S. S. Alias, A. A. Mohamad, Universiti Sains Malaysia, Nibong Tebal, Malaysia

Synthesis of Zinc Oxide by Sol–Gel Method for Photoelectrochemical Cells

This book focuses on the study of synthesized ZnO powder using Zn(CH3COO)2·2H2O precursor, methanol (as solvent), and sodium hydroxide (NaOH) to vary the pH. The successfully synthesized ZnO powder from the sol-gel centrifugation and sol-gel storage methods were characterized and investigated by X-ray diffraction, field emission scanning electron microscopy, transmission electron microscopy, Fourier-transform infrared spectroscopy, UV–visible spectroscopy, and photoluminescence test to compare the properties of the nanoparticles. The best characteristic of the ZnO powder from both methods was observed when the powders were coated on an ITO glass to fabricate a PEC. The current density–voltage performances of both PECs were investigated under luminescent and dark conditions.

Features
► Illustrates the complete process for the synthesis and characterization of ZnO nanocrystalline powder by sol–gel centrifugation and storage ► Demonstrates the application of ZnO nanocrystalline powder in photoelectrochemical cells

Contents
Introduction.- Nanocrystalline Metal Oxide Semiconductor.- ZnO: Effect of pH on Sol–Gel Process.- ZnO: Effect of Centrifugation and Storage on Sol–Gel Process.- ZnO: Photoelectrochemical Analysis.

Fields of interest
Optical and Electronic Materials; Nanoscale Science and Technology; Semiconductors

Target groups
Research

Product category
Brief

Due November 2013

2014. X, 52 p. 31 illus., 16 in color. (SpringerBriefs in Materials) Softcover
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P. Deb, Tezpur University, Tezpur, India

Kinetics of Heterogeneous Solid State Processes

Kinetic studies have traditionally being extremely useful in characterizing several physical and chemical phenomena in organic, inorganic and metallic systems. It provides valuable qualitative, quantitative and kinetic information on phase transformations, solid state precipitation, crystallization, oxidation and decomposition. Unfortunately, no single reference comprehensively presents nonisothermal kinetic analysis method for the study of complex processes, determining the actual mechanism and kinetic parameters. This book provides a new method for nonisothermal kinetics and its application in heterogeneous solid state processes. In the backdrop of limitations in existing methods, the book presents a brief review of the widely used isothermal and nonisothermal kinetic analysis methods.

Features
► Provides new method for nonisothermal kinetics and its application in heterogeneous solid state processes ► Discusses nonisothermal kinetic analysis method for the study of complex processes, determining the actual mechanism and kinetic parameters ► Presents a brief review of the widely used isothermal and nonisothermal kinetic analysis methods

Contents
Fundamentals Concepts of Kinetics.- Material Development and Process.- Nonisothermal Kinetic Analysis.- Kinetics of Solid State Reaction.- Kinetics of Heterogeneous Solid State Process.- Summary.- References.

Fields of interest
Characterization and Evaluation of Materials; Physical Chemistry; Nanotechnology

Target groups
Research

Product category
Brief

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M. Lee, Evanston, IL, USA (Ed)

Remarkable Natural Materials and Their Engineering Potential

This book explores a collection of natural surfaces, their scientific characteristics, and their unique engineering potential – demonstrating that engineering applications can be found in unexpected places. The surfaces covered range from botanical ones, like rice and lotus leaves, to insect surfaces, like butterfly and dragonfly wings. The variety of surfaces and numerous engineering potentials described show how biomimicry can be utilized to solve countless real-world problems.

Features
► Discusses natural surfaces in a format that is accessible to less technical readers ► Contains material on natural surfaces that can be found locally ► Encourages readers to explore the engineering value of the natural surfaces surrounding them

Contents
Gecko Pads: One Small Step for a Gecko, One Giant Leap For Dry Adhesion.- Diatoms: Glass Ornaments Of the Earth's Waters.- Botanic Leaves: A Discussion Of Superhydrophobic Surfaces.- Spider Silk: A Sticky Situation.- Lotus Leaves: Nature's Self -Cleaning Spectacle.- Whale Tubercles: Swimming With Agility.- Pine Needles: Exploring Natural Defenses.- Butterfly Wings: A Unique Look Through Nature's Kaleidoscope.- Snake Scales: Slithering With Precision.- Dragonfly Wings: A Discussion Of Dynamic Flight.- Frog Skin: The Frog Prince's Secret To Survival.

Fields of interest
Surfaces and Interfaces, Thin Films; Ecology; Popular Science in Nature and Environment

Target groups
Popular/general

Product category
Popular science

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W. Skorupa, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany; **H. Schmidt,** Chemnitz University of Technology, Chemnitz, Germany (Eds)

Subsecond Annealing of Advanced Materials

Annealing by Lasers, Flash Lamps and Swift Heavy Ions

The thermal processing of materials ranges from few fem to seconds by Swift Heavy Ion Implantation to about one second using advanced Rapid Thermal Annealing. This book offers after an historical excursus selected contributions on fundamental and applied aspects of thermal processing of classical elemental semiconductors and other advanced materials including nanostructures with novel optoelectronic, magnetic, and superconducting properties. Special emphasis is given on the diffusion and segregation of impurity atoms during thermal treatment.

Features
► Written by leading researchers in the field ► Describes annealing-related processes in semiconductor technology ► Includes a broad range of examples

Contents
The very early time.- Nanonet formation by constitutional supercooling of pulsed laser annealed, Mn-implanted germanium.- Metastable activation of dopants by solid phase epitaxial recrystallization.- Superconducting Ga-implanted Germanium.- Structural changes in SiGe/Si layers induced by fast crystallization. […]

Fields of interest
Optical and Electronic Materials; Laser Technology, Photonics; Semiconductors

Target groups
Research

Product category
Monograph

Due January 2014

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