Abstract

Newly prepared SnO$_2$-CeO$_2$ catalyst samples used as depollution catalysts were characterized applying low-temperature nitrogen adsorption (BET), X-ray diffraction (XRD), thermogravimetry (TG-dTG) and temperature-programmed reduction (TPR) methods. Pure SnO$_2$ has higher surface area (17 m$^2$/g) than the pure CeO$_2$ (8 m$^2$/g). Addition of organic tin oxide precursor to ceria in amount of 5 wt% slightly decreases the surface area of CeO$_2$ ($S_{Sn5-Ce}$ = 7 m$^2$/g). The increase of tin oxide content to 10 and 20 wt% increases the surface area of the catalyst ($S_{Sn10-Ce}$ = 9 m$^2$/g; $S_{Sn20-Ce}$ = 10 m$^2$/g). A similar effect was observed for pores of 1.7-300nm size. Catalyst sample Sn5-Ce exhibited the lowest pore volume, which increases with increasing the amount of tin oxide. Tin dioxide in Sn-Ce samples with lower loadings of SnO$_2$ (≤10 wt%) were well dispersed showing amorphous structure. High loading (20 wt%) of tin dioxide in Sn-Ce showed XRD lines of formation of cassiterite crystalline structure of SnO$_2$ without evidence of solid solution formation. In case of SnO$_2$ the TPR profile exhibits a major peak at about 545°C with much greater intensity than in case of CeO$_2$, revealing that SnO$_2$ was more easily reducible than CeO$_2$. Sn-Ce samples exhibit reducibility at lower temperatures (between 545-635°C) compared to the single tin dioxide (750°C).

Key words: crystalline structure, morphology, reducibility, SnO$_2$-CeO$_2$ impregnated samples