Microscope Design, Operation, and Alignment

Goal

You will be introduced to the technical construction and the main components of the transmission electron microscope Tecnai F30, the computer interface, the basic operation of this instrument, alignment procedures, image recording. The specimen of this laboratory is a cross-sectional specimen of a Si single crystal substrate with a thin epitaxial layer of Cu_2O grown on top of it.

Experiment

1. Familiarize yourself with the computer interface.
2. Familiarize yourself with the basic operation (apertures, condenser deflection, specimen translation, magnification, focus).
3. After the teaching assistant has inserted a specimen, check the vacuum and open the column valves.
4. Load FEG registers for HRTEM.
5. Load a recent alignment.
6. Find the beam.
7. Perform a basic alignment (eucentric height, gun tilt, gun shift, condenser aperture, current center, objective lens astigmatism).
8. Activate EFTEM and insert the TV camera.
9. Perform a coma-free alignment.
10. Fine-tune the objective lens stigmators.
11. Back to on-screen viewing mode, locate a region of interest in the silicon single crystal substrate.
12. Switch to diffraction and a tilt the respective region to a $\langle 110 \rangle$ zone axis.
13. Obtain a lattice image on the TV monitors.
14. Record the image with the CCD camera.

Report

No report is required for this laboratory.