

TEM Specimen Preparation Techniques

Goal

This experiment will demonstrate the most important techniques of TEM specimen preparation. You will learn how to prepare specimens of materials with good electrical conductivity (metals, alloys), materials with poor electrical conductivity (semiconductors, insulators), and nano-materials (powders) .

Experiment

- Prepare an Al_2O_3 powder for TEM by dispersing it in hexane (C_6H_{14}) under impact of ultra-sound and depositing it onto a holey carbon film supported by a Cu grid.
- Prepare a specimen of polycrystalline Al by electropolishing with a HNO_3 -methanol electrolyte.
- Prepare a specimen of single-crystalline Si by dimple grinding and ion-beam milling.
- Investigate the final specimens by light-optical microscopy. Record images of each specimen.

Report

- Referring to the pictures recorded during the laboratory, summarize the procedures for each method of TEM specimen preparation.
- Comment on the applicability of the different specimen preparation methods for different types of material.
- Comment on the advantages and disadvantages of each method (time, success rate, specimen quality).
- Discuss the light-optical micrographs of the specimens.