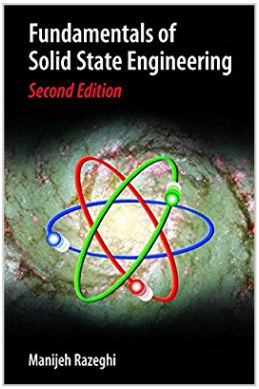

Fundamentals of Solid State Engineering

By Manijeh Razeghi

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Fundamentals of Solid State Engineering, 2nd Edition, provides a multi-disciplinary introduction to Solid State Engineering, combining concepts from physics, chemistry, electrical engineering, materials science and mechanical engineering. Basic physics concepts are introduced, followed by a thorough treatment of the technology for solid state engineering. Topics include compound semiconductor bulk and epitaxial thin films growth techniques, current semiconductor device processing and nano-fabrication technologies. Examples of semiconductor devices and a description of their theory of operation are then discussed, including transistors, semiconductor lasers and photodetectors.

Revised throughout, this second edition includes new chapters on the reciprocal lattice, optical properties of semiconductors, semiconductor heterostructures, semiconductor characterization techniques, and an introduction to lasers. Additions and improvements have been made to the material on photodetectors and quantum mechanics as well as to the problem sections.

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Fundamentals of Solid State Engineering By Manijeh Razeghi Bibliography

- Sales Rank: #3863757 in Books
- Published on: 2006-02-09
- Ingredients: Example Ingredients
- Original language: English
- Number of items: 1
- Dimensions: 9.25" h x 6.50" w x 1.75" l, 1.10 pounds
- Binding: Hardcover
- 882 pages

Editorial Review

Review
From the reviews of the third edition: “The subject area of solid state engineering is potentially very complex … . Manijeh Razeghi takes a multi-disciplinary approach to the text to address the requirements for engineers and scientists … . He commendably uses illustrations and worked examples for the benefit of comprehension; this is an excellent and well-rounded book.” (Times Higher Education, December, 2009)

From the Back Cover

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Revised throughout, this third edition includes new topics such as electron-electron and electron-phonon interactions, in addition to the Kane effective mass method. A chapter devoted to quantum mechanics has been expanded to cover topics such as the harmonic oscillator, the hydrogen atom, the quantum mechanical description of angular momentum and the origin of spin. This textbook also features an improved transport theory description, which now goes beyond Drude theory, discussing the Boltzmann approach.

Introducing students to the rigorous quantum mechanical way of thinking about and formulating transport processes, this textbook presents the basic physics concepts and thorough treatment of semiconductor characterization technology, designed for solid state engineers.

About the Author

Manijeh Razeghi is a Walter P. Murphy Professor of Electrical and Computer Engineering and Director of the Center for Quantum Devices at Northwestern University. She joined the ECE department in 1991. Prior to that, she was the Head of the Exploratory Materials Lab, Thomson-CSF, Orsay, France, from 1986-1991. She has authored 1000 papers, given more than 500 invited and plenary talks, written 12 book chapters, 8 books, and holds 50 patents. Dr. Razeghi is a Fellow of the International Engineering Consortium, a Life Member and Fellow of the Society of Women Engineers, and a Fellow of the Society of Photo-Optical Instrumentation Engineering, the Optical Society of America (OSA), and of the IEEE. She won the IBM Europe Science and Technology Prize, an Achievement Award from the Society of Women Engineers, and many Best Paper Awards. Manijeh Razeghi received her DEA in 1976, the Docteur 3eme Cycle in Solid State Physics in 1977, and the Docteur d'Etat des Sciences Physiques in 1980, all from the Universite de Paris Sud (11), France.

Manijeh Razeghi is one of the leading researchers in the field of optoelectronics. Her areas of expertise are in the growth and characterization techniques for III-V and II-VI semiconductor heterojunction multiple quantum well devices and superlattices for photonic and electronic devices. She was responsible for the design and implementation of epitaxial growth techniques such as metalorganic chemical vapor deposition (MOCVD), VPE, MBE and metalorganic molecular beam epitaxy (MOMBE) as well as optical, electrical, and structural characterization of the semiconductor multilayers. She has developed a number of semiconductors, advanced photonic and electronic devices such as lasers, photodetectors, transistors and which are in turn used in fiber optics communication.

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