

A New Addition to the NEAT ORU's Spectral Imaging Facility — Hitachi S-800 Turbo FE-SEM



(First Announcement)

Through a gift/donation from Agilent Technologies, Inc. NEAT ORU and Thermochemistry has acquired a Hitachi S-800 Turbo FE-SEM and Oxford INCA-Energy EDS attachment located in the Spectral Imaging Facility, Chemistry Building, Laboratory 11. The SEM installation was completed in July 2006, while the final integration of the EDS attachment is planned for Fall 2006 (awaiting a critical part from the vendor). This Hitachi S-800T SEM has proven itself in industry as a workhorse for over 15 years. After combining the Oxford INCA-Energy EDS system and PentaFET detector with the SEM, we can expect many more years of operation for NEAT users.

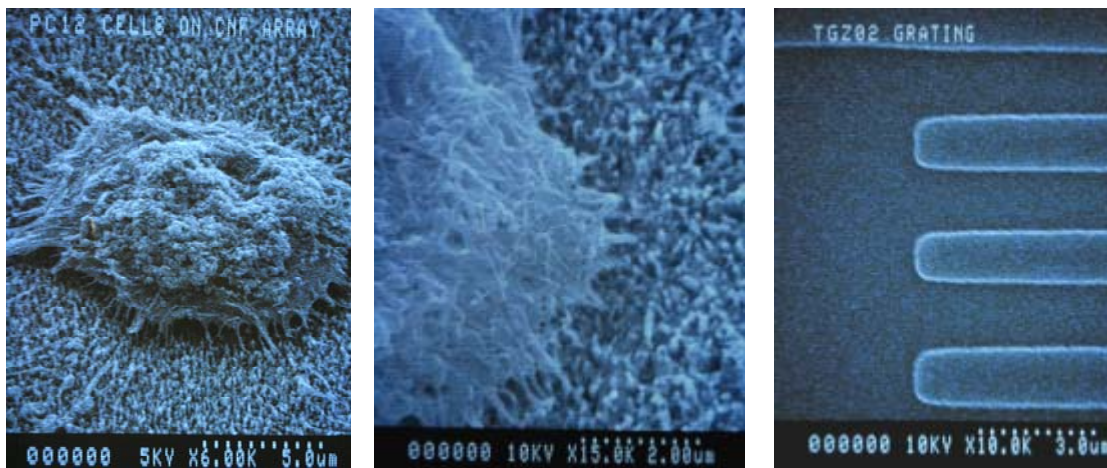
The S-800 SEM is available to students and researchers at UCD for free at present. Upon approval (most likely to be effective on December 1, 2006), this SEM is available on a recharge basis: \$30/hr for daytime use or training, and \$20/hr for after hour usage. Samples can be submitted for imaging at the assisted daytime rate or, after completing user training, samples can be imaged independently.

To arrange a tour, training, or to schedule instrument time please contact our development engineer at SIF, Mr. Alan Hicklin by e-mail (aghicklin@ucdavis.edu) or by phone (4-9033). For other inquiries regarding this SEM, you may contact Drs. Gang-yu Liu (4-9678) or Ting Guo (4-5283).

Technical specifications that may be of interest

- Cold field emission electron source allows greater resolution at lower accelerating potentials
- Low accelerating voltage option 500V to 5kV in 100 Volt increments allows imaging of un-coated samples without charge accumulation, and other accelerating voltages to 25kV
- 2 nm design specification resolution (The ultimate resolution spec has not been determined for Chemistry Rm 0011)
- Large depth of field 10-20mm and magnification from 20X to ~300 000X
- Quick 30 second sample loading through the exchange chamber
- Samples 1" x 1" x 1" for cross-section and up to 2" in diameter can be loaded for imaging through the sample exchange chamber
- Up to 4" wafers can be loaded with limited imaging coverage through direct stage mounting
- INCA Energy EDS system allows elemental detection down to Be and digital image capture for the SEM

Example images acquired using the S-800 during September 2006



Two images on the left are cells prepared for confocal microscopy (stained with fluorescein labeled phalloidin) and then dehydrated and coated for SEM. They are non-differentiated PC12 cells. They were not given nerve growth factor and thus do not have neurites. The cell line comes from the pheochromocytoma of a male rat. These are non-adherent cells that were grown on a collagen IV coated carbon nano-fiber array for 8 days (cell medium changed every two days).

The image on the right column represents a Calibration grating 1-D array of rectangular SiO₂ steps on a Si wafer with 100nm step height and 3um period. The structure is coated with Si₃N₄ to prevent the Si from oxidizing. An over-etched area on the grating boundary can be seen just below the text overlay.