

1. Record Nr.	UNINA9910510549903321
Autore	Rajendran Saravanan
Titolo	Inorganic Materials for Energy, Medicine and Environmental Remediation
Pubbl/distr/stampa	Cham : , : Springer International Publishing AG, , 2022 ©2022
ISBN	9783030798994 9783030798987
Descrizione fisica	1 online resource (269 pages)
Collana	Environmental Chemistry for a Sustainable World Ser. ; ; v.69
Altri autori (Persone)	NaushadMu VoDai-Viet N LichtfouseEric
Soggetti	Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Acknowledgments -- Contents -- About the Editors and Contributors -- Editors -- Contributors -- Chapter 1: Localized Surface Plasmon Resonance in Colloidal Copper Sulphide ($Cu_{2-x}S$, $x = 0 \dots < 1$) Nanocrystals and Its Applications -- 1.1 Introduction -- 1.2 Colloidal Copper Sulphide ($Cu_{2-x}S$) Nanomaterials - An Introduction -- 1.3 Localized Surface Plasmon Resonance in Nanocrystals - A Nutshell -- 1.4 Localized Surface Plasmon Resonance in Copper Sulphide ($Cu_{2-x}S$) Nanocrystals -- 1.5 Applications of Localized Surface Plasmon Resonance in Copper Sulphide Nanocrystals -- References -- Chapter 2: Titanium Dioxide/Graphene Nanocomposites as High-Performance Anode Material for Lithium Ion Batteries -- 2.1 Introduction -- 2.2 Graphene Synthesis -- 2.2.1 Exfoliation of Graphite -- 2.2.2 Deposition on Targets -- 2.3 Graphene for Energy Applications -- 2.3.1 Graphene as Active Electrode Material in Lithium Ion Batteries -- 2.4 Lithium ion Batteries -- 2.5 Graphene-Based Anodes for LIBs -- 2.5.1 Anode Materials and Their Properties -- 2.5.2 Graphene Anodes for Lithium Ion Batteries -- 2.5.3 Graphene Metal Oxide Composite Anode for Lithium Ion Batteries -- 2.5.4 Titanium Oxide/Graphene Binary

