CO Oxidation on SnO_2 Surfaces Promoted by Pt-Doping

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Doping a precious metal atoms into host metal oxide can enhance catalytic activity by changing the property of surface lattice oxygen. Here, a Pt-doped antimony-tin oxide (Pt/Sb-SnO_2) for CO and C_3H_6 oxidation was synthesized. Pt-deposited tin oxide (Pt/SnO_2) and silica (Pt/SiO_2) were also prepared for comparison. HAADF-STEM images, DRIFT for CO chemisorption, H_2-uptakes, and XPS results showed that the Pt/Sb-SnO_2 has atomically doped Pt inside the tin oxide surface. The Pt/Sb-SnO_2 showed the highest activity for CO oxidation but the poorest activity for C_3H_6 oxidation. CO-TPR and O_2-TPD results showed that doping Pt atoms into the tin oxide lattice leads to a better surface lattice oxygen activity, resulting in enhanced catalytic performance. In-situ DRIFT for CO oxidation showed less formation of carbonates on the surface of the Pt/Sb-SnO_2, resulting in enhanced CO oxidation activity and durability.