



The Materials Science of Semiconductors

By Angus Rockett

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This book describes semiconductors from a materials science perspective rather than from condensed matter physics or electrical engineering viewpoints. It includes discussion of current approaches to organic materials for electronic devices. It further describes the fundamental aspects of thin film nucleation and growth, and the most common physical and chemical vapor deposition techniques. Examples of the application of the concepts in each chapter to specific problems or situations are included, along with recommended readings and homework problems.

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The Materials Science of Semiconductors By Angus Rockett Bibliography

- Sales Rank: #2569299 in Books
- Published on: 2007-11-30
- Original language: English
- Number of items: 1
- Dimensions: 9.21" h x 1.44" w x 6.14" l, 2.18 pounds
- Binding: Hardcover
- 622 pages

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Editorial Review

Review

From the reviews:

"This textbook on semiconductors for students at advanced undergraduate or graduate level covers the basis of electronic band structures, engineering of alloys, and the effect of defects. Concentrating on semiconductors materials science rather than devices, Rockett also includes discussion of organic electronic materials, amorphous semiconductors, and methods for growth and deposition. Each chapter includes recommended reading suggestions and problems for study." (Materials Today, Vol. 11 (5), May, 2008)

"The 12 summarized chapters of The Materials Science of Semiconductors by Rockett ... provide excellent coverage for practicing engineers or students interrelating the underlying materials considerations with semiconductor devices. Each chapter contains diagrams, problems, substantial references, and additional readings; the book also includes an appendix and a dozen tables. ... Summing Up: Recommended. Upper-division undergraduate through professional collections." (S. M. Pilgrim, Choice, Vol. 46 (2), October, 2008)

From the Back Cover

The Materials Science of Semiconductors serves as a general textbook on semiconductors, and discusses semiconductors in detail, from the fundamental basis for their electronic structure to engineering of alloys and the effects of defects. Written for graduate and advanced undergraduate students in the hard sciences, this book covers the materials science of semiconductors rather than focusing on electronic devices as a primary topic.

The Materials Science of Semiconductors is focused on classical concepts of materials physics (including band theory), alloy design, defects and their physics, organic electronic materials, amorphous semiconductors, and thin film growth methods. This textbook includes a discussion of organic materials concepts and applications for light emitting and switching devices, and also covers the major methods for processing semiconductors from Czochralsky growth to atomic-layer deposition. Unlike other books on semiconductors, this book discusses how band structures are developed and gives a detailed calculation technique based on the LCAO method, without any significant reliance on a background in quantum mechanics.

The Materials Science of Semiconductors is dedicated to presenting fundamental concepts in a manner that is accessible to students without a background in physics or quantum mechanics. Each chapter includes current applications, particularly in optoelectronics, along with recommended readings and homework problems.

About the Author

Angus Rockett is a Professor of Materials Science and Engineering at the University of Illinois at Urbana-Champaign. He is a fellow of the AVS and teaches short courses and tutorials for the AVS, MRS and IEEE. He has in excess of 120 published journal articles and conference proceedings and has conducted research in a wide variety of thin film and electronic materials topics. He received a B.S. in Physics from Brown

University in 1980 and a Ph.D. from the University of Illinois in Materials Science in 1986. He has been a visiting scientist at the Uppsala University in Sweden, the Hahn Meitner Institute in Berlin, Germany and has served as a senior program administrator at the U.S. Department of Energy in Germantown, Maryland.

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