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CO oxidation activity of Au-Pt bimetallic catalysts deposited on Ta_2O_5/Ta substrate

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Bimetallic catalysts are commonly used in a variety of catalytic reactions. In this study, CO oxidation activity of nanoparticles prepared by deposition of Pt and Au on Ta_2O_5/Ta substrates under high vacuum conditions was studied at 190 ℃. In addition, the surface structures and chemical properties of the catalysts were characterized by scanning electron microscope (SEM) and X-ray photoelectron spectroscopy (XPS). When only Au was deposited on the surface, no catalytic activity could be found. Catalytic activity of Pt nanoparticles (<5 nm) was enhanced by post-deposited Au atoms. In contrast, such an enhancement in catalytic activity by Au was not found for bulk-like Pt films. The CO Temperature-Programmed-Desorption (TPD) results indicated that the Pt/Au surfaces with the highest catalytic activity should consist of Pt and Au, i.e. instead of Au-shell-Pt-core structures, a mixed Pt-Au structures were formed on the surface, when Au was deposited on pre-deposited Pt.