1. Record Nr. UNINA9910855393603321 Autore Bachheti Archana (Joshi) Titolo Carbon-Based Nanomaterials: Synthesis, Agricultural, Biomedical, and **Environmental Interventions** Pubbl/distr/stampa Singapore:,: Springer,, 2024 ©2024 **ISBN** 9789819702404 Edizione [1st ed.] Descrizione fisica 1 online resource (397 pages) Collana Smart Nanomaterials Technology Series Altri autori (Persone) BachhetiRakesh Kumar HusenAzamal Disciplina 620,115 Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Intro -- Preface -- Contents -- Editors and Contributors -- Carbon-Nota di contenuto

Based Smart Nanomaterials: An Overview -- 1 Introduction -- 2 Types of Carbon-Based Nanomaterials -- 3 Synthesis and Characterization of Carbon-Based Nanomaterials -- 4 Potential Applications, Current Research Trends, and Future Prospects of Carbon-Based Nanomaterials -- 5 Toxicity and Environmental Impact of Carbon-Based Nanomaterials -- 6 Conclusion and Future Directions -- References --Graphene-Based Nanomaterial Synthesis, Characterization, and Applications -- 1 Introduction -- 2 Graphene-Based Nanomaterial Synthesis -- 2.1 Hummers Method (Top-Down Method) -- 2.2 Reduction of Graphene Oxide (Top-Down Method) -- 2.3 Liquid Phase Exfoliation (LPE) (Top-Down Method) -- 2.4 Mechanical Cleavage (MC) (Top-Down Method) -- 2.5 Arc Discharge (Top-Down Method) -- 2.6 Chemical Vapor Deposition (CVD) (Bottom-Up Method) -- 2.7 Epitaxial Growth (Bottom-Up Method) -- 3 Characterization Techniques -- 4 Graphene-Based Nanomaterials Application -- 5 Conclusions --References -- Synthesis, Characterization, and Applications of Carbon Nanotube -- 1 Introduction -- 2 Synthesis of CNTs -- 2.1 Arc Discharge -- 2.2 Laser Ablation -- 2.3 Chemical Vapor Deposition (CVD) -- 3 Characterization of CNTs -- 3.1 Raman Spectroscopy -- 3.2 Fourier Transform IR and Infrared Spectroscopies -- 3.3 Ultravioletvisible Spectroscopy -- 3.4 X-ray Photoelectron Spectroscopy -- 3.5

