



Functional modification of Co-Zn ferrite nanoparticles: In vitro mediator for potential cancer theranostics

Raghvendra Ashok Bohara

D.Y.Patil University, India

Abstract:

In the present study, a facile synthesis route was developed to prepare surface functionalized superparamagnetic Cobalt zinc ferrite (CZF) magnetic nanoparticles (MNPs) by using triethylene glycol (TEG) as reducing agent and surface modifier ligand. Initially structural, morphological, and magnetic characterization were carried out in order to confirm their size, polydispersity, colloidal stability, and magnetic property. Fourier transform infrared spectroscopy (FTIR) confirmed the presence of triethylene glycol (TEG) on the surface of CZF MNPs. The CZF MNPs are of superparamagnetic in nature with high saturation magnetization, good colloidal stability, high specific absorption rate (SAR), and excellent biocompatibility. All these properties are crucial, for their use as nanomedicine in cancer theranostics such as magnetic fluid hyperthermia (MFH) treatment; which is considered as one of the most promising cancer therapy. The prepared CZF MNPs are found biocompatible with MCF7 (human breast cancer) and L929 (mouse fibroblast) cell lines and Vero cell line (monkey kidney cell line), when tested by MTT and SRB assays. Cell particle interaction was studied in-depth, by using multiple staining techniques combined with confocal microscopy. Finally, an In vitro hyperthermia experiment was carried on MCF7 cells, resulting in the death of MCF7 cells up to 80% within 60 min. The research demonstrates that the prepared CZF MNPs can be used as a potential candidate for effective MFH treatment for cancer cell death.

Biography:

Dr Raghvendra Ashok Bohara received his MSc degree in 2012 from the Department of Biochemistry, Shivaji University, Kolhapur, India. He obtained his Ph. D. from



the Center for Interdisciplinary Research, D. Y. Patil University, Kolhapur in 2016 under the supervision of Professor.

Publication of speakers:

1. Cation distribution, structural, morphological and magnetic properties of $\text{Co}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ ($x=0-1$) nanoparticles; DS Nikam, SV Jadhav, VM Khot, RA Bohara, CK Hong.
2. Role of functionalization: strategies to explore potential nano-bio applications of magnetic nanoparticles; RA Bohara, ND Thorat, SH Pawar.
3. Comprehensive cytotoxicity studies of superparamagnetic iron oxide nanoparticles; RM Patil, ND Thorat, PB Shete, PA Bedge, S Gavde, MG Joshi.
4. Synthesis and visible light photocatalytic antibacterial activity of nickel-doped TiO_2 nanoparticles against Gram-positive and Gram-negative bacteria; HM Yadav, SV Otari, RA Bohara, SS Mali, SH Pawar, SD Delekar.
5. One-step synthesis of uniform and biocompatible amine functionalized cobalt ferrite nanoparticles: a potential carrier for biomedical applications; RA Bohara, ND Thorat, HM Yadav, SH Pawar, A.A. Bohara, N.D. Thorat, A.K. Chaurasia, S.H. Pawar.

Webinar on Nanotechnology and Nanomedicine, August 24, 2020, London, UK

Citation: Priyank Purohit; Bimetallic nano pharmacophore for anticancer agents, India; Nanomedicine 2020; August 24, 2020; London, UK.