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The Influence of Surface Modification of Gold Nanoparticles Supported on TiO2 in the Catalytic Activity of CO Oxidation

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Gold catalysts supported on TiO2 have shown a unique catalytic behavior on CO oxidation, depending on surface effects. Particle size has an influence on the surface activity. To make monodisperse Au nanoparticles, organic capping ligands, such as alkylthiols, were used by a "greener" synthesis method [1,2] and Au nanoparticles were deposited on TiO2. However, organic capping ligands must be removed for high catalytic activities by the Au nanoparticles without changing the Au size [3]. We used UV ozone treatment to decompose thiol ligands. The samples have been characterized by X-ray photoelectron spectroscopy to examine the surface modification by UV ozone treatment. We show the size distribution of the gold nanoparticles by light scattering analysis and transmission electron microscopy. Au/TiO2 have been prepared using the wetness impregnation method. The catalytic performance of CO oxidation over Au supported on TiO2 under oxidizing reaction conditions (40 Torr CO and 100 Torr O2) were tested. The results show that the catalytic activity depends on particle size and the time of UV ozone exposure, which suggests the role of sulfur bonding in determining the catalytic activity of Au/TiO2 catalysts.

Keywords: Gold Nanoparticles supported on TiO2, surface effect, Catalytic Activity