Chapter

Chitosan and Nanotechnology Fundamentals

- March 2024
- March 2024

DOI:10.1007/978-3-031-52261-1_2

- In book: Nanochitosan-Based Enhancement of Fisheries and Aquaculture (pp.35-63)

Authors:

Oluwadurotimi Samuel Aworunse

Franklyn Iheagwam

Praise Agbetuyi-tayo

Ogochukwu Onwaeze

Micheal Bolarinwa Fabiyi

Akpoyovware Samuel Ejoh

Hide

Request full-text PDF

To read the full-text of this research, you can request a copy directly from the authors.

References (131)

Abstract

The process of deacetylation transforms chitin into chitosan, a biopolymer that exhibits exceptional biocompatibility, biodegradability and flexibility. Particularly at the nanoscale, chitosan exhibits compelling functionalities that confer suitability for diverse nanotechnology applications. In this chapter, we comprehensively explore the fundamental properties of chitosan, emphasising its critical role in nanotechnology integration, notably within aquaculture and fisheries. Nanonisation of chitosan significantly amplifies its potential with expanded applications in drug delivery, vaccination and water treatment in aquaculture practice. Nanochitosan integration addresses critical challenges in the fishing sector while aligning seamlessly with Sustainable Development Goal 14, fostering sustainable aquaculture practices. With recent advances in the techniques used in nanotechnology for modifying chitosan, the practice can become more sustainable, reducing waste and promoting efficient utilisation of resources. This holds great promise for establishing environmentally conscious processes within the realm of nanochitosan applications.

No full-text available

Citations (0)

References (131)

Nanomaterials: An overview of synthesis, classification, characterization, and applications

Article

Full-text available

- Jun 2023

-  Bawoke Mekuye
-  Birhanu Abera

View

Show abstract

Classification, Synthetic, and Characterization Approaches to Nanoparticles, and Their Applications in Various Fields of Nanotechnology: A Review
Article
Full-text available

- Nov 2022

-  Yousaf Khan
- Haleema Sadia
- Ali Shah
-  Muhammad Naeem Khan

View

Show abstract

Study on the Physicochemical Properties of Chitosan and their Applications in the Biomedical Sector
Article
Full-text available

- Jul 2023

-  Digafe Alemu
- Efrata Getachew

-  Ajoy Kanti Mondal

View

Show abstract

Chitosan: Properties and Its Application in Agriculture in Context of Molecular Weight Chitosan: Properties and Its Application in Agriculture in Context of Molecular Weight
Article
Full-text available

- Jun 2023

-  Ramon Román-Doval
- Sandra P Torres-Arellanes
-  Yair Tenorio
- 

Anai Alicia Valencia-Lazcano

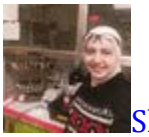
View

Show abstract

Nano-Curcumin/Chitosan Modulates Growth, Biochemical, Immune, and Antioxidative Profiles, and the Expression of Related Genes in Nile tilapia, Oreochromis niloticus
Article
Full-text available

- Jun 2023

-  Hiam Elabd

-  Heba Mahboub
-  Shimaa M. Salem
- Hadeer Eldesoky

View

Show abstract

Chitosan Based Biodegradable Composite for Antibacterial Food Packaging Application
Article
Full-text available

- May 2023

- Andre Jiang
-  Rajkumar Patel
-  Bandana Padhan
- Madhumita Patel

View

Show abstract

Chitosan: A Potential Biopolymer in Drug Delivery and Biomedical Applications
Article
Full-text available

- Apr 2023

- Nimeet Desai

-  Dhwani Rana
-  Sagar Salave
-  Nagavendra Kommineni

View

Show abstract

A review on nanoparticles: characteristics, synthesis, applications, and challenges
Article
Full-text available

- Apr 2023
- Khadijah A. Altammar

View

Show abstract

Quercetin Application for Common Carp (Cyprinus carpio): I. Effects on Growth Performance, Humoral Immunity, Antioxidant Status, Immune-Related Genes, and Resistance against Heat Stress
Article
Full-text available

- Feb 2023
- AQUACULT NUTR

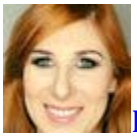
- Kobra Armobin
- Ehsan Ahmadifar
-  Hossein Adineh
-  Hien Van Doan

View

Show abstract

Chitin and Chitosan as Polymers of the Future—Obtaining, Modification, Life Cycle Assessment and Main Directions of Application
Article
Full-text available

- Feb 2023



- Klaudia Piekarska
- Monika Sikora
- Monika Owczarek
- Maria Wiśniewska-Wrona

View

Show abstract

Nano Functional Food: Opportunities, Development, and Future Perspectives
Article
Full-text available

