Catalytic Activity of Pt Nanoparticles on Metal Oxide Nanocatalysts Synthesized using Ultrasonic Spray Pyrolysis Process

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We report the catalytic activity of Pt/metal oxide nanocatalysts synthesized via ultrasonic spray pyrolysis (USP) process under CO oxidation. We found that the average particle size of the dispersed platinum nanoparticles can be controlled by changing the concentration of the Pt precursor and the calcination conditions. As for catalytic activity, catalyst with high Pt loading showed a higher conversion of CO. The turnover rate of the Pt/SiO_2 catalysts increased after calcination at 600 °C, then decreased after calcination at 750 °C, mainly due to agglomeration at the high temperature and partly because of severe oxidation. We used various oxide supports including CeO_2, TiO_2, Al_2O_3, and out of these oxides, Pt/CeO_2 catalysts showed the highest catalytic activity. The catalytic activity of the Pt nanocatalysts synthesized using USP exhibited higher catalytic activity compared with Pt/SiO_2 synthesized via wet chemical synthesis or wetness impregnation. It is attributed to better dispersion of the nanoparticles on the oxide support as well as the removal of hydrocarbon impurities during calcination.