Microscopies -- 3.7 Scanning Probe Microscopies -- 4 Applications of CNTs -- 4.1 CNT-Based Drug and Delivery of Genes -- 4.2 Artificial Implants -- 4.3 Tissue Engineering -- 4.4 Field Emission Source in Electronic Devices -- 5 Conclusion -- References --Functionalization of Carbon-Based Nanoparticles for Various Applications -- 1 Introduction -- 2 Types of Nanomaterials. 2.1 1-D Nanoparticles -- 2.2 2-D Nanoparticles-Carbon Nanotubes --2.3 0-D Nanoparticles-Fullerenes -- 2.4 Dendrimers -- 3 Functionalization of Carbon-Based Nanoparticles- -- 3.1 Exohedral Functionalization -- 3.2 Endohedral Functionalization -- 4 Applications of Carbon-Based Nanoparticles in Different Areas -- 4.1 Applications of Functionalized Carbon Nanotubes -- 4.2 Applications of Functionalized Quantum Dots -- 4.3 Applications of Functionalized Dendrimers -- 4.4 Applications of Functionalized Fullerenes -- 5 Conclusion -- References -- Smart Carbon Nanomaterials and Their Effect on the Antioxidant System of Plants -- 1 Introduction -- 2 Overview of Smart Carbon Nanomaterials -- 3 Carbon Nanotubes -- 4 The Importance of Smart Carbon Nanomaterials as an Antioxidant -- 5 Use of Smart Carbon Nanomaterials as Antioxidants in Different Studies -- 6 Future Directions of Smart Carbon Nanomaterials as an Antioxidant -- 7 Conclusion -- References -- Role of Carbon Nanomaterials in the Prevention of Plant Disease -- 1 Introduction -- 2 Types of Carbon Nanomaterials -- 2.1 Carbon Nanotubes -- 2.2 Graphene -- 2.3 Fullerene -- 2.4 Other Carbon Nanomaterials -- 3 Application of Carbon Nanomaterials in the Prevention of Plant Disease -- 3.1 Carbon Nanotubes -- 3.2 Graphene Nanomaterials -- 3.3 Fullerene -- 4 Conclusion -- References -- Recent Research on the Use of Carbon Nanomaterials in Plant Growth and Development -- 1 Introduction -- 2 Overview of Carbon Nanotubes and Graphene -- 3 Carbon Nanotube Classifications -- 4 Importance of Nanomaterials in Agriculture -- 5 Synthesis of Carbon Nanotubes -- 6 Carbon Nanomaterials in Plant Nutrition -- 6.1 Enhanced Nutrient Delivery --6.2 Role in Micronutrient Uptake and Stimulating Photosynthesis with Nanomaterials -- 6.3 Improved CO2 Fixation -- 6.4 Increased Chlorophyll Production. 6.5 Protection Against Pathogens -- 6.6 Biochemical and Physiological Effects -- 7 Conclusion -- References -- Role of Carbon Nanotubes for Herbicide Detection and Remediation -- 1 Introduction -- 2 Structure and Type of Carbon Nanotubes -- 3 Properties of Carbon Nanotubes -- 4 Carbon Nanotubes Synthesis -- 5 Applications of Carbon Nanotubes for Herbicide Detection -- 6 Applications of Carbon Nanotubes for Herbicide Remediation -- 7 Potential Toxicity of Carbon Nanotubes -- 8 Limitations of the Application of Carbon Nanotubes -- 9 Conclusions -- References -- Drug Delivery Using Carbon Nanomaterials -- 1 Introduction -- 2 Classification of Carbon Nanomaterial -- 2.1 Porous Carbon -- 2.2 Carbon Dots -- 2.3 Nanodiamonds -- 2.4 Fullerenes -- 2.5 Carbon Nanotubes -- 2.6 Graphene -- 3 Physicochemical Effects on Carbon Nanomaterial's Ability to Deliver Drugs -- 3.1 Enzymatic Degradation -- 3.2 Biocompatibility and Biological Interactions -- 3.3 Bio-corona -- 3.4 Toxicity -- 4 Carbon Nanomaterials in Drug Delivery -- 4.1 Delivery of Anticancer Drugs -- 4.2 Delivery of Anti-tubercular Drugs -- 4.3 Delivery of Antifungal Drugs -- 4.4 Delivery of Anti-inflammatory Drugs -- 4.5 Delivery of Neurological Drugs -- 4.6 Delivery of Biomolecules, Gene Transfection, and as Biosensors -- 5 Challenges and Limitations of Carbon Nanomaterials -- 6 Conclusions --References -- Biomedical Applications of 1D and 2D Carbon-Based

