Nano Biomedical Research Group

NBRG offers following Potential one year MS projects for Fall 2016-17

1. *Synthesis and functionalization of colloidal manganese ferrite nanoparticles for biological applications*

Significant interest has arisen in the research of nanoparticles during the last two decades, in particular for biomedical applications. Magnetic oxide nanoparticles with proper surface coatings are increasingly being evaluated for clinical applications such as hyperthermia, drug delivery, magnetic resonance imaging, and transfection. The properties of manganese ferrite highly depend on the composition, morphology and size, which are strongly connected with the preparation conditions. Functionalization of nanoparticles has been exploited for the incorporation of biomolecules and the improvement of nanoparticle colloidal stability. More extensive research work is required to improve particle coating in order to reduce their toxicity while avoiding the reduction of their physical properties such as magnetization.

2. *Preparation of anticancer drug loaded colloidal magnetic nanoparticles for targeted drug delivery*

Chemotherapy has significantly improved the cancer treatment over the past half-century. Unfortunately, conventional chemotherapeutic agents lack selectivity where less than 0.1–1% of the drugs are taken up by tumor cells, with the remaining 99% going into healthy tissue. Hence one of the greatest challenges facing chemotherapy today is developing drug delivery systems that are efficacious and have therapeutic selectivity. In this study, we will focus on designing biocompatible magnetic nanoparticles that can be used as drug carriers.

3. *Synthesis of size tunable silver nanoparticles for their potential application in biology*

The ability to produce silver nanoparticles with fine control of their size, physical, chemical, and structural properties is crucial for expanding their applicability in biological sensing, imaging, and biomedicine. Silver nanoparticles has significant application in nanotoxicology, since Ag+ ions released from silver nanoparticles have been proved to be antibiotic. So the design of generic and reproducible methods for the preparation of silver nanoparticles with a broad range of defined morphologies is a cornerstone to fully exploit the unique properties and promising applicability of silver nanoparticles. We will focus on different methods; the choice of both the reducing agent and the stabilizer to control over the growth process, providing effective means to tune the size, and also the shape of silver nanoparticles.

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