

## Surfactant Free Synthesis of Magnetite/Hydroxyapatite Composites for Hyperthermia Treatment

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**Abstract :** In recent times, magnetic hyperthermia is used for cancer treatment as a tool for active targeting of delivering drugs to the targeted site. It has a potential advantage over other heat treatment because there is no systemic buildup in organs and large doses are possible. The aim of this study is to develop a suitable magnetic biomaterial that can destroy the cancer cells as well as induce bone regeneration. In this work, the composite material was synthesized in two-steps. First, porous iron oxide nano needles were synthesized by hydrothermal process. Second, the hydroxyapatite, were synthesized from natural calcium (i.e., egg shell) and inorganic phosphorous source using wet chemical method. The crystalline nature is confirmed by powder X-ray diffraction analysis (XRD). Thermal analysis and the surface area of the material is studied by Thermo Gravimetric Analysis (TGA), Brunauer-Emmett and Teller (BET) technique. Scanning electron microscope (SEM) images show that the particles have nanoneedle-like morphology. The magnetic property is studied by vibrating sample magnetometer (VSM) technique which confirms the superparamagnetic behavior. This paper presents a simple and easy method for synthesis of magnetite/hydroxyapatite composites materials.

**Keywords :** iron oxide nano needles, hydroxyapatite, superparamagnetic, hyperthermia

**Conference Title :** ICMMM 2014 : International Conference on Magnetism and Magnetic Materials

**Conference Location :** Barcelona, Spain

**Conference Dates :** August 18-19, 2014