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Abstract

The adsorption of CO on Pd(100) was investigated using simultaneous ambient pressure X-ray photoelectron spectroscopy (APXPS) and infrared reflection absorption infrared spectroscopy (IRRAS). The measurements were performed as a function of CO partial pressures from ultra-high vacuum to 0.5 Torr. Total CO coverages estimated from the complementary APXPS and IRRAS measurements are in good agreement. A signal for atop CO, which is uncommon for Pd(100), was observed in the IRRAS data and was used to identify the C 1s binding energy of this species. Discerning this binding configuration of CO on the Pd(100) surface at elevated pressures has significance for catalytic reactions involving CO, where bridging CO is often the only configuration considered. We also detail the combined APXPS/IRRAS instrumentation and discuss ways to improve these multimodal measurements, which should have wide applicability across many areas of surface and interface science.

Keywords

bridging CO, atop CO, surface coverage, IRRAS, APXPS