

## CO oxidation on Pd nanoparticles: particle size-effect

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The CO oxidation reactivity of Pd films with different levels of surface coverage on Ta-oxide was examined at different temperatures. A change in Pd coverage resulted in different Pd particle sizes. The lowest temperature for the onset of CO oxidation was observed (150 °C) at a mean particle size of 2-3 nm. Larger and smaller Pd particles showed CO oxidation reactivity only at higher temperatures. These results suggest that Pd nanoparticles have size dependent catalytic reactivity, which is similar to that of Au. X-ray photoelectron spectroscopy showed no change in the charge state of Pd due to strong metal-substrate charge transfer. This study demonstrates that transition metals other than Au can exhibit a particle size-dependence on the CO oxidation reactivity.

## Modification of chemical reactivity of Pd nanoparticles supported by fluorinated MgO by high-energy electron beam

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Electronic structures of Pd nanoparticles deposited on fluorinated MgO surfaces were studied using X-ray Photoelectron Spectroscopy (XPS). Moreover, CO oxidation reactivity of Pd nanoparticles were measured. Pd atoms nucleated at oxygen-vacancies of MgO surfaces, and Pd atoms at MgO/Pd interfaces were partially positively charged. When fluorinated MgO was exposed to high-energy e-beam under (0.3 and 1 MeV in energy) ambient conditions, removal of F was found. Change in the concentration of F did not have influence on Pd core level shift; however, the catalytic reactivity was decreased upon e-beam treatment, implying that F can act as promotor of Pd catalysts.