

1. Record Nr.	UNISA996495165503316
Titolo	Chitosan-based nanocomposite materials : fabrication, characterization and biomedical applications // Shikha Gulati, editor
Pubbl/distr/stampa	Singapore : , : Springer, , [2022] ©2022
ISBN	9789811953385 9789811953378
Descrizione fisica	1 online resource (349 pages)
Disciplina	620.115
Soggetti	Nanocomposites (Materials) Nanocomposites (Materials) - Machinability
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Acknowledgments -- About This Book -- Contents -- About the Editor -- Abbreviations -- 1 Introduction to Chitosan and Chitosan-Based Nanocomposites -- 1 Introduction -- 2 Chitosan: Structure and Preparation -- 2.1 Chitin and Chitosan: Chemical Structures -- 2.2 Preparation of Chitin and Chitosan -- 3 Modifications of Chitosan -- 3.1 Physical Modifications of Chitosan -- 3.2 Chemical Modifications of Chitosan -- 4 Properties of Chitosan -- 5 Characterization of Chitosan -- 6 Need for Nanotechnology -- 7 Chitosan Nanocomposites: Structural Analysis -- 7.1 Structure of Chitosan Nanocomposites: Nanofillers and Nanocoatings -- 7.2 Functionalization of Nanofillers in the Synthesis of Chitosan Nanocomposites -- 8 Synthesis Scheme for Chitosan Nanocomposites -- 8.1 Synthesis Strategies to Produce Chitosan Nanocomposites -- 8.2 Cross-Linking of Chitosan Nanocomposites -- 9 Chitosan Metal Nanocomposites -- 9.1 Chitosan-Gold Nanocomposites -- 9.2 Chitosan-Nickel Nanocomposites -- 9.3 Chitosan-Iron Nanocomposites -- 9.4 Chitosan-Copper Nanocomposites -- 9.5 Chitosan-Silver Nanocomposites -- 10 Properties of Chitosan Nanocomposites -- 10.1 Loading and Release of Drugs -- 10.2 Particle Size and Zeta Potential -- 10.3 Study of Cytotoxicity and Cellular Uptake -- 10.4 Stability -- 10.5 Antimicrobial Properties of Chitosan

Nanocomposites -- 11 Characterization of Chitosan Nanocomposites -- 11.1 Measurement of Size -- 11.2 Measurement of Morphology -- 11.3 Measurement of Specific Surface Area -- 11.4 Measurement of Chemical Composition -- 11.5 Measurement of Zeta Potential -- 11.6 Measurement of Antimicrobial Properties -- 11.7 Drug Content, Loading Efficiency, and Drug Release Measurements -- 12 Biomedical Applications of Chitosan Nanocomposites -- 12.1 Chitosan-Based Nanoparticles for the Treatment of Cancer. 12.2 Chitosan Nanoparticles for Tissue Engineering -- 12.3 Chitosan Nanoparticles for Wound Dressing -- 12.4 Chitosan Nanoparticles for Encapsulation of biologically Active Compounds -- 12.5 Chitosan Nanoparticles for Drug Delivery -- 12.6 Chitosan Nanoparticles for Bone Engineering -- 12.7 Chitosan Nanoparticles for Antioxidant Activity -- 12.8 Chitosan Nanoparticles for Biosensor Applications -- 12.9 Chitosan Nanoparticles for Enzyme Immobilization Support -- 12.10 Chitosan Nanoparticles as Antimicrobial Agents -- 12.11 Chitosan-Based Nanoparticles for Gene Therapy -- 13 Limitations and Challenges of the Use of Chitosan Nanocomposites in Biomedical Research -- 14 Conclusion and Future