Reactive oxygen on a Au/TiO_2 supported catalyst

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Abstract

We investigated the oxygen storage capacity (OSC) of Au/TiO_2 catalysts as well as its correlation with the activity for CO oxidation and in particular the influence of the Au particle size on these properties in kinetic measurements and in TAP (temporal analysis of products) reactor measurements. Catalysts with identical Au loading but different Au particle sizes were prepared by calcination of the same raw catalyst in air to different temperatures; the Au particle sizes were characterized by transmission electron microscopy and X-ray diffraction. TAP multi-pulse data indicate that oxygen stored on the catalyst surface reacts with CO; both the OSC and the activity for the CO oxidation increase with decreasing Au particle size. From the small amount of removable oxygen, between 0.4 and 1.0% of the total surface oxygen of the support material, and its almost linear relation with the perimeter sites of the interface between the gold particles and the support, we suggest that the removable oxygen species are located at these perimeter sites of the interface. Furthermore, these oxygen species are shown to represent the active oxygen in the CO oxidation reaction under present reaction conditions.

Keywords: *Au/TiO_2, CO oxidation, Oxygen Storage Capacity (OSC), Temporal Analysis of Products (TAP)*

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