**Information of LMB Polara I Cryo-TEM**

Manufacturer: FEI Ltd

Installed in the old LMB Building in 2007 . Moved to the new LMB building and re-installed in 2013.

**Brief configurations:**

* FEI Polara G2 Cryo-TEM, Serial Number: D316
* S-FEG (Schottky Field emitter)
* HT generator and accelerating system for electron energy of 80 – 300 keV
* Lens system: two condenser-lens system; TWIN objective lens with mini-condenser lens; Diffraction lens, Intermediate lens; two projective lenses
* Manual apertures system: C1, C2, objective, SA apertures
* Polara vacuum system: IGP1 (ion getter pump, for column), IGP2 (accelerating tube), IGP3 (FEG chamber), IPG4 (liner tubes), turbo molecular pump (for pre-pumping column, gun and specimen airlock and cryo cycle); with interlocked differentially pumped column. ODP (oil diffusion pump for projection chamber) and oil rotary pump (for buffer tank vacuum and pre-vacuum of projection chamber)
* Cryo specimen stage: computer-controlled, eucentric side-entry, high-stability CompuStage; X, Y, Z and α tilting; capable of imaging at temperature of liquid nitrogen and liquid helium
* Gatan Polara cryo-transfer system, holding 6 cartridges in one transfer, connected to column vacuum. One Cryo Station for loading specimen grids in to Polara cartridges and transferring to microscope (with Scroll Dry Pump)
* Cryo cooling by a liquid nitrogen and liquid helium reservoir, manual top-up of cryogens.
* Image recording: Falcon III detector and Orius CCD as Pre-GIF cameras; Gatan energy-filter GIF Tridiem 864, 4K x 4K US4000 Ultrascan CCD camera as Post-GIF camera
* Plate camera with 56 sheets of film
* Compressed air: using the building compressed air supply
* LN2 pressurised Dewar (60L) for supply of liquid nitrogen for cooling down
* Operation / automation: Operating system Windows XP; Low Dose image system; FEI automatic data acquisition system EPU, Xplore3D acquisition system, SerialEM data acquisition system, allowing automatic high-resolution cryoEM and cryoET data collection. Falcon III allows video frame captures but no electron counting

**Brief specifications:**

* Energy spread: 0.8 eV
* Objective lens TWIN specifications:
* Point resolution (nm) 0.236;
* Information limit (nm):

• at high magnification ≤ 0.16

• at 59 k x: - 0°tilt ≤ 0.2;

- 45° tilt ≤ 0.23;

- 70° tilt ≤ 0.34

* Cs objective (mm) 2.0; Cc objective (mm) 2.2; Focal length (mm) 2.7
* Maximum eucentric tilt ± 70°
* Rotation-free magnification: Magnification reproducible within 1.5%
* Specimen stage: X, Y movement 2 mm; specimen size 3 mm;
* Specimen recall reproducibility: ≤ 0.5 μm (x, y) and ≤ 0.5° (α tilt) attainable
* Drift at:
* 0° tilt < 0.5 nm/min
* 45° tilt < 1.5 nm/min
* 70° tilt < 2.5 nm/min
* Image displacement < 2.0 μm during ± 70° tilt (for automated tomography)
* Stage temperature: LN2 only is 82 K;

Helium system:

* + Minimum cartridge temperature < 15 K
  + Hold time of liquid helium reservoir > 6 hr
  + Airlock cycle time (vacuum transfer of 6 cartridges) after preparation in Cryo workstation) < 15 min
  + Insertion time of specimen (cartridge) into the column < 2 min
  + Setting time to low temperature once inserted into the column < 10 min
  + Vacuum: oil free column vacuum. Vacuum levels: specimen chamber 10-5 Pa; gun 10-6 Pa