

Catalytic Combustion of Toluene Over NiO Supported on Mesoporous Silica Catalysts Prepared by Atomic Layer Deposition

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Nickel oxide was deposited on mesoporous silica by atomic layer deposition (ALD) consisting of sequential exposures to $\text{Ni}(\text{cp})_2$ and H_2O . NiO/silica samples were characterized by inductively coupled plasma-mass spectroscopy (ICP-MS), transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS), etc. The flow-type reactor was used to measure activity of NiO/silica catalyst for catalytic combustion of toluene. The activity of NiO/silica catalyst was evaluated in terms of toluene removal efficiency and selectivity to CO_2 and compared with those of bare nickel oxide nanoparticles. In order to investigate influence of reaction temperature on combustion aspect, the catalytic combustion experiments were carried out at various temperatures. We show that both bare and supported NiO can be efficient catalysts for total oxidation of toluene at a temperature as low as 250°C .

Keywords: Atomic layer deposition, Catalytic combustion, Toluene oxidation, Nickel oxide catalyst