



## 4D Electron Microscopy : Imaging In Space And Time

World Scientific,  
2009

Electronic resource

Electronic books

Monografía

The modern electron microscope, as a result of recent revolutionary developments and many evolutionary ones, now yields a wealth of quantitative knowledge pertaining to structure, dynamics, and function barely matched by any other single scientific instrument. It is also poised to contribute much new spatially-resolved and time-resolved insights of central importance in the exploration of most aspects of condensed matter, ranging from the physical to the biological sciences. Whereas in all conventional EM methods, imaging, diffraction, and chemical analyses have been conducted in a static - ti

<https://rebiunoda.pro.baratznet.cloud:38443/OpacDiscovery/public/catalog/detail/b2FpOmNlbGVicmF0aW9uOmVzLmJhcmF0ei5yZW4vMj10Mj14Mjc>

**Título:** 4D Electron Microscopy Imaging In Space And Time

**Editorial:** World Scientific 2009

**Descripción física:** 1 online resource (360)

**Contenido:** Cover13; -- Contents -- Acknowledgements -- Preface -- 1. Historical Perspectives: From Camera Obscura to 4D Imaging -- References -- 2. Concepts of Coherence: Optics, Diffraction, and Imaging -- 2.1 Coherence 8212; A Simplified Prelude -- 2.2 Optical Coherence and Decoherence -- 2.3 Coherence in Diffraction -- 2.3.1 Rayleigh criterion and resolution -- 2.3.2 Diffraction from atoms and molecules -- 2.4 Coherence and Diffraction in Crystallography -- 2.5 Coherence in Imaging -- 2.5.1 Basic concepts -- 2.5.2 Coherence of the source, lateral and temporal -- 2.5.3 Imaging in electron microscopy -- 2.6 Instrumental Factors Limiting Coherence -- References -- 3. From 2D to 3D Structural Imaging: Salient Concepts -- 3.1 2D and 3D Imaging -- 3.2 Electron Crystallography: Combining Diffraction and Imaging -- 3.3 High-Resolution Scanning Transmission Electron Microscopy -- 3.3.1 Use of STEM for electron tomography of inorganic materials -- 3.4 Biological and Other Organic Materials -- 3.4.1 Macromolecular architecture visualized by cryo-electron tomography -- 3.5 Electron-Energy-Loss Spectroscopy and Imaging by Energy-Filtered TEM -- 3.5.1 Combined EELS and ET in cellular biology -- 3.6 Electron Holography -- References -- 4. Applications of 2D and 3D Imaging and Related Techniques -- 4.1 Introduction -- 4.2 Real-Space Crystallography via HRTEM and HRSTEM -- 4.2.1 Encapsulated nanocrystalline structures -- 4.2.2 Nanocrystalline catalyst particles of platinum -- 4.2.3 Microporous catalysts and molecular sieves -- 4.2.4 Other zeolite structures -- 4.2.5 Structures of complex catalytic oxides solved by HRSTEM -- 4.2.6 The value of electron diffraction in solving 3D structures -- 4.3 Electron Tomography -- 4.4 Electron Holography -- 4.5 Electron Crystallography -- 4.5.1 Other complex inorganic structures -- 4.5.2 Complex biological structures -- 4.6 Electron-Energy-Loss Spectroscopy and Imaging -- 4.7 Atomic Resolution in an Environmental TEM -- 4.7.1 Atomic-scale electron microscopy at ambient pressure by exploiting the technology of

microelectromechanical systems -- References -- 5. 4D Electron Imaging in Space and Time: Principles -- 5.1 Atomic-Scale Resolution in Time -- 5.1.1 Matter particle8211;wave duality -- 5.1.2 Analogy with light -- 5.1.3 Classical atoms: Wave packets -- 5.1.4 Paradigm case study: Two atoms -- 5.2 From Stop-Motion Photography to Ultrafast Imaging -- 5.2.1 High-speed shutters -- 5.2.2 Stroboscopy -- 5.2.3 Ultrafast techniques -- 5.2.4 Ultrafast lasers -- 5.3 Single-Electron Imaging -- 5.3.1 Coherence of ultrafast packets -- 5.3.2 The double-slit experiment revisited -- 5.3.3 Ultrafast versus fast imaging -- 5.3.4 The velocity mismatch and attosecond regime -- 5.4 4D Microscopy: Brightness, Coherence and Degeneracy -- 5.4.1 Coherence volume and degeneracy -- 5.4.2 Brightness and degeneracy -- 5.4.3 Coherence and Contrast -- 5.4.4 Contrast, dose, and resolution -- Further Reading -- References -- 6. 4D Ultrafast Electron Imaging: Developments and Applications -- 6.1 Developments at Caltech 8212; A Brief History -- 6.2 Instruments and Techniques -- 6.3 Structure, Morphology, and Mechanics -- 6.3.1 Selected-area image (diffraction) dynamics -- 6.3.2 Dynamical morphology: Time-dependent warping -- 6.3.3 Proof of principle: Gold dynamics -- 6.3.4 Prototypical case: Graphite in 4D space

**Copyright/Depósito Legal:** 816582541

**ISBN:** 1282759914 9781282759916 9781848163911 1848163916

**Materia:** Electron microscopy Hyperspace Space and time Three-dimensional imaging Electron microscopy. Hyperspace. Space and time. Three-dimensional imaging. Imaging, Three-Dimensional Microscopy, Electron Diagnostic Imaging Microscopy Image Processing, Computer-Assisted Diagnostic Techniques and Procedures Computing Methodologies Investigative Techniques Analytical, Diagnostic and Therapeutic Techniques and Equipment Diagnóstico Information Science

---

## **Baratz Innovación Documental**

- Gran Vía, 59 28013 Madrid
- (+34) 91 456 03 60
- [informa@baratz.es](mailto:informa@baratz.es)