USE OF THE TRANSMISSION ELECTRON MICROSCOPE

Laboratory Instructor: Dr. I. Baker

OBJECT:

To observe and interpret images and diffraction patterns from a thin foil produced using transmission electron microscopy.

EXPERIMENTAL RESULTS

You should record images and diffraction patterns and interpret them in your write up.

Diffraction

1) For a particular camera length, obtain a selected area diffraction pattern from Thallous chloride to determine the exact camera length. (Thallous chloride is simple cubic with a_o = 3.84 Å.)
2) Obtain and index selected area electron diffraction patterns from: a) a thin region of foil, and b) a thick region of foil. Note: Use low index orientations or indexation may be difficult.
3) Obtain images and diffraction patterns from a MoO_3 specimen and use this to examine the rotation between the image and the diffraction pattern.
4) Obtain a convergent beam electron diffraction (CBED) pattern with the beam along a low index zone axis from: a) a thin region of foil, and b) a thick region of foil.

Imaging

Your write up should include photographs of the features below together with a very brief explanation of the image contrast using either dynamical theory or kinemetical theory when appropriate. Obtain micrographs of:

1) Grain boundary fringes
2) Thickness contours
3) Bend contours.

For a dislocation or a set of dislocations, set up two-beam conditions and:

4) Obtain a bright field image and corresponding selected area diffraction pattern.
5) Obtain a corresponding dark field image by a) displacing the aperture, and b) tilting the illumination.
6) Obtain a weak-beam dark-field image corresponding to 4) and corresponding diffraction pattern.

Remember to print the negatives that you produce as *positives*. For the diffraction patterns, particularly the Kikuchi pattern(s), you should print them onto photographic paper (using the printer in the E.M. center) rather than using a LaserWriter.