Prospects -- References -- 2 Strategies for Synthesis and Chemical Modifications of Chitosan-Based Nanocomposites: A Versatile Material with Extraordinary Potential for Diverse Applications -- 1 Introduction -- 2 Structures and Properties of Chitosan -- 2.1 Structure -- 2.2 Physiochemical Properties -- 2.3 Biological Properties -- 3 Some Common Chitosan Derivatives -- 4 Methods of Synthesis of Chitosan Nanoparticles -- 4.1 Emulsification and Cross-linking -- 4.2 Reversed Micelles Method -- 4.3 Precipitation-Based Methods -- 4.4 Ionic Gelation -- 4.5 Self-assembly -- 4.6 Top-Down Approach -- 5 Green Synthesis of Chitosan Nanoparticles -- 6 Modification Strategies of Chitosan -- 6.1 Chitosan Modification to Produce Functional Derivatives -- 6.2 Enhanced Anti-microbial Performance -- 6.3 Improved Water Solubility -- 6.4 Better Biocompatibility -- 7 Conclusions -- References -- 3 Characterization Techniques for Chitosan and Its Based Nanocomposites -- 1 Introduction -- 2 Nanomaterial Properties -- 2.1 Morphological and Topological Properties of Chitosan Nanomaterials -- 2.2 Solid-State Properties of Chitosan-Based Nanomaterials/NPs. 2.3 Elemental Analysis/Properties of Chitosan-Based Nanomaterials/NPs -- 2.4 Interaction Analysis/Properties of Chitosan-Based Nanomaterials/NPs -- 2.5 Determination of Chitosan-Based Nanomaterials/NPs -- 3 Conclusion -- References -- 4 Implementation of Chitosan-Based Nanocomposites for Drug Delivery System -- 1 Introduction -- 2 Important Biochemical and Physiological Properties of Chitosan -- 3 Carbon-Based Bionanocomposites -- 4 Carbon-Based Nanocomposites -- 5 Graphene/Graphene Oxide -- 6 Carbon Nanotubes (CNTs) -- 7 Applications of Chitosan-Based Nanocomposites in Drug Delivery -- 8 Conclusion and Future Prospects -- References -- 5 Potential of Chitosan-Based Nanocomposites for Biomedical Application in Gene Therapy -- 1 Introduction -- 2 Chitosan as a Gene Carrier -- 3 Application of Polymers in Gene Delivery -- 3.1 Artificial Polymers -- 3.2 Natural Polymers -- 4 General Characteristics of Chitosan -- 5 Factors Affecting Gene Transfer in Chitosan Delivery System -- 5.1 Surface Charge and Zeta Potential -- 5.2 Particle Size -- 5.3 Chitosan Modification Reactions -- 6 Application of Chitosan-Based Nanocomposites in Gene Therapy -- 7 Conclusion -- References -- 6 Recent Advancements in the Application of Chitosan-Based Nanocomposites in Tissue Engineering and Regenerative Medicine -- 1 Introduction -- 2 Chitosan Nanocomposites Definition and Obtention Applied to Tissue

Engineering and Regenerative Medicine -- 3 Chitosan Nanocomposites
 Physicochemical Properties -- 4 Applications of Chitosan-Based
 Nanocomposites in Tissue Engineering and Regenerative Medicine --
 4.1 Tissue Engineering -- 4.2 Regenerative Medicine -- 5 Concluding
 Remarks and Future Perspectives -- References -- 7 Emerging
 Applications of Chitosan-Based Nanocomposites in Multifarious Cancer
 Diagnosis and Therapeutics -- 1 Introduction.
