
Description: Nanostructured Semiconductor Oxides for the Next Generation of Electronics and Functional Devices focuses on the development of semiconductor nanocrystals, their technologies and applications, including energy harvesting, solar cells, solid oxide fuel cells, and chemical sensors. Semiconductor oxides are used in electronics, optics, catalysts, sensors, and other functional devices. In their 2D form, the reduction in size confers exceptional properties, useful for creating faster electronics and more efficient catalysts.

After explaining the physics affecting the conductivity and electron arrangement of nanostructured semiconductors, the book addresses the structural and chemical modification of semiconductor nanocrystals during material growth. It then covers their use in nanoscale functional devices, particularly in electronic devices and carbon nanotubes. It explores the impact of 2D nanocrystals, such as graphene, chalcogenides, and oxide nanostructures, on research and technology, leading to a discussion of incorporating graphene and semiconductor nanostructures into composites for use in energy storage. The final three chapters focus on the applications of these functional materials in photovoltaic cells, solid oxide fuel cells, and in environmental sensors including pH, dissolved oxygen, dissolved organic carbon, and dissolved metal ion sensors.

Nanostructured Semiconductor Oxides for the Next Generation of Electronics and Functional Devices is a crucial resource for scientists, applied researchers, and production engineers working in the fabrication, design, testing, characterization, and analysis of new semiconductor materials. This book is a valuable reference for those working in the analysis and characterization of new nanomaterials, and for those who develop technologies for practical devices fabrication.

- Focuses on the development of semiconductor nanocrystals, their technologies and applications, including energy harvesting, solar cells, solid oxide fuel cells, and chemical sensors
- Reviews fundamental physics of conductivity and electron arrangement before proceeding to practical applications
- A vital resource for applied researchers and production engineers working with new semiconductor materials

Contents:

About the author
Woodhead Publishing Series in Electronic and Optical Materials
Introduction
Acknowledgements
Dedication
1: Electrons and holes in a semiconductor
Abstract
1.1 Order and disorder in semiconductor crystals
1.2 Electrical conductivity of semiconductor crystals
1.3 Mechanisms of n- and p-type conductivity
1.4 The energy spectrum of an electron in an infinite crystal lattice
1.5 The energy spectrum of an electron in a finite crystal lattice
1.6 Statistics of electrons and holes in semiconductors
1.7 Limits of the band theory of semiconductors
1.8 State-of-the-art techniques for characterization of nanostructured semiconductors
2: Structural and chemical modification of semiconductor nanocrystals
Abstract
2.1 Introduction
2.2 Vapour-phase material growth
2.3 Solution-phase material growth
2.4 Vertical and horizontal alignment strategies
2.5 Doping of metal oxide semiconductor systems
2.6 Energy harvesting based on semiconductor piezoelectric nanostructures
2.7 Physical electrochemistry of semiconductor nanocrystals
2.8 Structural and electrochemical properties of semiconductor nanocrystals
3: Electronic devices and functional structures based on nanostructured semiconductors
Abstract
3.1 Introduction to novel nanoscale devices from nanostructured semiconductors
3.2 Tunable electronic devices
3.3 Optoelectronics based on nanostructured semiconductors
3.4 Resonators and cantilevers based on nanostructured semiconductors
3.5 Functional structures: carbon nanotubes
3.6 Carbon nanotubes for environmental sensors
4: Two-dimensional semiconductor nanocrystals: new direction in science and technology
Abstract
4.1 Physical and chemical properties of graphene
4.2 The impact of these properties on science and industry
4.3 Chalcogenide semiconductor nano-crystals
4.4 Titanium dioxide nanocrystals
4.5 Molybdenum trioxide nanocrystals
4.6 Tungsten trioxide nanocrystals
4.7 Niobium pentoxide nanocrystals
4.8 Tantalum pentoxide nanocrystals
4.9 Zinc oxide nanocrystals
4.10 Impact of combining two-dimensional semiconductor nanocrystals into three-dimensional structure
5: Composite graphene/semiconductor nanostructures for energy storage
Abstract
5.1 Performance of graphene in lithium ion batteries
5.2 Performance of graphene in electrochemical capacitors
5.3 Prospects of using graphene in lithium ion batteries (LIBs) and electrochemical capacitors (ECs)
5.4 Composite graphene/semiconductor nanocrystals in LIBs and ECs
5.5 Development of three-dimensional conductive networks
5.6 Nanostructured thermopower wave sources
6: Nanostructured semiconductor composites for solar cells
Abstract
6.1 Operating principle of a liquid-junction photovoltaic cell
6.2 Nanostructured semiconductors as solar harvesting materials: strategic potential of inorganic semiconductors in photovoltaics
6.3 Principles of inorganic solid-state nanostructured solar cells
6.4 Structured transparent electron conductors
6.5 Semiconductor quantum dot absorbers
6.6 Dye-sensitized solar cells (DSSCs)
6.7 Future trends in technological development
7: Nanostructured semiconductor composites for solid oxide fuel cells (SOFCs)
Abstract
7.1 Introduction to materials and designs for solid oxide fuel cells (SOFCs)
7.2 Nanostructured cathode materials
7.3 Electrolytes for SOFCs
7.4 Nanostructured anode materials
7.5 Interconnects for SOFCs
7.6 Miniaturisation of SOFCs
7.7 Low-temperature SOFCs
7.8 Toward further performance increase of SOFCs at lower temperatures
7.9 Rational SOFC material design: new advances and tools
7.10 SOFC applications and markets
8: Semiconductor nanocrystals in environmental sensors
Abstract
8.1 Solid-state pH sensors
8.2 Electrochemical dissolved oxygen (DO) sensors
8.3 Conductivity measurements
8.4 Antifouling technologies for solid-state water quality sensors
8.5 Solid-state turbidity sensors
8.6 Solid-state dissolved organic carbon (DOC) sensors
8.7 Solid-state dissolved metal ion sensors
8.8 Future trends

