



UNIVERSITY OF
BIRMINGHAM

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| Module Name: | Electron Microscopy (SEM and TEM) |
| Module Code: | 04 19782 |
| Presenter(s): | Dr Yu Lung Chiu |
| Credit Rating: | 10 |
| Venue: | School of Metallurgy & Materials, University of Birmingham |

Description:

The aim of this module is to develop a capacity for using advanced electron beam analysis to characterise materials. The principles of electron microscopy for imaging, structural and chemical analysis are introduced. Coverage includes: scanning electron microscopy (secondary and backscattered electron imaging), transmission electron microscopy (Mass-thickness contrast, diffraction contrast, phase contrast and electron diffraction), scanning transmission electron microscopy (bright-field, dark-field and high angle annular dark field imaging), and chemical analysis (EDX, WDX and PEELS). The basic understanding of the techniques is then used to review the strengths and limitations of the different approaches when applied to materials characterisation.

Learning Outcomes:

By the end of the module the student should be able to:

- Describe the basic principles of electron beam analysis methods covered
- Critically assess the strengths and limitations of the methods covered
- Select an appropriate technique for a particular problem relating to electron beam analysis
- obtain and identify a electron diffraction pattern
- Obtain and interpret a TEM micrograph
- Interpret an EDX spectrum

Syllabus:

Transmission electron microscopy, D.B. Williams and C.B Cater, Plenum Publishing Corporation, 1996.
Chemical microanalysis using electron beams, I.P. Jones, London: Institute of Materials, 1992.
Scanning electron Microscopy, X-ray microanalysis, and analytical electron microscopy, E. Charles et al., 1990.

Assessment:

2,000-3,000 word essay to be submitted within four weeks after the course presentation.