 2 Emerging Role of Nanotechnology in Oncotherapy -- 2.1
 Nanoparticles: What Are They? -- 3 Advantages of Nanoformulations
 in Cancer Therapy -- 4 What Are Nanocomposites? -- 5 Chitosan:
 A Versatile Super Polymer in Treating Cancer -- 6 Synthesis
 and Attributes of Chitosan-Based Bionanocomposites -- 7 Biomedical
 Relevance of Chitosan-Based Nanoformulations -- 7.1 Antimicrobial
 Outcomes -- 7.2 Anti-Cancer Drugs -- 7.3 Drug Delivery Frameworks
 -- 7.4 Tissue Engineering Applications -- 7.5 Wound Healing
 Applications -- 7.6 Gene Therapy and Bioimaging Applications -- 7.7
 Biosensing -- 8 Chitosan-Based Nanocomposites: An Upcoming
 Domain in Cancer Diagnosis and Therapy -- 9 Concluding Remarks
 and Future Perspective -- References -- 8 An Overview
 of the Application of Chitosan-Based Nanocomposites in Bioimaging --
 1 Introduction -- 2 Chitosan Nanoparticles in Bioimaging -- 2.1 Optical
 Imaging -- 2.2 Ultrasound Imaging -- 2.3 Magnetic Resonance Imaging
 (MRI) -- 2.4 Computed Tomographic Imaging -- 2.5 Photoacoustic
 Imaging (PAI) -- 3 Conclusion -- References -- 9 Chitosan-Based
 Nanocomposites as Remarkably Effectual Wound Healing Agents -- 1
 Introduction -- 2 Chemical Transformation of Chitin to Chitosan -- 3
 Processing Techniques for Synthesis of Chitosan-Based
 Nanocomposites -- 3.1 Mechanical Stirring -- 3.2 Solvent Casting --
 3.3 Freeze-Drying -- 3.4 Layer-By-Layer Assembly -- 3.5
 Electrospinning -- 4 Effects and Action of Chitosan on Skin Wound -- 5
 Properties of Chitosan -- 5.1 Antibacterial Property -- 5.2 Antioxidant
 Property -- 6 Chitosan Nanocomposite Scaffolds Toward Wound
 Dressings -- 6.1 Chitosan Sponge for Wound Healing -- 6.2
 Immobilized Chitosan Extract Scaffolds for Wound Healing -- 6.3
 Natural/synthetic Polymer Blend Scaffolds for Wound Healing -- 7
 Application of Chitosan-Based Metallic Nanocomposites in Wound
 Healing -- 7.1 Chitosan/nAu.
 7.2 Chitosan/nCu -- 7.3 Chitosan/nAg -- 7.4 Chitosan/nTiO₂ -- 7.5
 Chitosan/nZnO -- 8 Conclusion and Future Outlook -- References --
 10 Role of Antibacterial Agents Derived from Chitosan-Based
 Nanocomposites -- 1 Introduction of Chitosan-Based Nanocomposites
 -- 2 Mode of Action -- 3 Factors Affecting chitosan's Antibacterial
 Activity -- 3.1 Concentration of Chitosan -- 3.2 Molecular Weight --
 3.3 Positive Charge Density -- 3.4 Hydrophilic/Hydrophobic
 Characteristic -- 3.5 Chelating Capacity -- 3.6 pH -- 3.7 Ionic Strength
 -- 3.8 Physical State -- 3.9 Temperature and Time -- 4 Complexes
 of Chitosan with Certain Materials -- 4.1 Antimicrobial Activity
 of Chitosan/Metal Nanocomposites -- 4.2 Chitosan Nanoparticles'
 Antimicrobial Activity in Bacterial Biofilms -- 4.3 Chitosan
 Nanoparticles Loaded with Antibiotics or Other Microbicidal Substances
 Possessing Antimicrobial Activity -- 5 Applications of Chitosan-Based
 Nanosystems' Antimicrobial Activity -- 5.1 Antimicrobial Agent -- 5.2
 Wound Dressing -- 5.3 Antibacterial Activity Against Plant Pathogens
 -- 5.4 Antimicrobial Films and the Food Packaging -- 5.5 Application
 in Medical Industry -- 5.6 Antibacterial Coating -- 5.7 Application
 Against Various Detrimental Bacteria (Animal Pathogens) -- 6
 Conclusions and Future Outlook -- References -- 11 Biomedical
 Application of Chitosan-Based Nanocomposites as Antifungal Agents

-- 1 Introduction -- 2 Antifungal Properties of Chitosan-Based Nanocomposites -- 3 Chitosan-Based Nanocomposites Displaying Antifungal Activity in Agriculture -- 4 Antifungal Activity of Chitosan-Based Nanocomposites in Food Packaging Industries -- 5 Biomedical Applications of Chitosan-Based Nanocomposites as Antifungal Agents -- 6 Chitosan-Based Nanocomposites Displaying Antifungal Activity in the Maritime Sector.
7 Miscellaneous Applications of Antifungal Properties of Chitosan-Based Nanocomposites.
