1. Record Nr. UNINA9910780727803321

Autore: Zhang Jin Z

Titolo: Optical properties and spectroscopy of nanomaterials [[electronic resource] /] / Jin Zhong Zhang

Pubbl/distr/stampa: Hackensack, NJ, : World Scientific, c2009

ISBN:
1-282-76063-7
9786612760631
1-61583-240-8
981-283-666-7

Descrizione fisica: 1 online resource (xvi, 383 p. ) : ill. (some col.)

Disciplina: 620.5

Soggetti:
Nanostructured materials - Optical properties
Nanostructured materials - Spectra

Lingua di pubblicazione: Inglese

Formato: Materiale a stampa

Livello bibliografico: Monografia

Note generali: Bibliographic Level Mode of Issuance: Monograph

Nota di bibliografia: Includes bibliographical references and index.

Nota di contenuto: 1. Introduction -- 2. Spectroscopic techniques for studying optical properties of nanomaterials. 2.1. UV-visible electronic absorption spectroscopy. 2.2. Photoluminescence and electroluminescence spectroscopy. 2.3. Infrared (IR) and Raman vibrational spectroscopy. 2.4. Time-resolved optical spectroscopy. 2.5. Nonlinear optical spectroscopy : harmonic generation and up-conversion. 2.6. Single nanoparticle and single molecule spectroscopy. 2.7. Dynamic light scattering (DLS). 2.8. Summary -- 3. Other experimental techniques : electron microscopy and X-ray. 3.1. Microscopy : AFM, STM, SEM and TEM. 3.2. X-ray : XRD, XPS, and XAFS, SAXS. 3.3. Electrochemistry and photoelectrochemistry. 3.4. Nuclear magnetic resonance (NMR) and electron spin resonance (ESR). 3.5. Summary -- 4. Synthesis and fabrication of nanomaterials. 4.1. Solution chemical methods. 4.2. Gas or vapor-based methods of synthesis : CVD, MOCVD and MBE. 4.3. Nanolithography techniques. 4.4. Bioconjugation. 4.5. Toxicity and green chemistry approaches for synthesis. 4.6. Summary -- Optical properties of semiconductor nanomaterials. 5.1. Some basic concepts about semiconductors. 5.2. Energy levels and density of states in reduced dimension systems. 5.3. Electronic structure and electronic

Sommario/riassunto

Optical properties are among the most fascinating and useful properties of nanomaterials and have been extensively studied using a variety of optical spectroscopic techniques. A basic understanding of the optical properties and related spectroscopic techniques is essential for anyone who is interested in learning about nanomaterials of semiconductors, insulators or metal. This is partly because optical properties are intimately related to other properties and functionalities (e.g. electronic, magnetic, and thermal) that are of fundamental importance to many technological applications, such as energy conversion, chemical analysis, biomedicine, optoelectronics, communication, and radiation detection. Intentionally designed for upper-level undergraduate students and beginning graduate students with some basic knowledge of quantum mechanics, this book provides the first systematic coverage of optical properties and spectroscopic techniques of nanomaterials.