

Investigation of NO reduction by CO reaction over NiO_x/CeO₂ catalysts

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CeO₂ supported NiO_x catalysts (NiO_x/CeO₂) have been widely studied in various catalytic reactions including NO reduction by CO. In this work, a series of NiO_x/CeO₂ catalysts were prepared and tested with various characterizations techniques (e.g., BET, Raman, XRD, DRIFT) as well as Gas Chromatography (GC) to investigate their physicochemical properties, surface properties, and catalytic activities in the NO reduction by CO reaction. In addition to the nickel loading, the impact of catalyst synthesis conditions on the molecular/electronic structure and the catalytic performance were studied. The increase in Ni loading of the catalyst (up to monolayer) led to decrease in specific surface area, formation of NiO_x crystalline structures on CeO₂ surface, easier reduction of the catalyst comparing to bulk NiO_x and bulk CeO₂, as well as increase in catalytic activity. It was also concluded that the presence of oxygen vacancy/defect site, Ni²⁺ oxidation state, and smaller crystallite size are believed to enhance the catalytic activity. The results provided insights on the structure-activity relationship of NiO_x/CeO₂ catalysts for NO reduction by CO reaction.