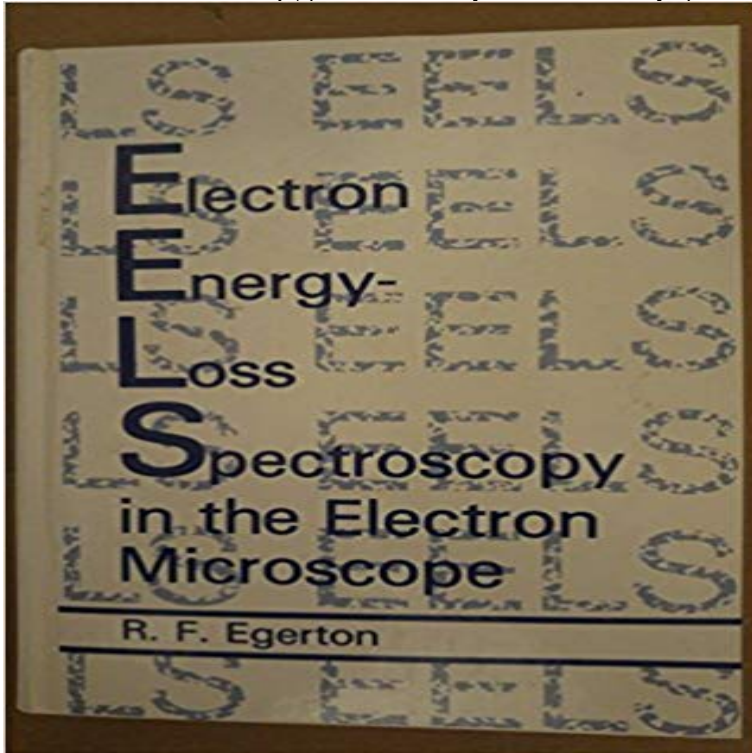


Electron Energy-Loss Spectroscopy in the Electron Microscope



Electron energy-loss spectroscopy (EELS or ELS) has been used to investigate the physical properties of solids for over 40 years in a handful of laboratories distributed around the world. More recently, electron microscopists have become interested in EELS as a method of chemical analysis with the potential for achieving very high sensitivity and spatial resolution, and there is a growing awareness of the fact that the loss spectrum can provide structural information from a thin specimen. In comparison with energy-dispersive x-ray spectroscopy, for example, EELS is a fairly demanding technique, requiring for its full exploitation a knowledge of atomic and solid-state physics, electron optics, and electronics. In writing this book, I have tried to gather together relevant information from these various fields. Chapter 1 begins at an elementary level; readers with some experience in EELS will be familiar with the content of the first two sections. Chapter 2 deals with instrumentation and experimental technique, and should contain material of interest to researchers who want to get the best performance out of commercial equipment as well as those who contemplate building their own spectrometer or electron-detection system. Chapter 3 outlines the theory used to interpret spectral features, while Chapter 4 gives procedures for numerical processing of the energy-loss spectrum. Chapter 5 contains examples of practical applications of EELS and a discussion of radiation damage, spatial resolution, and detection limits.

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