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Modifying the Adsorption of Molecules at Metal Surfaces by Quantum Confinement of Electrons LEVAN TSKIPURI, ROBERT BARTYNSKI, Rutgers University — We have studied the bonding of CO on several ultrathin Cu and Co films that exhibit metallic quantum well (MQW) states, whose energies change as a function of overlayer thickness, using inverse photoemission (IPE), reflection-absorption infrared spectroscopy (RAIRS) and temperature programmed desorption (TPD). For Co system, which has unoccupied MQW states that do not cross the Fermi level, a CO 2π-induced feature is observed in IPE at 3.8 eV above E_F. CO desorbs at 375 K (30 K lower than for hcp Co surfaces) and a second TPD feature at 230 K appears upon low temperature ($\sim$ 100K) dosing. These TPD peak temperatues change as a function of film thickness and are correlated with two different C-O stretch vibrational frequencies observed in the IR spectra. The intensity of the C-O stretch feature in IRAS spectra, and the peak CO desorption temperature in TPD from CO on Cu MQWs both show modulations that are correlated with MQW states crossing the EF. We have also studied the influence of MQW states on the adsorption properties of the dimethyl disulfide (thiol) molecule $(CH_3S)_2$, which forms a self-assembled monolayer when adsorbed on the Cu(100) surface.

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