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2.4.4 Interpretation of Diffracted Intensities2.4.5 Errors and Assumptions; 2.5 Electron Diffraction; 2.5.1 Wave Properties of Electrons; 2.5.2 Ring Patterns, Spot Patterns and Laue Zones; 2.5.3 Kikuchi Patterns and Their Interpretation; Summary; Bibliography; Worked Examples; Problems; 3 Optical Microscopy; 3.1 Geometrical Optics; 3.1.1 Optical Image Formation; 3.1.2 Resolution in the Optical Microscope; 3.1.3 Depth of Field and Depth of Focus; 3.2 Construction of the Microscope; 3.2.1 Light Sources and Condenser Systems; 3.2.2 The Specimen Stage; 3.2.3 Selection of Objective Lenses
3.2.4 Image Observation and Recording3.3 Specimen Preparation; 3.3.1 Sampling and Sectioning; 3.3.2 Mounting and Grinding; 3.3.3 Polishing and Etching Methods; 3.4 Image Contrast; 3.4.1 Reflection and Absorption of Light; 3.4.2 Bright-Field and Dark-Field Image Contrast; 3.4.3 Confocal Microscopy; 3.4.4 Interference Contrast and Interference Microscopy; 3.4.5 Optical Anisotropy and Polarized Light; 3.4.6 Phase Contrast Microscopy; 3.5 Working with Digital Images; 3.5.1 Data Collection and The Optical System; 3.5.2 Data Processing and Analysis; 3.5.3 Data Storage and Presentation
3.5.4 Dynamic Range and Digital Storage3.6 Resolution, Contrast and Image Interpretation; Summary; Bibliography; Worked Examples; Problems; 4 Transmission Electron Microscopy; 4.1 Basic Principles; 4.1.1 Wave Properties of Electrons; 4.1.2 Resolution Limitations and Lens Aberrations; 4.1.3 Comparative Performance of Transmission and Scanning Electron Microscopy; 4.2 Specimen Preparation; 4.2.1 Mechanical Thinning; 4.2.2 Electrochemical Thinning; 4.2.3 Ion Milling; 4.2.4 Sputter Coating and Carbon Coating; 4.2.5 Replica Methods; 4.3 The Origin of Contrast; 4.3.1 Mass-Thickness Contrast
4.3.2 Diffraction Contrast and Crystal Lattice Defects

Sommario/riassunto

Microstructural characterization is usually achieved by allowing some form of probe to interact with a carefully prepared specimen. The most commonly used probes are visible light, X-ray radiation, a high-energy electron beam, or a sharp, flexible needle. These four types of probe form the basis for optical microscopy, X-ray diffraction, electron microscopy, and scanning probe microscopy.

 Microstructural Characterization of Materials, 2nd Edition is an introduction to the expertise involved in assessing the microstructure of engineering materials and to the experimental met