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Water-Gas –Shift Reaction on Gold Nanoparticles Supported on Iron Oxide Surfaces: A Scanning Tunneling Microscopy/Spectroscopy Study KWANG TAEG RIM, DAEJIN EOM, LI LIU, JOAN RAITANO, SIU-WAI CHAN, Columbia University, MARIA FLYTZANI-STEPANOPOULOUS, Tutfs University, GEORGE FLYNN, Columbia University — We present a Scanning Tunneling Microscopy (STM)/Scanning Tunneling Spectroscopy (STS) study of the Water-Gas-Shift reaction on a model catalyst system consisting of supported gold nanoparticles on a reduced $Fe_3O_4(111)$ surface in ultrahigh vacuum. Gold forms two electrically distinct nanoparticles on an iron oxide surface upon annealing multilayer $Au/Fe_3O_4(111)$ at 500 °C for 15 minutes. STS measurements show that large gold nanoparticles ($\sim$ 8 nm) exhibit a metallic electronic structure while single gold adatoms bonded to the oxygen sites of the $Fe_3O_4(111)$ surface are likely positively charged. This $Au/Fe_3O_4(111)$ system is dosed with CO and H_2O at various temperatures. The site specific adsorption and the interaction of CO with the Au nanoparticles will be presented and discussed along with the observation of the site specific dissociative adsorption of H_2O to elucidate the catalytic properties of Au nanoparticles on a reducible iron oxide surface.

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