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*“This precious textbook takes the readers to the frontiers of semiconductor physics, starting from very basic formulations of the electron and lattice systems of solids. The author places a special emphasis on photonic processes indispensable for physics and device applications of semiconductors. The book impressively shows that most of the interesting properties and phenomena in solids are understood under the concept of ‘electron–lattice interactions’.”*

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This book presents theoretical treatments on various optically induced electro-atomic processes in semiconductors from a unified point of view. Treating the system as a macroscopic association of electrons and ions, the basic properties of nonmetallic materials are reexamined, such as the electron band theory and lattice vibrations. The electron–lattice interaction is then introduced as a dynamical response of condensed matter when it is electronically or optically excited. With the aid of proper configuration coordinate diagrams, various phenomena are precisely examined, including carrier scattering, polaron formation, lattice relaxation, Stokes shift and phonon side band in optical spectra, intrinsic and extrinsic self-trapping, and symmetry breaking structural changes. The book provides a deeper understanding of the underlying physics and excellent insight for experimental as well as theoretical researchers in materials science and engineering to develop their further research.



**Yuzo Shinozuka** received his doctoral thesis from the University of Tokyo, Japan, in 1980. Then he engaged in the theoretical research of semiconductor physics first at Yamaguchi University and then at Wakayama University. His interest is in making simple models to explain mysterious phenomena. The main subjects are various electronic and atomic processes induced by electron–lattice interactions in non-metallic materials, including intrinsic and extrinsic self-trapping, nonradiative recombination, deep levels, defect reaction, and material modification by electronic excitations. Dr. Shinozuka also participated in the theory of electronic states in alloy semiconductors. He is now a professor emeritus at Wakayama University.