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	Titolo	Electron Nano-Imaging : Basics of Imaging and Diffraction for TEM and STEM / / by Nobuo Tanaka
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	Edizione	[1st ed. 2017.]
	Descrizione fisica	1 online resource (XXVIII, 333 p. 129 illus., 22 illus. in color.)
	Disciplina	502.825
	Soggetti	Materials science
		Spectroscopy
		Microscopy
		Nanoscale science
		Nanoscience
		Nanostructures
		Characterization and Evaluation of Materials
		Spectroscopy and Microscopy
		Spectroscopy/Spectrometry
		Nanoscale Science and Technology
	Lingua di pubblicazione	Inglese
	Formato	Materiale a stampa
	Livello bibliografico	Monografia
	Nota di contenuto	Seeing nanometer-sized world -- Structure and imaging of a transmission electron microscope (TEM) -- Basic theories of TEM imaging -- Resolution and image contrast of a transmission electron microscope (TEM) -- What is high-resolution transmission electron microscopy ? -- Lattice images and structure images -- Imaging theory of high-resolution TEM and image simulation -- Advanced transmission electron microscopy -- What is scanning transmission electron microscopy (STEM)? -- Imaging of scanning transmission electron microscopy (STEM) -- Image contrast and its formation mechanism in STEM -- Imaging theory for STEM -- Future prospects and possibility of TEM and STEM -- Concluding remarks -- Introduction of Fourier transforms for TEM and STEM -- Imaging by using a convex lens: Convex lens as phase shifter -- Contrast transfer

function of a transmission electron microscope: Key term for understanding of phase contrast in HRTEM -- Complex-valued expression of aberrations of a round lens -- Cowley's theory for TEM and STEM imaging -- Introduction to the imaging theory for TEM including non-linear terms -- What are image processing methods? -- Elemental analysis by electron microscopes: Analysis using an electron probe -- Electron beam damage to specimens -- Scattering of electrons by an atom: Fundamental process for visualization of a single atom by TEM -- Electron diffraction and convergent beam electron diffraction (CBED): Basis for formation of lattice fringes in TEM and image intensity of STEM -- Bethe's method for dynamical electron diffraction: Basic theory of electron diffraction in thicker crystals -- Column approximation and Howie-Whelan's method for dynamical electron diffraction: Theory for observation of lattice defects -- Van-Dyck's method for dynamical electron diffraction and imaging: Basis of atomic column imaging -- Eikonal theory for scattering of electrons by a potential -- Debye-Waller factor and thermal diffuse scattering (TDS) -- Relativistic effects to diffraction and imaging by a transmission electron microscope: Basic theories for high-voltage electron microscopy.

Sommario/riassunto	In the present book, the basics of imaging and diffraction in transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM) are explained in textbook style. The book focuses on the explanation of electron microscopic imaging of TEM and STEM without including in the main text distracting information on basic knowledge of crystal diffraction, wave optics, mechanism of electron lens, and scattering/diffraction theories, which are explained in detail separately in the appendices. A comprehensive explanation is provided using Fourier transform theory. This approach is unique in comparison with other advanced textbooks on high-resolution electron microscopy. With the present textbook, readers are led to understand the essence of the imaging theories of TEM and STEM without being diverted by facts about electron microscopic imaging. The up-to-date information in this book, particularly for imaging details of STEM and aberration corrections, is valuable worldwide for today's graduate students and professionals just starting their careers.