Composite Anodes -- 2.5.5 Ternary Titanium Dioxide/Graphene
Composite Electrodes -- 2.6 Lithium Storage Mechanism in Titanium
Dioxide/Graphene Nanocomposite -- 2.7 Conclusion and Future
Outlook -- References -- Chapter 3: Design and Fabrication of Nano-
Structured Materials for Fuel Cell Application -- 3.1 Overview of Fuel
Cell -- 3.2 Working Principle of a Fuel Cell -- 3.3 Types of Fuel Cell --
3.4 Nanostructures Materials and Recent Development in Fuel Cell
Application -- 3.4.1 Nano-engineered Catalysts in the Fuel Cell --
3.4.2 Recent Development in the Fuel Cell -- 3.4.3 Future Technical
Developments in the Fuel Cell.
3.5 Effective Role of Fuel Cell in Energy Issues -- 3.5.1 Fuel Cell
in Transport -- 3.5.2 Fuel Cell as Heat Source -- 3.5.3 Fuel Cell
in Electricity -- 3.6 Conclusion -- References -- Chapter 4: Synthesis
of Nano-Particles and Its Applications in Heavy Metal Removal
from Wastewater -- 4.1 Introduction -- 4.2 Types of Nano-Materials --
4.3 Synthesis of Nano-Adsorbents -- 4.3.1 Bottom Up Process --
4.3.1.1 Sol Gel Method -- 4.3.1.2 Chemical Vapour Deposition --
4.3.1.3 Biosynthesis -- 4.3.1.4 Pyrolysis Method -- 4.3.2 Top Down
Process -- 4.3.2.1 Mechanical Milling -- 4.3.2.2 Laser Ablation Process
-- 4.3.2.3 Thermal Decomposition Process -- 4.4 Applications
of Nano-Materials in Wastewater Treatment -- 4.4.1 Graphene Oxide
Nano-Particles -- 4.4.2 Iron-Oxide Nano-Particles -- 4.4.3 Titanium
Di-Oxide Nano-Particles -- 4.4.4 Carbon Nano-Tubes -- 4.4.5 Zinc
Oxides -- 4.5 Conclusion -- References -- Chapter 5: Role of Metal
and Metal Oxides for the Removal of Water Pollutants -- 5.1
Introduction -- 5.2 Water Pollution -- 5.2.1 Type of Pollutants
in Wastewater from Various Sources -- 5.2.2 Methods Used to Treat
Polluted Water -- 5.3 Role of Metals and Metal Oxides for Wastewater
Treatment -- 5.3.1 Metals -- 5.3.1.1 Silver -- 5.3.1.2 Gold -- 5.3.1.3
Iron -- 5.3.2 Metal Oxides -- 5.3.2.1 Zinc Oxide -- 5.3.2.2 Iron Oxide
-- 5.3.2.3 Titanium Dioxide -- 5.3.2.4 Cerium Oxide -- 5.3.2.5
Zirconium Oxide -- 5.3.2.6 Manganese Oxide -- 5.4 Conclusions --
References -- Chapter 6: Magnetic Nanomaterials for Energy Storage
Applications -- 6.1 Introduction -- 6.2 Experimental Methods -- 6.2.1
Co-precipitation Method -- 6.2.2 Chemical Oxidation Method -- 6.2.3
Polyol Process -- 6.2.4 Hydrothermal Process -- 6.3 Surface
Modification -- 6.4 Characterization -- 6.5 Magnetic Nanoparticles
for Energy Storage Applications -- 6.5.1 Fe₃O₄ -- 6.5.2 Fe₂O₃ --
6.5.3 MnFe₂O₄ and NiFe₂O₄.
6.6 Effect of Magnetic Field -- 6.7 Summary and Future Directions --
References -- Chapter 7: Emerging Nano-Structured Metal Oxides
for Detoxification of Organic Pollutants Towards Environmental
Remediation: Overview and Future Aspects -- 7.1 Introduction -- 7.1.1
Methods for Treatment of Waste Waters -- 7.1.2 Evolution of Metal
Oxides for Detoxification of Pollutants -- 7.2 Background of Study --
7.2.1 Sustainability and Green Remediation -- 7.3 Technological
Approaches Towards Removal of Organic Pollutants -- 7.3.1
Adsorption Process -- 7.3.1.1 Adsorption of Organic Pollutants by
Activated Carbon -- 7.3.1.2 Adsorption of Organic Pollutants by
Carbon Nanotube (CNT) -- 7.3.2 Fenton Process -- 7.3.2.1 Electro-
Fenton -- 7.3.2.2 Photo-Fenton -- 7.3.2.3 Sono-Electro-Fenton (SEF)
-- 7.3.3 Advanced Oxidation Process -- 7.3.3.1 Advanced Oxidation
Technology (AOT) -- 7.3.3.2 AOTs using Hydrogen Peroxide -- 7.3.3.3
OP using Ozonation -- 7.3.4 Photocatalytic Process -- 7.4 Metal Oxide
Based Nanomaterials for Environmental Remediation -- 7.4.1 Pure/Bare
Metal Oxides Based Nanomaterials -- 7.4.2 Doped Metal Oxides Based
Nanomaterials -- 7.4.3 Graphene/Graphene Oxide Based Metal Oxide
Nanomaterials -- 7.4.4 Hybrid Materials (Core-Shell) Based Metal Oxide

Nanomaterials -- 7.5 Summary and Conclusion -- References -- Chapter 8: Metal Nanostructures Derived Composites for Catalytic Conversion of Organic Contaminants in Wastewater -- 8.1 Introduction -- 8.2 Conversion of Nitrophenol to Aminophenol -- 8.3 Dye Degradation Over Metal Nanocomposites -- 8.4 Removal of Toxic Chromium by Metal Oxide Nanostructure -- 8.5 Conclusions -- References -- Chapter 9: Removal of Persistent Organic Pollutants Using Redox Active Metal Oxide Nanocatalysts via Advanced Oxidation Process -- 9.1 General Introduction -- 9.2 Background -- 9.3 Redox Active Metal Oxide Nanocatalysts for Advanced Oxidation Processes -- 9.4 Copper Oxide Nanocatalysts -- 9.5 Cerium Oxide Nanocatalysts -- 9.6 Iron Oxide Nanocatalysts -- 9.7 Cobalt Oxide Nanocatalysts -- 9.8 Conclusions -- References -- Chapter 10: Metal-Based Particles as a Catalyst for Proton Exchange Membrane Fuel Cells -- 10.1 Introduction -- 10.2 Introduction of Direct-Methanol Fuel Cells -- 10.3 Introduction of Direct-Ethanol Fuel Cells -- 10.4 Introduction of Formic Acid Fuel Cells -- 10.5 Metal Catalysts for Methanol Fuel Cell -- 10.6 Metal Catalysts for Ethanol Fuel Cell -- 10.7 Metal Catalysts for Formic Acid Fuel Cell Application -- 10.8 Conclusion -- References.
