

## SHORT ABSTRACT

### Copper Based Nanomaterials for Potential Biomedical Applications

The current thesis work emphasizes on fabrication of different nanoscale dimensions of copper and manipulating them with different materials for diverse biomedical applications. As a relatively safe material with wide functionality; copper was chosen as a primary platform to fabricate some therapeutic tools. The present thesis is divided into six chapters.

**Chapter 1** of the thesis describes about nanoscience and nanotechnology. It also provides information about nanomaterials along with their synthesis and multi-dimensional applications. Salient features of this current thesis work have been mentioned in brief.

**Chapter 2** explains a facile process of fabrication of a luminescent bovine serum albumin (BSA)-copper nanocluster (BSA-Cu NCs) customized ibuprofen nanodrug (BSA-Cu NC-Ibf) for *in vivo* cancer therapy as malignancy has covered a major portion of the health ailments of our society. The as synthesized BSA-Cu NC-Ibf exhibited incomparable chemotherapeutic efficiency on Daltons lymphoma ascites (DLA) bearing Swiss albino mice with significant reduction of tumour growth. It also inhibited metastasis of the cancer cells and thus enhances the life expectancy of mice.

Looking at the potential antimicrobial role of copper nanoparticles, a bimetallic Fe-Cu-nanocomposite on the surface of fine sand particles was fabricated for annihilation of multidrug resistant clinical isolates which was reported in **Chapter 3** as emergence of drug resistant bacteria is a major cause of concern in treating infections.

**Chapter 4** reports fabrication of a portable water filter utilizing the bimetallic nanocomposite which can be successfully utilised to filter a wide range of bacteria along with hazardous metals for point-of-use water filtration.

**Chapter 5** of this thesis describes fabrication of a nanomaterial based dressing material in dual form, which exhibited broad spectrum antimicrobial activity. The wound healing ability of both the dressing materials was also carried out in Wistar albino rats with infected diabetic wounds. Remarkably, they have also been found to assist in healing of infected diabetic wounds and show a promising prospect in the management of other infectious wounds.

**Chapter 6** of this thesis gives an overview of the whole work along with future prospects of the prepared materials.