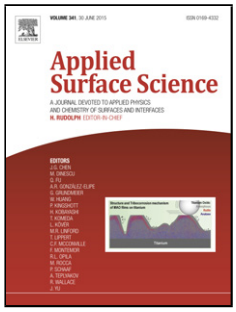

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Thermal stability and microstructure of catalytic alumina composite support with lanthanum species

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Abstract

Lanthanum (La) modified γ-alumina composite was examined for application toward thermostable catalytic support at elevated temperature. La added alumina was prepared through an aqueous process using lanthanum (Ⅲ) nitrate and then characterized by surface area measurement, X-ray powder diffraction (XRD), differential thermal analysis (DTA), scanning electron microscope (SEM), transmission electron microscope (TEM), X-ray photoemission spectroscopy (XPS) and surface desorption of CO_2. It was found that the properties depended on the La content and heat treatment temperatures. The characterization of the surface, structural and chemical properties of La-Al_2O_3 showed the existence of a strong interaction between the La species and alumina via formation of new phase and modified surface in Al_2O_3 samples. $LaAlO_3$ nanoparticle formed among alumina particles by the solid phase reaction of Al_2O_3 and La_2O_3. The increase of the surface basicity of La modified alumina was demonstrated using CO_2 temperature programmed desorption experiments. The controlled surface interaction between La oxide and alumina provide the unique surface and structural properties of the resulting mixed oxides as catalysts and catalytic supports.