

Electron Diffraction Workshop

THE NEXT WORKSHOP WILL TAKE PLACE ON: Workshop will be organised when sufficient interest is registered (Contact hours – full day workshop)

WHO SHOULD ATTEND THIS WORKSHOP?

Researchers, PhD and Hons students in the physical sciences with TEM experience wishing to use electron diffraction to investigate the structure of crystalline materials as part of their research project at the UWA Centre for Microscopy, Characterisation and Analysis (CMCA), or other facilities.

WORKSHOP OUTLINE:

The principles and applications of electron diffraction in the TEM will be reviewed through an initial lecture. Practical training on the microscope will introduce attendees to the technique of selected area electron diffraction (SAD/SAED), the use of selected area apertures, the acquisition of experimental data and calibration methods. Basic diffraction pattern analysis and interpretation will be included in the workshop. There will be opportunities for attendees to discuss the use of electron diffraction in their research project with a member of Centre staff.

WHAT YOU SHOULD KNOW BEFORE THE WORKSHOP?

It will be assumed that attendees have a basic knowledge of crystal structures and crystallography. 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 electron diffraction workshop. It is also recommended that you gain some experience operating a TEM before attending the workshop.

WHAT WILL YOU LEARN ON THIS WORKSHOP?

Attendees will learn how to obtain and interpret selected area electron diffraction data, including –

- How to set up and align the microscope for electron diffraction;
- The use of selected area apertures;
- How to obtain selected area diffraction patterns on film and a digital camera;
- How to tilt samples containing large crystals onto a zone-axis;
- Basic diffraction pattern interpretation (e.g. is the sample crystalline or amorphous? Is it polycrystalline?);
- Basic diffraction pattern analysis (measuring planar spacings and interplanar angles, identifying a zone-axis);
- Introduction to diffraction pattern simulation;
- Sample requirements for electron diffraction in the TEM (but not sample preparation methods).

WHAT IS NOT INCLUDED IN THIS WORKSHOP?

Basic information on TEM operation is covered in the TEM training course and is not included in this workshop. Crystallography and information related to the understanding of crystal structures is not included in this workshop (and it will be assumed that attendees already have a basic understanding of these topics). Detailed information on the theory of electron diffraction and pattern simulation is not included in the workshop. Convergent beam electron diffraction will not be covered 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 electron diffraction in the TEM before attending the course. Many TEM-related books including electron diffraction information can be found in the UWA library. The following are recommended –

- Transmission Electron Microscopy (1996), D.B. Williams and C.B. Carter, Plenum Press (one volume of the 4-volume set covers diffraction)
- Electron beam analysis of materials (1994) M.H. Loretto, Chapman and Hall
- Electron microscopy and analysis (2001) Peter J. Goodhew, John Humphreys, Richard Beanland, Taylor and Francis
- Transmission electron microscopy and diffractometry of materials (2002) Brent Fultz and James Howe, Springer
- Introduction to conventional transmission electron microscopy (2003) Marc De Graef, Cambridge University Press

The library also houses a set of DVD recordings of microscopy workshops run by the Microscopy Society of America.

RELATED TRAINING OPPORTUNITIES:

Other TEM-related workshops currently include –

- TEM training course (for basic TEM operation);
- High resolution imaging (HREM) (for atomic resolution imaging);
- Energy-filtered TEM (EFTEM) (for element distribution 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 physical sciences (appointments can also be made with Dr Martin Saunders or Dr Alexandra Suvorova 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).

HOW DO I REGISTER AND WHAT DOES IT COST?

Places on the electron diffraction workshop are available to researchers / students with a demonstrated need to use electron diffraction in their research.

You can register your interest in attending the next workshop by completing the online registration form.

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.

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.