



Inorganic Antibiotics based on Metal Oxide Nanocomposites

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Abstract:

The occurrence of contiguous diseases poses a great concern regarding public health worldwide particularly with the emergence of resistant bacterial strains against traditionally used organic moieties based antibiotics. Inorganic nanoparticles have the potential of being used as bactericidal agent due to their effective antimicrobial activity, colloidal aqueous stability and comparatively low toxic profile. Owing to their multiple mechanisms of bactericidal activity, inorganic metal oxides and their nanocomposites may serve as a new class of effective disinfectants. This work presents the extensive study on antibacterial properties of novel nanocomposites of $\gamma\text{-Fe}_2\text{O}_3$ with CuO & NiO against pathogenic bacterial strains of *B. subtilis*, *S. aureus*, *E. coli* and *S. typhi* by using two distinct methods. The prepared nanocomposites were very adequate to combat the bacterial growth and their bactericidal efficiency was comparable to the commercial antibiotic gentamycin. The nanocomposites were synthesized via wet-chemical approach by keeping the iron concentration constant and varying the concentration of other cations in the sample. The samples were further characterized using XRD, TEM, EDAX, Raman, VSM and TGA-DTA to investigate structural, optical, magnetic and thermal properties of the prepared nanocomposites respectively. Also, the prepared nanocomposites were highly biocompatible and found non-toxic to human cell line MCF7. Thus these non-toxic nanocomposites can be used as the potential antibiotic to counter the diseases caused by normal and multi drug resistant pathogenic bacterial strains.

Biography:

Mayank Bhushan obtained his B.Tech degree in Biotechnology in 2010 from SRM University, Chennai, India. He has completed his M.Tech. degree in Nanoscience and Technology in 2012 from Pondicherry University, Puducherry, India. Subsequently, in August 2012 he has joined PhD program in Nanoscience and Technology at Centre for Nanoscience and Technology, Pondicherry University and final degree is yet to



be awarded. Currently he is working as guest lecturer at Department of Nanotechnology, North Eastern Hill University, Shillong, India. His current research interests include development of inorganic nanomaterials based new generation antibiotics, bioimaging probes and nano carriers for targeted drug delivery.

Recent Publications:

1. A Novel Strategy for the Surface Modification of Superparamagnetic (Fe_3O_4) Iron Oxide Nanoparticle for Lung Cancer Imaging
2. Fabrication and a detailed Study of Antibacterial Properties of $\gamma\text{-Fe}_2\text{O}_3/\text{NiO}$ Nanocomposites along with their Structural, Optical, Thermal, Magnetic and Cytotoxic Features
3. Study of synthesis, structural, optical and magnetic characterizations of iron/copper oxide nanocomposites: A promising novel inorganic antibiotic
4. Facile synthesis of Fe/Zn oxide nanocomposites and study of their structural, magnetic, thermal, antibacterial and cytotoxic properties
5. Antibacterial applications of $\gamma\text{-Fe}_2\text{O}_3/\text{Co}_3\text{O}_4$ nanocomposites and study of their structural, optical, magnetic and cytotoxic characteristics

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