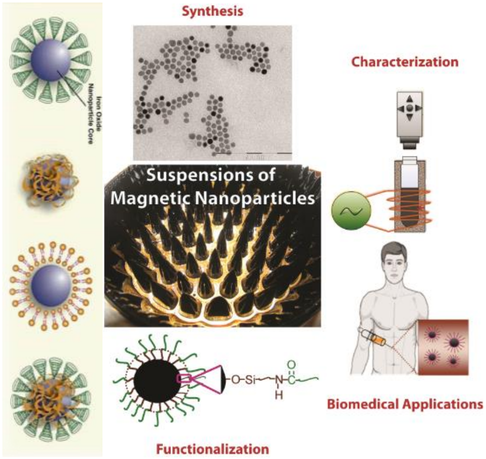
This thesis discusses the use of magnetic nanoparticles (MNPs) in magnetic hyperthermia which is an interesting and alternative treatment of cancer. This cancer therapy involves the targeted administration of MNPs into the human body, accumulation of those MNPs at sites of cancer, and the local heating of those MNPs with an externally applied AC magnetic field. This heating can lead to cellular degradation and ultimately inducing apoptosis with cancer cell death in temperatures above 41^{o}C.



Iron oxide nanoparticles are the most widely studied materials for magnetic hyperthermia. Up to date, attempts to improve the heating efficiency of synthetic Fe_3O_4 nanoparticles deals with the replication of preparation conditions of magnetite biomineralization into magnetotactic bacteria. The slow rate of crystal formation through intermediate complexes and the obtained dimensions within the magnetic monodomain size range (30-40 nm) are the main reasons for their superior heating efficiency. Another crystal phase which is described as the sulfur equivalent of magnetite, the thiospinel greigite (Fe_3S_4), can also be found as the product of many magnetotactic bacteria in the form of nanoparticle chains. In spite of the subordinate magnetic properties of greigite nanoparticles compared to magnetite, there are some important advantages for their evaluation in biomedical applications. These are the relative ease of surface functionalization, low toxicity and minimum effect to normal cells during magnetic hyperthermia.

Specifically the objective of this work constitutes the study of the synthesis of magnetite and greigite MNPs by co-precipitation using various surfactants (citric acid, CTAB, dextran) in an attempt to optimize the colloidal stability, the properties and heating efficiency under high frequency of magnetic field AC.

Once the synthesis of nanoparticles had been completed, measurements of X-Ray Diffraction (XRD) and Transmission electron Microscopy (TEM) were made for identification of the crystal structure and location of the shape and the average distribution and dispersion of their size. Then magnetic characteristics of nanoparticles through hysteresis loops were received from Vibrating Sample Magnetometer (VSM). Finally, as for their thermal response, measurements of magnetic hyperthermia were made in different concentrations (1, 2, 4, 6, 8 mg / mL) and fields (0. 02, 0. 025, 0. 03T) under fixed frequency (765KHz).The heating efficiency of MNPs is expressed by SLP (Specific Loss Power). Results both of magnetite and greigite samples will be compared each other aiming the evaluation of most suitable nanoparticles for hyperthermia applications.