Synthesis of magnetic hydroxyapatite nanocomposites and investigation of its structural and magnetic properties

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Abstract: Hydroxyapatite (Ca10(PO4)6(OH)2) with the hexagonal crystal structure is the only identifiable mineral phase of bone. In this work, magnesium ferrite-hydroxyapatite nanocomposites were synthesized for the purpose of medical applications. The first step of this work is the synthesis of mesoporous hydroxyapatite nanorods via co-precipitation method in combination with micelles template. Non-ionic surfactant Pluronic P123 was used as a micelles template. At the second step, magnesium ferrite-hydroxyapatite nanocomposites were synthesized by the sonochemical method. The crystal structure of nanopowders was determined using X-ray diffraction pattern. Transmission electron microscopy was also applied for the morphology of the samples. From TEM image of the nanocomposite, it was observed that magnesium ferrite nanoparticles have spherical shape with diameter of about 8 nm on the surface of hydroxyapatite nanorods. Hysteresis loops (M-H) of magnesium ferrite nanoparticles and magnesium ferrite-hydroxyapatite nanocomposites were measured at room temperature by a vibrating sample magnetometer. The results revealed the superparamagnetic behavior of the produced nanostructures.

Keywords: Hydroxyapatite; magnesium ferrite; nanorods; nanocomposite; superparamagnetic.