- Dec 2022
- INT J MOL SCI

- Qijun Su
- Xiang Zhao
- Xin Zhang
- Chunxin Wang

View

Show abstract

Classification, Synthetic, and Characterization Approaches to Nanoparticles, and Their Applications in Various Fields of Nanotechnology: A Review
Article
Full-text available

- Nov 2022

-  Syed Naimat Ullah
-  Muhammad Naeem Khan

View

Show abstract

Antibiotic resistance in aquaculture and aquatic organisms: a review of current nanotechnology applications for sustainable management
Article
Full-text available

- Aug 2022
- ENVIRON SCI POLLUT R

-  Emmanuel Sunday Okeke
-  Kingsley Chukwudozie
-  Raphael Nyaruaba
-  Charles Obinwanne Okoye

View

Show abstract

Chitosan: Sources, Processing and Modification Techniques
Article
Full-text available

- Jun 2022

-  Alessandro Pellis
-  Georg M Guebitz
-  Gibson S Nyanhongo

View

Show abstract

Green Flame-Retardant Composites Based on PP/TiO2/Lignin Obtained by Melt-Mixing Extrusion
Article
Full-text available

- Mar 2022

-  Marlene Andrade-Guel
-  Christian J. Cabello-Alvarado
- Carlos Alberto Ávila-Orta
- Leopoldo Rios-González

View

Show abstract

A Comprehensive Review of Nanomaterials: Types, Synthesis, Characterization, and Applications
Article
Full-text available

- Feb 2023

-  Salem Salah Salem

- Eman N. Hammad
- Asem A. Mohamed
-  Wagdy El-Dougdoug

View

Show abstract

Review on Natural, Incidental, Bioinspired, and Engineered Nanomaterials: History, Definitions, Classifications, Synthesis, Properties, Market, Toxicities, Risks, and Regulations
Article
Full-text available

- Jan 2022

-  Ahmed Barhoum
- María Luisa García-Betancourt
-  Jaison Jeevanandam
-  Mikhael Bechelany

View

Show abstract

Nanotechnology in aquaculture: Applications, perspectives and regulatory challenges
Article
Full-text available

- Jan 2022

-  Carlos Fajardo Quiñones

-  Gonzalo Martínez-Rodríguez
-  Julian Blasco
-  Marcos De Donato

View

Show abstract

Antimicrobial Properties of Chitosan and Chitosan Derivatives in the Treatment of Enteric Infections

Article

Full-text available

- Nov 2021
- MOLECULES

- Dazhong Yan
- Yanzhen Li
- Yinling Liu
- Chen Yan

View

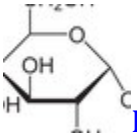
Show abstract

Trends in the treatment of aquaculture effluents using nanotechnology

Article

Full-text available

- Nov 2021

-  Lawal Ogunfowora
-  Kingsley O. Iwuozor

-  Joshua O. Ighalo
-  Chinenye Adaobi Igwegbe

View

Show abstract

Chitosan: An Overview of Its Properties and Applications
Article
Full-text available

- Sep 2021

-  Inmaculada Aranaz
-  Andrés Alcántara
-  Maria Concepcion Civera
-  Florentina Niuris Acosta Contreras

View

Show abstract

Mechanical Milling: A Superior Nanotechnological Tool for Fabrication of Nanocrystalline and Nanocomposite Materials
Article
Full-text available

- Sep 2021

-  Sherif El-Eskandarany

- Abdulsalam Al-Hazza
- Latifa A. Al-Hajji
-  Fahad Al-Ajmi

View

Show abstract

Advances in Chitosan-Based Nanoparticles for Drug Delivery
Article
Full-text available

- Sep 2021
- INT J MOL SCI

-  PharmDr. Veronika Mikušová, PhD.
-  Peter Mikuš

View

Show abstract

Nanotechnology: A next-generation tool for sustainable aquaculture
Article
Full-text available

- Aug 2021
- AQUACULTURE

- Biplab Sarkar
-  Arabinda Mahanty

-  Sanjay K Gupta
-  Surajit Bhattacharjee

View

Show abstract

Antimicrobial Properties of Food Nanopackaging: A New Focus on Foodborne Pathogens
Article
Full-text available

- Jul 2021

-  Amir Ali Anvar
-  Hamed Ahari
- Maryam Ataee

View

Show abstract

GSTP1 positive prostatic adenocarcinomas are more common in Black than White men in the United States
Article
Full-text available

- Jun 2021
- PLOS ONE

-  Igor Vidal
- Qizhi Zheng
- Jessica L. Hicks

-  Angelo Michael De Marzo

View

Show abstract

Microbe-Mediated Biosynthesis of Nanoparticles: Applications and Future Prospects
Article
Full-text available

- Jun 2021

- Bhupendra Koul
-  Anil K. Poonia
- Dhananjay Yadav
-  Jun-O Jin

View

Show abstract

Folic Acid-Coated Nanochitosan Ameliorated the Growth Performance, Hematological Parameters, Antioxidant Status, and Immune Responses of Rainbow Trout (Oncorhynchus mykiss)
Article
Full-text available

