

•

Article preview

- [Abstract](#)
- [Cited by \(1\)](#)



Polymeric Biomaterials for Healthcare Applications

Woodhead Publishing Series in Biomaterials
2022, Pages 271-283

9 - Controlling the toxicity of antibiotics and metal nanoparticles by using polymers for the treatment of bacterial infection for medical applications

Author links open overlay panel Williams Kehinde Kupolati ^{1 2}, Emmanuel Rotimi Sadiku ^{1 3}, A.A. Eze ^{1 3}, I.D. Ibrahim ^{1 3}, O. Agboola ⁴

Institute for NanoEngineering Research (INER), Tshwane University of Technology, Pretoria, South Africa

Department of Civil Engineering, Tshwane University of Technology, Pretoria, South Africa

Department of Chemical, Metallurgical and Materials Engineering, Polymer Technology Unit, Tshwane University of Technology, Pretoria, South Africa

Department of Chemical Engineering, Covenant University, College of Engineering, Ota, Nigeria

Available online 13 May 2022, Version of Record 13 May 2022.

What do these dates mean?

1

2

3

4

Abstract

The excessive intake of antibiotics in a quest to kill bacterial growth in the body results in antibiotic toxicity. This study investigated how to control the toxicity of antibiotics and metal nanoparticles by using polymers to treat bacterial infections for medical applications. The literature study determined that the control of toxicity of antibiotics and metallic nanoparticles could be achieved through encapsulation of antibiotics or metallic nanocomposites in biodegradable polymer-based therapy or by using biodegradable polymeric nanoparticles in delivering antimicrobial drugs. These can be obtained through the chemical conjugation of an antibiotic to a premade polymer through pendant group attachment or by polymerizing antibiotic-containing monomers. The physicochemical properties of polymers play a vital role, and the targeted polymer-antibiotic conjugates are polymeric materials with good-quality antibacterial properties. Drug-resistant bacteria can be treated through the development of synergistic antibacterial therapy. In addition, a good sterilization process needs to be done on medical instruments and devices after they are used on a patient. The future use of polymer-based antibiotics could be as implants and as active and passive medical devices that can be applied during surgery.

Access through your organization

Check access to the full text by signing in through your organization.

[Access through your organization](#)

References (0)

Cited by (1)

- [Synthetic Polymers as Antibacterial and Antiviral Agents](#)
2024, ACS Symposium Series

[View full text](#)

Copyright © 2022 Elsevier Ltd. All rights reserved.

Recommended articles

- [Nosocomial Bacterial Infection of Orthopedic Implants and Antibiotic Hydroxyapatite/Silver-Coated Halloysite Nanotube With Improved Structural Integrity as Potential Prophylaxis](#)
Antibiotic Materials in Healthcare, 2020, pp. 171-220
Jimmy Lolu Olajide, ..., Emmanuel Rotimi Sadiku
- [Design, manufacture, and testing of customized sterilizable respirator](#)
Journal of the Mechanical Behavior of Biomedical Materials, Volume 131, 2022, Article 105248
Ruohan Xu, ..., Zhao Qin

- [Study on Wear Prediction of Shield Disc Cutter in Hard Rock and Its Application](#)
KSCE Journal of Civil Engineering, Volume 26, Issue 3, 2022, pp. 1439-1450
Zhenyong Wang, ..., Shixian Wang
[Show 3 more articles](#)

Article Metrics

- Cookies are used by this site. [Cookie Settings](#)
All content on this site: Copyright © 2025 or its licensors and contributors. All rights are reserved, including those for text and data mining, AI training, and similar technologies. For all open access content, the relevant licensing terms apply.