



Synthesis, characterization and magnetic behavior of Mg–Fe–Al mixed oxides based on layered double hydroxide

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ARTICLE INFO

Article history:

Received 22

November 2012

Received in

revised form

12 April 2013

Available online 25

April 2013

Keywords:

Layered doubled

hydroxides

Coprecipitation

Mixed

oxides

Magnetic

properties

ABSTRACT

In the present work, Mg–Al–Fe layered double hydroxides were prepared by coprecipitation reaction with hydrothermal treatment. The characterization of precursors and their corresponding calcinated products (mixed oxides) were carried out by X ray diffraction, X-ray photoelectron spectroscopy (XPS), termogravimetric analysis and differential scanning calorimetry, diffuse reflectance UV–vis spectroscopy, specific surface area, Mössbauer and magnetic properties. The Fe³⁺ species were observed in tetrahedrally and octahedrally coordination in brucite layered. The XPS analysis shows that the Fe³⁺ ions can be found in two coordination environments (tetrahedral and octahedral) as mixed oxides, and as spinel-structure. Oxides show a decrease in the specific surface areas when the iron loading is increased. The magnetic and Mössbauer response show that MgAlFe mixed oxides are different behaviours such as different population ratios of ferromagnetic, weak-ferromagnetic, paramagnetic and superparamagnetic phases. The better crystallization of spinel structure with increased temperature is correlated with the improved magnetic properties.