CO oxidation activity of Au–Pt bimetallic catalysts deposited on Ta$_2$O$_5$/Ta substrate

Yuan Luo, Hyun Ook Seo, Kwang-Dae Kim, Wei Sheng Tai and Young Dok Kim*

Department of Chemistry, Sungkyunkwan University, Suwon, 440-746, Korea

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$_2$O$_5$/Ta substrates under high vacuum conditions was studied at 190 °C. 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.