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Preparation of high surface area binary-CeCoOx for VOCs catalytic oxidation

For volatile organic compounds (VOCs) abatement, a series of high surface area cerium-cobalt mixed oxide nanocatalysts with different cerium/cobalt ratios were prepared via a surfactant assisted-templating precipitation method using cetyltrimethylammonium bromide (CTAB) as a surfactant. The obtained catalysts were characterized by different techniques including X-ray diffraction (XRD), H2-temperature programmed reduction (H2-TPR), N2 physisorption, X-ray photoelectron spectroscopy (XPS) and transmission electron microscopy (TEM). The XRD and TEM results revealed highly dispersed cobalt on the surface of ceria oxide. Moreover, the incorporation of cobalt into the CeO2 lattices to form Ce1-yCoyOx mixed oxides at ratio of y≤0.4 increased the dispersion of the obtained catalyst as well as oxygen vacancies which leads to the enhancement of oxygen storage capacity. BET results indicated that the prepared catalysts had a mesoporous structure and a large specific surface area of 138.91 m2.g-1. The XPS spectra showed that both Ce4+ and Ce3+ were presented in the nanocatalysts with various peak shape in the different cobalt ratios and played an important role on the oxygen vacancies in the catalysts.
Keywords: CeCoOx, catalytic oxidation, nanocatalyst, mixed oxide, oxygen vacancies

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