- Jun 2021

-  Sahar Farahnak Roudsari
-  Houman Rajabi Islami
-  Seyed Abdolmajid Mousavi

-  Mehdi Shamsaie Mehrgan

View

Show abstract

Delivery of selenium using chitosan nanoparticles: Synthesis, characterization, and antioxidant and growth effects in Nile tilapia (Orechromis niloticus)
Article
Full-text available

- May 2021
- PLOS ONE

- Juliana M Araujo
-  Rodrigo Fortes-Silva
- Cicero Pola
-  Carmen L Gomes

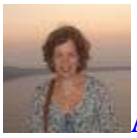
View

Show abstract

Bio-Based Sensors for Smart Food Packaging—Current Applications and Future Trends
Article
Full-text available

- Mar 2021
- SENSORS-BASEL

-  Carolina Rodrigues

-  Victor Gomes Lauriano Souza
-  Isabel Coelhoso
-  Ana Luisa Fernando

View

Show abstract

Electrocoagulation-flocculation of aquaculture effluent using hybrid iron and aluminium electrodes: A comparative study

Article

Full-text available

- Mar 2021
- CHEM ENG J

-  Chinenye Adaobi Igwegbe
-  Okechukwu. Dominic. Onukwuli
-  Joshua O. Ighalo
-  Chinedu Josiah Umembamalu

View

Show abstract

A review article on nanotechnology in aquaculture sustainability as a novel tool in fish disease control

Article

Full-text available

- Mar 2021
- AQUACULT INT

- Sameh Nasr-Eldahan
-  Asmaa Nabil
-  Mohamed Attia Shreadah
-  Tamer El-Sayed Ali

View

Show abstract

Nanomaterials: A review of synthesis, properties, recent progress, and challenges
Article
Full-text available

- Feb 2021

- Nadeem Baig
-  Irshad Kammakakam
- Wail Falath

View

Show abstract

Laser Synthesis and Microfabrication of Micro/Nanostructured Materials Toward Energy Conversion and Storage
Article
Full-text available

- Dec 2021

-  Lili Zhao

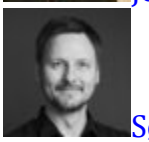
- Zhen Liu
-  Duo Chen
-  Weijia Zhou

View

Show abstract

Commercial Spirits for Surfactant-Free Syntheses of Electro-Active Platinum Nanoparticles
Article
Full-text available

- Jan 2021

-  Jonathan Quinson
-  Søren Bredmose Simonsen
-  L. Theil Kuhn
-  Matthias Arenz

View

Show abstract

Nanoparticles: Synthetic techniques, surface deposition and applications
Conference Paper

- Jan 2023

- Aditya Sekhri

-  Renu Sharma
-  Ruchi Bharti

View

Chitosan nanoparticle immersion vaccine offers protection against tilapia lake virus in laboratory and field studies
Article

- Nov 2022
- FISH SHELLFISH IMMUN

-  Puntanat Tattiyapong
-  Sirikorn Kitiyodom
-  Teerapong Yata
-  Win Surachetpong

View

Show abstract

Molecular mechanisms and genetic alterations in prostate cancer: From diagnosis to targeted therapy
Article

- Mar 2022
- CANCER LETT

-  Fabrizio Fontana
- Martina Anselmi
- Patrizia Limonta

View

Show abstract

Recent advances on botanical biosynthesis of nanoparticles for catalytic, water treatment and agricultural applications: A review
Article

- Feb 2022
- SCI TOTAL ENVIRON

-  Ngoan Thi Thao Nguyen
- Luan Minh Nguyen
- Thuy Thi Thanh Nguyen
- Thuan Van Tran

View

Show abstract

Enhanced antimicrobial and antioxidant properties of Nano chitosan and pectin based biodegradable active packaging films incorporated with fennel (Foeniculum vulgare) essential oil and potato (Solanum tuberosum) peel extracts
Article

- Feb 2022

- Ameya S. Sadadekar
-  Shruthy Ramesh

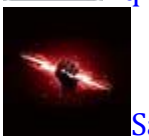
-  Radhakrishnan Preetha
-  Nagamaniammai Govindarajan

View

Show abstract

Synthesis of nanomaterials using various top-down and bottom-up approaches, influencing factors, advantages, and disadvantages: A review
Article

- Dec 2021
- ADV COLLOID INTERFAC

- Namra Abid
- Aqib Muhammad Khan
-  Sara Shujait
-  Muhammad Maqbool

View

Show abstract

Classification and Properties of Nanoparticles
Chapter

- Jul 2022

-  Saadbin Khan

-  M. Khalid Hossain

View

Show abstract

Synthesis and Characterization of Au:ZnO (core:shell) nanoparticles via laser ablation
Article