Fluorescence Spectroscopy -- 3.6 Scanning and Transmission Electron

-- 2 Biomedical Importance of Nanoparticles -- 2.1 Detection and Diagnosis -- 2.2 Drug Delivery -- 2.3 Therapeutics Agents -- 3 Emerging 1D and 2D Nanomaterials and Their Biomedical Applications -- 4 Carbon-Based Nanomaterials and Their Applications -- 5 1D Carbon-Based Nanomaterials and Their Biomedical Applications -- 5.1 Carbon Nanotubes (CNTs) -- 5.2 CNTs as Biosensors. 5.3 CNTs in Drug Delivery -- 5.4 CNTs in Cancer Therapy -- 6 2D Carbon-Based Nanomaterials and Their Biomedical Applications -- 6.1 Graphene -- 6.2 Graphene Oxide -- 6.3 Reduced Graphene Oxide -- 7 Some Specific Biomedical Applications of 2D Carbon-Based Nanomaterials -- 7.1 Drug Delivery -- 7.2 Gene Delivery -- 7.3 Biosensing -- 7.4 Tissue Engineering -- 8 Toxicity Issues of Carbon-Based Nanomaterials -- 8.1 Toxicity Issues of Carbon-Based Nanomaterials on Living Organisms -- 8.2 Toxicity Issues of Carbon-Based Nanomaterials on the Environment -- 9 Future Prospects -- 10 Conclusion -- References -- A Recent Update of Graphene-Based Nanomaterials for Biomedical Applications: Focusing on Drug Delivery and Tissue Engineering -- 1 Introduction -- 2 Graphene and Graphene Oxide Synthesis -- 2.1 Exfoliation -- 2.2 Chemical Vapor Deposition Method -- 2.3 Thermal Reduction Methods -- 2.4 Chemical Reduction Methods -- 3 The Graphene/Graphene Derivatives-Based Materials in Biomedical Applications -- 3.1 Drug Delivery -- 3.2 Tissue Engineering -- 4 Conclusion -- References -- Carbon Nanomaterials in Drug and Gene Delivery Potential: Focus on Fungal Infections -- 1 Introduction -- 1.1 Background on Fungal Infections and Their Impact on Human Health -- 1.2 Need for Effective Drug and Gene Delivery Systems for Fungal Infections -- 1.3 Overview of Carbon Nanomaterials and Their Unique Properties -- 1.4 Rationale for Exploring Carbon Nanomaterials in Drug and Gene Delivery for Fungal Infections -- 2 Types of Carbon Nanomaterials for Drug and Gene Delivery -- 2.1 Carbon Nanotubes (CNTs) -- 2.2 Graphene and Graphene Oxide (GO) -- 2.3 Carbon Dots and Nanodots -- 2.4 Fullerenes -- 3 Applications and Results in Fungal Infection Therapy -- 3.1 Antifungal Drug Delivery Using Carbon Nanomaterials -- 3.2 Gene Delivery for Antifungal Therapy. 4 Challenges and Future Perspectives -- 4.1 Safety Considerations and Potential Toxicity of Carbon Nanomaterials -- 4.2 Regulatory

Nanomaterials -- 1 Introduction -- 1.1 Preparation of Nanomaterials

Aspects and Hurdles in Translating Carbon Nanomaterial-Based Therapies to the Clinic -- 4.3 Long-Term Stability and Degradation Issues -- 4.4 Optimization of Drug Loading and Release Kinetics -- 4.5 Advancements in Personalized and Targeted Therapy Using Carbon Nanomaterials -- References -- Functionalized Carbon Nanotubes Biomedical Applications and Toxicological Implications -- 1 Introduction -- 2 Structure of Carbon Nanotubes -- 3 Synthesis -- 3.1 Arc Discharge -- 3.2 Chemical Vapour Deposition (CVD) -- 3.3 Electrolysis -- 3.4 Laser Ablation -- 3.5 Sonochemical Method -- 4 Materials -- 5 Functionalization Techniques of CNTs -- 6 Functionalization of CNTs -- 6.1 Noncovalent Functionalization -- 6.2 Covalent Functionalization -- 7 Advancement in CNTs-3D Bioprinting -- 8 Biomedical Application of Carbon Nanotubes -- 9 Limitations of CNT -- 10 Toxicity -- 11 Conclusion -- References -- Role of Carbon Nanomaterials in Air Pollution Remediation -- 1 Introduction -- 2 Common Types of Carbon Nanomaterials -- 2.1 Carbon Nanotube (CNT) -- 2.2 Graphene -- 2.3 Fullerenes -- 2.4 Carbon Nanofibers (CNFs) -- 3 Mechanisms of Air Pollution Remediation -- 3.1 Adsorption Activity of Carbon Nanomaterials (CNMs) -- 3.2 CNMs in Catalytic Activity and Reactive Oxygen Species (ROS) Generation -- 4

Applications of CNMs in Air Pollution Remediation -- 5 Challenges in Carbon Nanomaterials Application -- 5.1 Manufacturing Costs -- 5.2 Toxicity and Environmental Risks -- 5.3 Public Acceptance -- 5.4 Advantages and Disadvantages -- 6 Conclusion -- References -- Carbon Nanomaterial for Oil Spill Clean-Up -- 1 Introduction -- 2 Ecosystem and Societal Impact of Oil Spill -- 3 Superhydrophobic and Superoleophilic Carbon-Based Material. 4 Carbon Nanomaterials for Oil Spill Clean-up.