Order by Fax - using the form below

Order by Post - print the order form below and send to

Research and Markets,
Guinness Centre,
Taylors Lane,
Dublin 8,
Ireland.
Fax Order Form
To place an order via fax simply print this form, fill in the information below and fax the completed form to 646-607-1907 (from USA) or +353-1-481-1716 (from Rest of World). If you have any questions please visit

http://www.researchandmarkets.com/contact/

Order Information
Please verify that the product information is correct.

Web Address: http://www.researchandmarkets.com/reports/2736266/
Office Code: SCPL9O4T

Product Format
Please select the product format and quantity you require:

| Quantity | Hard Copy (Hard Back) | USD 227 + USD 28 Shipping/Handling |

* Shipping/Handling is only charged once per order.

Contact Information
Please enter all the information below in BLOCK CAPITALS

Title: Mr ☐ Mrs ☐ Dr ☐ Miss ☐ Ms ☐ Prof ☐
First Name: ____________________________ Last Name: ____________________________
Email Address: * ____________________________
Job Title: ____________________________
Organisation: ____________________________
Address: ____________________________
City: ____________________________
Postal / Zip Code: ____________________________
Country: ____________________________
Phone Number: ____________________________
Fax Number: ____________________________

* Please refrain from using free email accounts when ordering (e.g. Yahoo, Hotmail, AOL)
Payment Information

Please indicate the payment method you would like to use by selecting the appropriate box.

☐ Pay by credit card: You will receive an email with a link to a secure webpage to enter your credit card details.

☐ Pay by check: Please post the check, accompanied by this form, to:
Research and Markets,
Guinness Center,
Taylors Lane,
Dublin 8,
Ireland.

☐ Pay by wire transfer: Please transfer funds to:
Account number 833 130 83
Sort code 98-53-30
Swift code ULSBIE2D
IBAN number IE78ULSB98533083313083
Bank Address Ulster Bank,
27-35 Main Street,
Blackrock,
Co. Dublin,
Ireland.

If you have a Marketing Code please enter it below:

Marketing Code: ________________________

Please note that by ordering from Research and Markets you are agreeing to our Terms and Conditions at http://www.researchandmarkets.com/info/terms.asp

Please fax this form to:
(646) 607-1907 or (646) 964-6609 - From USA
+353-1-481-1716 or +353-1-653-1571 - From Rest of World