

Advanced Characterization of Materials at Micro-, Nano- and Atomic Scale

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Electron diffraction in TEM - Introduction and Applications

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Abstract

Electron diffraction is a powerful technique to analyze especially crystalline materials. Electron diffraction is essential to get single crystalline information of small volumes of a material.

The goal of this lecture is to give an introduction to electron diffraction and to the reciprocal space and to demonstrate how powerful electron diffraction is to characterize the structure and the characteristics of materials on a small scale.

In the introduction it will be shown how to obtain electron diffraction patterns in the transmission electron microscope and it will be discussed how to process the electron diffraction pattern for analyzing the phases in the sample and for obtaining crystallographic information of the sample. Though there are limitations as multiple scattering and dynamical effects it will be demonstrated how useful electron diffraction data is for solving complex crystal structures. Furthermore different electron diffraction techniques like convergent beam electron diffraction (CBED), precession electron diffraction (PED) and diffraction tomography and their application will be discussed.