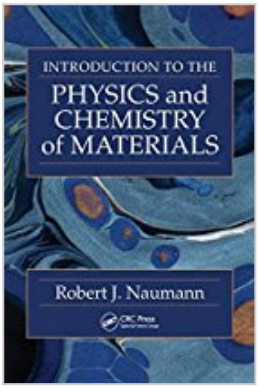

Introduction to the Physics and Chemistry of Materials

By Robert J. Naumann

Introduction to the Physics and Chemistry of Materials By Robert J. Naumann

Discusses the Structure and Properties of Materials and How These Materials Are Used in Diverse Applications

Building on undergraduate students' backgrounds in mathematics, science, and engineering, **Introduction to the Physics and Chemistry of Materials** provides the foundation needed for more advanced work in materials science. Ideal for a two-semester course, the text focuses on chemical bonding, crystal structure, mechanical properties, phase transformations, and materials processing for the first semester. The material for the second semester covers thermal, electronic, photonic, optical, and magnetic properties of materials.

Requiring no prior experience in modern physics and quantum mechanics, the book introduces quantum concepts and wave mechanics through a simple derivation of the Schrödinger equation, the electron-in-a-box problem, and the wave functions of the hydrogen atom. The author also presents a historical perspective on the development of the materials science field. He discusses the Bose–Einstein, Maxwell–Boltzmann, Planck, and Fermi–Dirac distribution functions, before moving on to the various properties and applications of materials.

With detailed derivations of important equations, this applications-oriented text examines the structure and properties of materials, such as heavy metal glasses and superconductors. It also explores recent developments in organics electronics, polymer light-emitting diodes, superconductivity, and more.

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Editorial Review

Review

... varies from the majority of available course resources on materials science and engineering for undergraduate engineering students, which cover a wide range of topics that ultimately converge on engineering design. … focuses on the solid-state physics and chemistry of materials at the graduate level. …well-written …. Graduate students, primarily those specializing in electronic materials, as well as faculty and practitioners will benefit tremendously from this book. Comprehensive index … . Summing Up: Highly recommended.

– T.Z. Kattamis, University of Connecticut, writing in *CHOICE Current Reviews for Academic Libraries*, July 2009, Vol. 46, No.11

This introductory text provides the background necessary for advanced studies in materials science by discussing the structure and properties of materials and their various applications. … The book has very good technical depth. Equations are clearly presented and problems are explained in detail to give the reader, especially those who have little background in quantum mechanics, a solid background in material science. … While the focus of this text is on the fundamental theory, many applications are presented in each chapter pertaining to the material covered in that chapter. … intended as an undergraduate course for materials science majors or for anyone interested in learning about the fundamentals of material. This text could serve as an excellent reference source for anyone who needs a basic and through understanding of fundamental material behavior.

– *IEEE Electrical Insulation Magazine*, November/December 2009 - Vol. 25, No.6

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