

NiAl-Layered Double Hydroxide: Preparation, Characterization and Applications in Photo-Catalysis and Hydrogen Storage

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Abstract : NiAl-Layered Double Hydroxide (NiAl-LDH), one of anionic functional layered materials, has been prepared by a simple co-precipitation process. X-ray diffraction patterns confirm the formation of the desired compounds of NiAl hydroxide single phase and the crystallite size was found to be about 4.6 nm. The morphology of the prepared samples was investigated using scanning electron microscopy and the layered structure was appeared under the transmission electron microscope. The thermal stability and the function groups of NiAl-LDH were investigated using thermal gravimetric analysis (TGA) and Fourier transform infrared (FTIR) respectively. NiAl-LDH was investigated as a photo-catalyst for the degradation of some toxic dyes such as toluidine blue and bromopyrogallol red. It shows good catalytic efficiency in visible light and even in dark. For the first time NiAl-LDH was used for hydrogen storage application. NiAl-LDH samples were exposed to 20 bar applied hydrogen pressure at room temperature, 100 and -193 oC. NiAl-LDH samples appear to have feasible hydrogen storage capacity. It was capable to adsorb 0.1wt% at room temperature, 0.15 wt% at 100oC and storage capacity reached 0.3 wt% at -193 oC.

Keywords : NiAl-LDH, preparation, characterization, photo-catalysis, hydrogen storage

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