

Reductive Formation of Nanogold and Catalysis by Stabilized Particles

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Gold catalysis (CO oxidation, water-gas shift) has been examined in terms of the likely oxidation states of gold that are required for high catalytic activity. For gold/titania, gold/titania-zinc oxide, gold/iron oxide and gold-zeolite Y it is clear that high activity is associated with a partial reduction of the gold, originally introduced in the Au(+3) state. Spectroscopic (Mossbauer effect, IR, XPS) data suggests that gold(+1) may be of great importance in catalysis. Evidence from studies of CO chemisorption for the involvement of perimeter gold sites located near or at the metallic gold particle-oxide support interface (at least for gold/titania) has also been obtained.