- Jul 2021
- OPTIK

-  Taha Mohsin Al-Rashid
-  Uday M. Nayef
-  Majid Jabir
-  Falah Mutlak

View

Show abstract

Smart nanosensors for intelligent packaging
Chapter

- Jan 2021

-  Zahra Mohammadpour
-  Seyed Morteza Naghib

View

Show abstract

Recent advances of emerging green chitosan-based biomaterials with potential biomedical applications: A review
Article

- Jun 2021
- CARBOHYD RES

- Ajahar Khan
- Khalid A. Alamry

View

Show abstract

Transparency in the activities of the Food and Agriculture Organization for sustainable fisheries
Article

- Apr 2021
- MAR POLICY

- Solène Guggisberg

View

Show abstract

Phenylalanine-responsive fluorescent biosensor based on graphene oxide-chitosan nanocomposites catalytic film for non-destructive fish freshness grading
Article

- Feb 2021
- FOOD CONTROL

- Farah Faiqah

-  Ling Ling Tan

View

Show abstract

The effects of chitosan-vitamin C nanocomposite supplementation on the growth performance, antioxidant status, immune response, and disease resistance of Nile tilapia (Oreochromis niloticus) fingerlings
Article

- Jan 2021
- AQUACULTURE

-  Rowida Ibrahim
-  Shimaa A. Amer
- Khalid Yehia Farroh
-  Shaimaa Ahmed

View

Show abstract

Insights into the Mechanism of Combustion Synthesis of Iron Oxide Nanoparticles Gained by Laser Diagnostics, Mass Spectrometry, and Numerical Simulations: A Mini-Review
Article

- Dec 2020
- ENERG FUEL

- Igor Rahinov
- Johannes Sellmann
-  Matthieu Lalanne

-  Irenaeus Wlokas

View

Show abstract

The effects of chitosan-vitamin C nanocomposite supplementation on the growth performance, antioxidant status, immune response, and disease resistance of Nile tilapia (Oreochromis niloticus) fingerling
Article

- Dec 2020
- AQUACULTURE

-  Naif Ahmed Al-Gabri

View

Show abstract

Show more

Recommended publications

Discover more
Sponsored content

See keynote speaker, Harry Glorikian, influential expert in global healthcare and author of MoneyBal...
July 2018

Harry Glorikian, MBA, has over three decades of experience building successful ventures around the world. Mr. Glorikian is a much sought-after speaker best known for his achievements in healthcare, diagnostics, healthcare IT, and the convergence of these areas. Join us in Denver, Colorado at...

View post

Sponsored content

Discover how Precision Medicine is changing the face of autoimmune disease diagnosis and management
June 2018

Precision Medicine has made significant inroads in the management of patients around the world, mainly in oncology. As autoimmunologists we truly believe there is a strong need for Precision Medicine approaches that can improve the care of individuals with autoimmune diseases, or even lead to...

View post

Article
Full-text available

Drug delivery pathways to the central nervous system via the brain glymphatic system circumventing t...

July 2024 · Exploration

The blood-brain barrier (BBB) poses daunting challenges in treating diseases associated with the central nervous system (CNS). Recently, the traditional notion of the absence of the lymphatic system in the brain is evolving. The discovery of the glymphatic system in the brain has stimulated tremendous interest in developing new strategies for the treatment of CNS diseases. Leveraging the ... [Show full abstract]

View full-text

Article
Full-text available

A review of recent advances in the stability, efficacy, and biosafety of black phosphorus-based drug...

July 2024 · Journal of Materials Science

Two-dimensional black phosphorus nanosheets (BPNSs) possess remarkable structures and properties, including a honeycomb-like wrinkled morphology and a tunable direct band gap. These attributes make BPNSs highly promising for biomedical applications, particularly in drug delivery. Nonetheless, employing BPNSs in drug delivery encounters challenges related to biosafety, stability, and ... [Show full abstract]

View full-text

Article
Full-text available

Injectable Hydrogels for Intratumoral Administration Against Breast Cancer

July 2024 · Journal of Polymers and the Environment

Breast cancer poses a significant health risk and remains the most prevalent cancer among women. The side effects associated with traditional chemotherapy, such as neurotoxicity, liver or kidney dysfunction, highlight the urgent need for novel breast cancer therapies. In this regard, local delivery of chemotherapeutics has been emerged to be one of the efficient methods to eradicate the tumor ... [Show full abstract]

View full-text

Article

[Zinc Oxide/Carbon Material-Embedded Supramolecular Drug Delivery System with Photoswitching Properti...](#)
July 2024 · ACS Applied Bio Materials

-  Fasih Bintang Ilhami
- [...]
-  Noto Susanto Gultom

Read more

Last Updated: 17 Jun 2024

or

Discover by subject area