

TOPICAL REVIEW

## Nanobiohybrids and bacterial carriers: a novel pathway to targeted cancer therapy

Diyar Salahuddin Ali<sup>1,2,\*</sup> , Hazha Omar Othman<sup>1,3</sup>, Sarhang Hayyas Mohammed<sup>2</sup>, Rebwar Omar Hassan<sup>1,4</sup>, Zahraa Sarkawt Faethullah<sup>2</sup>, Roza Ibrahim Kareem<sup>2</sup> and Slim Smaoui<sup>5</sup>  
Published 16 September 2024 • © 2024 IOP Publishing Ltd. All rights, including for text and data mining, AI training, and similar technologies, are reserved.

[Nano Futures, Volume 8, Number 3](#)

[Focus on challenges in clinical translation of nanomedicine](#)

Citation Diyar Salahuddin Ali *et al* 2024 *Nano Futures* 8 032001

DOI 10.1088/2399-1984/ad7802

Article metrics

41 Total downloads



Submit

[Submit to this Journal](#)

Permissions

[Get permission to re-use this article](#)

You may also like

JOURNAL ARTICLES

[Roadmap on printable electronic materials for next-generation sensors](#)

[Top-down bottom-up graphene synthesis](#)

[Nanostructured photovoltaics](#)

[Roadmap for unconventional computing](#)

## Abstract

The new strategies in this regard of nanotechnology and biotechnology guarantee new, efficient modalities for cancer therapy. In this study, we explore nanobiohybrids, the bacterium-targeted cancer treatment approach that presents a new category of therapeutic carriers for treating cancer. We specifically focus on bacteriomimetics, where bacteria are used as natural carriers for therapeutic agents. These bacteria possess the ability of pathotropism in localizing themselves around tumor tissues, even hypoxic areas that are generally refractory to standard therapies. By engineering the surface of these bacteria, we enhance how they target tumor cells so that treatment is delivered specifically to the tumor microenvironment with no or minimal systemic side effects. Furthermore, these synthetic nanoparticles inculcated into these bacterial systems stabilize drugs and also provide a way for controlled release, which is important to maintain therapeutic effectiveness. Our results established that such nanobiohybrids are capable of efficient delivery of chemotherapeutic agents and of conducting a local real-time therapeutic response from the perspective of personalized cancer treatment. This research implies a huge development in targeted therapy against cancer, and further work has focused on optimizing these biohybrid systems for clinical applications.