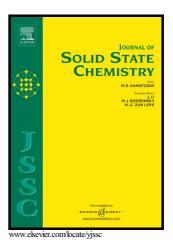
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I.G. Ryltsova, O.V. Nestroinaya, O.E. Lebedeva, F. Schroeter, F. Roessner



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SYNTHESIS AND CHARACTERIZATION OF LAYERED DOUBLE HYDROXIDES CONTAINING NICKEL IN UNSTABLE OXIDATION STATE +3 IN CATIONIC SITES

Ryltsova I. G.^{1*}, Nestroinaya O. V.¹, Lebedeva O. E.¹, Schroeter F.², Roessner F.²

¹Belgorod State National Research University, 85, Pobedy St., Belgorod, 308015, Russia

²Carl von Ossietzky University, D-26111 Oldenburg, Germany

*e-mail: ryltsova@bsu.edu.ru

A series of layered double hydroxides (LDH) with molar ratio M²⁺ /M³⁺ = 3:1 and different degrees of aluminum substitution in the cationic sites by Ni³⁺ were prepared by precipitation from solution in the presence of sodium hypochlorite as an oxidizing agent. The synthesized samples were characterized by various techniques including powder X-ray Diffraction (XRD), Thermogravimetric and Differential Thermal Analysis (TG-DTA), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Diffuse reflectance infrared Fourier transform (DRIFT) spectroscopy and inverse Temperature-programmed Reduction (iTPR). The results indicate that single-phase LDHs were formed during synthesis and they were of a high degree of crystallinity. The thermal stability of LDHs did not decrease essentially with increasing Ni³⁺ content. The calcination at 600°C led to the complete destruction of the layered structure and formation of mixed oxide phases. In iTPR experiments for as-synthesized LDHs the reduction of Ni³⁺ to Ni²⁺ took place above 400°C, and the reduction of Ni²⁺ to Ni⁰ occurred above 600°C.

Graphical Abstract

Layered double hydroxides containing Ni(III) in cationic sites of brucite-like layers have been successfully prepared by precipitation from salts solution in an oxidizing environment. The synthesized samples have been characterized by various

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