

Nano-Magnetic Hydrotalcite Synthesized by Double In-situ Hydrothermal Method with Enhanced Electromagnetic Characteristics

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A series of nano-magnetic hydrotalcite with different content of CoFe_2O_4 is prepared by homogeneous double in-situ hydrothermal method using self-synthesised CoFe_2O_4 , Cobalt nitrate hexahydrate ($\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$), magnesium nitrate hexahydrate ($\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$), nitrate aluminum nonahydrate ($\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$), and sodium hydroxide (NaOH) as starting materials. The crystal structure, morphology, magnetic and thermal stability of the samples were characterized in detail by X-ray diffraction (XRD), scanning electron microscope (SEM), vibrating sample magnetometer (VSM) and thermal gravimetric differential thermal analyzer (TG-DTA) techniques. XRD patterns showed that a small amount of CoFe_2O_4 did not affect the crystallization properties of hydrotalcite, and magnetic hydrotalcite has typical characteristic peak containing both hydrotalcite and CoFe_2O_4 . SEM images indicated the magnetic hydrotalcite samples were lamellar with magnetic matrix of CoFe_2O_4 adsorbed on the surface of LDHs layer. The results of VSM displayed that the magnetic hydrotalcite was ferromagnetic, and sample saturation magnetization of three samples increased with the increasing CoFe_2O_4 content with the values of 1.35, 2.7 and 5.9 eum/g. TG-DTA results indicated the thermal decomposition characteristics of magnetic hydrotalcite is similar to the characteristics of pure hydrotalcite thermal decomposition and the addition of magnetic matrix improved the thermal decomposition temperature of the hydrotalcite.

Keywords: hydrothermal; double in-situ; Magnetic; hydrotalcite; structure; properties

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