Energy-Filtered Transmission Electron Microscopy (EFTEM) Workshop

THE NEXT WORKSHOP WILL TAKE PLACE ON: Workshop will be organised when sufficient interest is registered (half day workshop). Register your interest with Dr Martin Saunders (martin@cmm.uwa.edu.au).

WHO SHOULD ATTEND THIS COURSE?

Researchers, PhD and Hons students in the physical or biological sciences with TEM experience intending to use energy-filtered TEM as part of their research project at the UWA Centre for Microscopy, Characterisation and Analysis (CMCA), including those wishing to:

- obtain element distribution images (including light elements such a B, C, N, O, etc.);
- improve the contrast in images from samples that show only weak contrast using conventional TEM imaging techniques (including unstained biological samples);
- improve image quality and contrast in images of thick samples.

COURSE OUTLINE:

The principles and applications of energy-filtered TEM and elemental mapping will be reviewed through an initial lecture. Practical training on the microscope will introduce attendees to the relevant software (Digital Micrograph) for operating the energy-filter and obtaining energy-filtered TEM images. There will be opportunities for attendees to discuss the use of energy-filtered TEM in their research project with a member of Centre staff.

WHAT YOU SHOULD KNOW BEFORE THE COURSE?

Attendees are expected to be familiar with the basic operation of a TEM and the TEM aspects of their own research project before attending the course. You must have completed the TEM training course before you can attend the EFTEM workshop. It is also recommended that you gain some experience operating a TEM before attending the workshop.

WHAT WILL YOU LEARN ON THIS COURSE?

Attendees will learn how to obtain and interpret energy-filtered TEM data, including –

- How to set up and align the energy filter;
- How to obtain images with increased contrast (elastic or zero-loss filtering);
- How to obtain images showing the element distribution in the sample (elemental mapping using the three-window technique and jump-ratio imaging);
- How to obtain structural images from thick samples;
- How to avoid mistakes when interpreting elemental maps and other energy-filtered data;
- Sample requirements for energy-filtered TEM (but not sample preparation methods).

WHAT IS NOT INCLUDED IN THIS COURSE?

Basic information on TEM operation is covered in the TEM training course and is not included in this workshop. The related subject of electron energy-loss spectroscopy (EELS) is covered in a separate workshop and will not be discussed in detail in this workshop.

TEACHING MATERIALS:

Copies of lecture notes and supporting documentation will be made available in electronic form before the course. Attendees are expected to be familiar with the basic principles and applications of energy-filtered TEM before attending the course. Many TEM-related books including EFTEM information can be found in the UWA library.

Attendees are recommended to download and read the following review article (and any of the included references) before attending the workshop –

- P.J. Thomas and P.A. Midgley (2002) An introduction to energy-filtered transmission electron microscopy, TOPICS IN CATALYSIS 21 (4): 109-138 DEC 2002 (http://www.springerlink.com/content/r2861783416019r5/fulltext.pdf)

The library also houses a set of DVD recordings of microscopy workshops run by the Microscopy Society of America. The following DVDs are recommended –

- #226 Bentley, Energy filtered imaging: a tutorial (2000)
- #257 Egerton, Electron energy loss spectroscopy (2003)

RELATED TRAINING OPPORTUNITIES:

Other TEM-related workshops currently include –

- TEM training course (for basic TEM operation);
- Electron diffraction (for crystal structure analysis);
- High resolution imaging (HREM) (for atomic resolution imaging);
- Electron energy-loss spectroscopy (for local composition and chemistry);
- X-ray microanalysis by TEM (for compositional analysis);
- Scanning TEM imaging (including BF and HAADF imaging);
- Sample preparation for the biological sciences (appointments can also be made with Dr Peta Clode (pclode@cmm.uwa.edu.au) to discuss your specific requirements);
- Sample preparation for the physical sciences (appointments can also be made with Dr Martin Saunders (martin@cmm.uwa.edu.au) or Dr Alexandra Suvorova (suvorova@cmm.uwa.edu.au) to discuss your specific requirements).

Appointments to discuss individual projects, project planning, etc. can be made directly with Centre staff (Physical Sciences – Dr Martin Saunders; Biological Sciences – Dr Peta Clode).

HOW DO I REGISTER AND WHAT DOES IT COST?

Places on the EFTEM workshop are available to researchers/students with a demonstrated need to use energy filtered TEM in their research. You can apply to attend the next workshop by completing the online registration form - Registration will open in early 2007.

Places are limited and preference will be given to registered CMCA Users. Your place will be confirmed in advance of the next scheduled workshop.

To find out about becoming a CMCA User contact the CMCA Manager, Jeanette Hatch (admin@cmm.uwa.edu.au or phone 6488 2770).

The workshop is free to all current registered Users. All non-registered participants will be allocated a place only if maximum numbers are not reached, and a cost of $220 (inc. GST) will apply. Any enrollee who fails to cancel their attendance more than 24h in advance will be charged a $55 (inc. GST) no show fee.