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NIT Rourkela pioneers green alternative to fight antibiotic resistance

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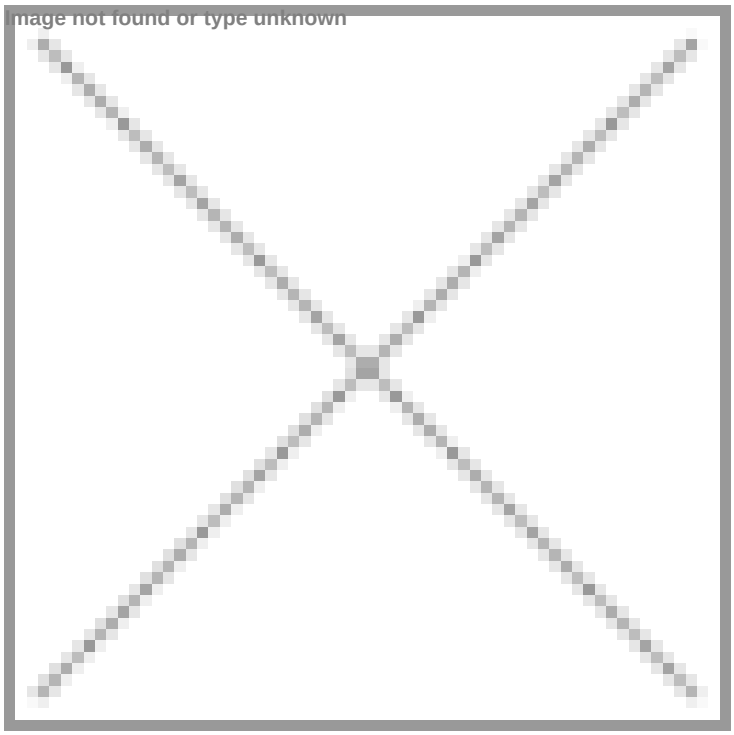
Study has focused on finding an eco-friendly way to kill harmful bacteria



Researchers at the National Institute of Technology (NIT) Rourkela have used extracts from medicinal plants to produce potent antibacterial agents that are environmentally safe and effective.

The research addresses the problem of antimicrobial resistance. The overuse of traditional antibiotics has resulted in the rise of “superbugs” that have become resistant to these treatments. All around the world, scientists are seeking alternative methods to fight these superbugs.

One promising class of materials that has been studied is Zinc oxide nanoparticles, materials so tiny that tens of thousands of them could fit across the width of a human hair. These tiny particles damage the bacterial cells and disrupt their normal functions.

Electrically charged Zinc ions damage the cell membrane by producing reactive molecules that stress and kill the bacteria, as well as by blocking the cell’s vital processes. Conventional synthesis of these nanoparticles involves the use of harsh chemicals that can be toxic to humans and/or the environment.

To address this NIT Rourkela researchers have used an eco-friendly approach to producing the Zinc oxide nanoparticles. Instead of using harsh chemicals, the researchers used extracts from leaves and petals of Marigold, Mango, and Eucalyptus to reduce zinc salts into zinc oxide nanocrystals with adsorbed phytocompounds from the extracts.

Highlighting the importance of the research, Prof. Suman Jha, Associate Professor. Department of Life Science, NIT Rourkela, said, “The green-synthesized zinc oxide nanoparticles with phyto-corona, as a sustainable and effective antimicrobial platform, offer a promising solution to combat antimicrobial resistance while leveraging the medicinal properties of surface-adsorbed plant-derived phytocompounds. This work is a step toward developing a new generation of green nanomaterials that can support sustainable healthcare systems. Our vision is to develop scalable, affordable, and environmentally safe antimicrobial materials that can be integrated into healthcare, sanitation, and food preservation applications. By harnessing India’s rich biodiversity and indigenous plant resources, we aim to create self-reliant innovations that contribute meaningfully to global health and sustainability goals.”