Material Characterization using Electron Holography

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DESCRIPTION

**Material Characterization using Electron Holography**

Exploration of a unique technique that offers exciting possibilities to analyze electromagnetic behavior of materials

*Material Characterization using Electron Holography* addresses how the electromagnetic field can be directly visualized and precisely interpreted based on Maxwell’s equations formulated by special relativity, leading to the understanding of electromagnetic properties of advanced materials and devices. In doing so, it delivers a unique route to imaging materials in higher resolution.

The focus of the book is on in situ observation of electromagnetic fields of diverse functional materials. Furthermore, an extension of electron holographic techniques, such as direct observation of accumulation and collective motions of electrons around the charged insulators, is also explained. This approach enables the reader to develop a deeper understanding of functionalities of advanced materials.

Written by two highly qualified authors with extensive first-hand experience in the field, *Material Characterization using Electron Holography* covers topics such as:

- Importance of electromagnetic fields and their visualization, Maxwell’s equations formulated by special relativity, and de Broglie waves and wave functions
- Outlines of general relativity and Einstein’s equations, principles of electron holography, and related techniques
• Simulation of holograms and visualized electromagnetic fields, electric field analysis, and in situ observation of electric fields

• Interaction between electrons and charged specimen surfaces and interpretation of visualization of collective motions of electrons

For materials scientists, analytical chemists, structural chemists, analytical research institutes, applied physicists, physicists, semiconductor physicists, and libraries looking to be on the cutting edge of methods to analyze electromagnetic behavior of materials, *Material Characterization using Electron Holography* offers comprehensive coverage of the subject from authoritative and forward-thinking topical experts.

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**ABOUT THE AUTHOR**

Daisuke Shindo is Team Leader, RIKEN Center for Emergent Matter Science and Professor Emeritus, Tohoku University. He is Fellow of the Japan Institute of Metals and Materials, and also Fellow of Korean Society of Microscopy. He has been involved in high-resolution electron microscopy and analytical electron microscopy for microstructure characterization of various materials for more than 30 years. He is currently interested in electromagnetic-field observation of advanced materials by electron holography of collective motions of electrons through electromagnetic field variations.

Takeshi Tomita developed various instruments of electron microscopes, especially electron guns and lens systems in JEOL Ltd. for more than 40 years. He was involved in the project of the development of Cs-corrected TEMs. He is also attributed to the development of a secondary electron energy analyzer for TEMs. He has deep knowledge about the electromagnetic field and the special relativity.

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