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Nota di contenuto	NANOPARTICULATE MATERIALS; CONTENTS; PREFACE; LIST OF SYMBOLS; LIST OF ABBREVIATIONS; ABOUT THE AUTHOR; 1 INTRODUCTION; 1.1 Overview; 1.2 Nanoparticle-Based Materials; 1.3 Unique Characteristics; 1.3.1 Surface Behaviors; 1.3.2 Vapor Pressure and Solubility; 1.3.3 Size-Dependent Characteristics; 1.4 Properties; 1.4.1 Chemical; 1.4.2 Mechanical; 1.4.3 Electrical; 1.4.4 Magnetic; 1.4.5 Optical; 1.4.6 Biological; 1.5 Key Scientific and Technical Challenges; 1.5.1 Synthesis; 1.5.2 Characterization; 1.5.3 Superstructure Assembly; 1.5.4 Bulk Processing; 1.5.5 Large-Scale Production 1.5.6 Modeling and Simulation1.6 Applications; 1.7 Processing Overview; 1.8 Summary; Questions; References; 2 NANOPARTICLE SYNTHESIS; 2.1 Introduction; 2.2 Theory; 2.2.1 Nucleation; 2.2.1.1 Homogeneous Nucleation; 2.2.1.2 Heterogeneous Nucleation; 2.2.2 Growth; 2.3 Gas-Phase Nanoparticle Synthesis; 2.3.1 Gas-Gas Reaction; 2.3.1.1 Physical Vapor Synthesis; 2.3.1.2 Chemical Vapor Synthesis;

2.3.1.3 Laser Ablation; 2.3.2 Gas-Liquid Reaction; 2.3.3 Gas-Solid Reaction; 2.4 Liquid Nanoparticle Synthesis; 2.4.1 Fundamental Method; 2.4.1.1 Precipitation; 2.4.1.2 Metal Salt Reduction
2.4.1.3 Hydrolysis; 2.4.1.4 Solvothermal Synthesis; 2.4.1.5 Cryochemical Synthesis; 2.4.2 Confinement Method; 2.4.2.1 Spray Pyrolysis; 2.4.2.2 Solventless Synthesis; 2.4.3 Composite Nanoparticle Synthesis; 2.4.3.1 Core/Shell Structure; 2.4.3.2 Electroless Deposition; 2.4.3.3 Templating; 2.4.3.4 Bio-Based Synthesis; 2.4.4 Field-Assisted Nanoparticle Synthesis; 2.4.4.1 Micelle Synthesis; 2.4.4.2 Laser-Assisted Synthesis; 2.4.4.3 Plasma-Assisted Synthesis; 2.4.4.4 Microwave-Assisted Synthesis; 2.4.4.5 Sonication-Assisted Synthesis; 2.4.4.6 Radiation-Assisted Synthesis; 2.4.4.7 Electric Field-Assisted Synthesis; 2.5 Solid Nanoparticle Synthesis; 2.5.1 Milling; 2.5.2 Reactions between Solids; 2.6 Summary; Questions; References; 3 NANOPARTICLE CHARACTERIZATION; 3.1 Introduction; 3.2 Size, Shape, and Morphology; 3.2.1 Microscopy; 3.2.1.1 Scanning Electron Microscopy; 3.2.1.2 Transmission Electron Microscopy; 3.2.1.3 Scanning Probe Microscopy; 3.2.2 Dynamic Light Scattering; 3.2.3 X-ray Diffraction Line Broadening; 3.2.4 Small-Angle Scattering; 3.2.5 Optical Spectroscopy; 3.3 Energetics and Global Thermodynamics; 3.4 Surface Area; 3.5 Porosity and Pore Size
3.5.1 Electron Imaging; 3.5.2 Gas Adsorption; 3.6 Structure; 3.6.1 Surface Structure; 3.6.1.1 Low-Energy Electron Diffraction; 3.6.1.2 Atomic Force Microscopy; 3.6.1.3 Scanning Tunneling Microscopy; 3.6.2 Bulk Structure; 3.6.2.1 X-ray Diffraction; 3.6.2.2 Electron Diffraction; 3.6.2.3 Neutron Diffraction; 3.7 Composition; 3.7.1 Surface Composition; 3.7.1.1 Auger Electron Spectroscopy; 3.7.1.2 X-ray Photoelectron Spectroscopy; 3.7.1.3 Secondary Ion Mass Spectroscopy; 3.7.2 Bulk Composition; 3.7.2.1 Optical Atomic Spectroscopy; 3.7.2.2 X-ray Fluorescence Spectroscopy; 3.7.2.3 Energy Dispersive X-ray Analysis

Sommario/riassunto

Serving as the only systematic and comprehensive treatment on the topic of nanoparticle-based materials, this book covers synthesis, characterization, assembly, shaping and sintering of all types of nanoparticles including metals, ceramics, and semiconductors. A single-authored work, it is suitable as a graduate-level text in nanomaterials courses.
