparation of SEM and cryo-SEM data acquisition.
- **Denton Benchtop Turbo Carbon/Gold Evaporator** for applying thin layers of carbon or gold on surfaces, SEM samples, or specimen support grids.



Four Ultramicrotomes. For producing semithin and ultrathin sections from embedded tissues or prepared materials at room temperature or under cryo conditions. Three ultramicrotomes for room temperature ultrathin and semithin sectioning of resin embedded samples (Leica UC6, Leica Ultracut S, and RMC Power-Tome PC). One cryo-ultramicrotome (Leica UC6i/FC6) for sectioning under cryo conditions.

BALTEC HPM 010 High Pressure Freezing machine for preparing frozen specimens including thick samples and monolayer cell cultures.

Leica AFS Cryo-Substitution apparatus designed for dehydration and fixation of cryo preserved specimens followed by gradual temperature increase and resin embedding.

ThermoFisher Vitrobot Mark IV for plunge freezing aqueous solutions and cell suspensions in liquid ethane or propane for cryo-TEM or cryo-ET data acquisition.

Quorum GloQube Plasma Cleaner to prepare support films by glow discharging for conventional and cryo electron microscopy. This instrument hosts a separate chamber for special treatment of support films under various gas environments

Imaging Data Processing and Analysis. 3 iMac workstations with Microsoft, Adobe, ImageJ, and IMOD software packages. Other image processing software packages installed as needed.

IEMC - Biochemistry Connector Site

Two Transmission Electron Microscopes. The IEMC – Biochemistry Connector site houses TEMs suitable for imaging biological and non-biological specimens at room temperature and under cryo-conditions.

- **FEI Talos Arctica (200 kV)** with Bio-Quantum/K3 direct electron detector and Autoloader system. This instrument is suitable for cryo-grid screening and automated high throughput collection of high-resolution single particle cryo-EM data.
- **FEI Talos L120C (120 kV)** with LaB6 and 4k CETA detector for negative stain and cryo-grid screening.
- **Holders for Cryo-EM** image acquisition: one Gatan 626 cryo-transfer holder

ThermoFisher Vitrobot Mark IV and CP3 Plunger- Gentle blot (Model 930) for plunge freezing aqueous solutions and cell suspensions in liquid ethane or propane for cryo-TEM or cryo-ET data acquisition.

Denton Benchtop turbo Carbon Evaporator for Carbon coating of grids.

Plasma cleaning systems to prepare support films by glow discharging for conventional and cryo electron microscopy. These systems include a Solarus Plasma Cleaning System (Model 950) for cleaning of grids and sample holders and a Pelco Easy glow for glow discharge.

Imaging Data Processing and Analysis. Glacier (Computation Cluster: 2 GPU nodes and 4 CPU nodes) with all image processing software, such as Relion, CisTEM, and EMAN2/Sphere.