

ESR spectra and thermal diffusivity of Zn-Al layered double hydroxide.

ABSTRACT

ZnAlNO₃LDH was synthesized using the co-precipitation method at pH 7±0.1 and ratio Zn/Al=4. The heat treatment of LDH was studied by X-ray diffraction (XRD) and thermogravimetric analysis (TGA/DTG) to investigate the stability of the LDH structure. The in situ electron spin resonance (ESR) spectra of fresh LDH from room temperature up to 190 °C were obtained, which are due to the presence of nitrate radicals in LDH interlayer. ESR spectra of sintered LDH below 200 °C (ex situ ESR spectra) were investigated, which are also due to the nitrate radicals. However, at 200 °C and above, spectra were due to the oxygen vacancies of ZnO, which was formed during the thermal treatment of LDH. Thermal diffusivity of LDH as a function of in situ temperatures results in a nonlinear relation, which is due to the changing water content of LDH when temperature increases. However, thermal diffusivity of LDH as a function of sintered temperatures showed a linear relation and the slope of these data demonstrated the dependency between thermal diffusivity and water content of LDH below 200 °C. For temperature above 180 °C, the thermal diffusivity behavior was mainly due to the ZnO phase in LDH.

Keyword: Nanostructures; Thermogravimetric analysis (TGA); X-ray diffraction; Electron paramagnetic resonance (EPR); Thermal conductivity.