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Unoccupied electronic structure of and CO Chemisorption on ultrathin Ni films HUA YAO, A.G DANESE, R.A BARTYNSKI, Rutgers University — The Ni/Cu(100) system has drawn considerable of attention in recent years because of its importance in both fundamental research and technological applications. Whereas many ultrathin metal systems are dominated by quantum size effects (QSEs), for epitaxial Ni films on Cu(100) there is an intermingling of QSEs, electronic hybridization, and surface/interface effects, making it complicated and challenging to obtain a microscopic picture of this bimetal system. We have performed a series of inverse photoemission (IPE) studies of the unoccupied electronic structure of the Ni/Cu(100) and CO/Ni/Cu(100) systems as a function of Ni thickness. IPE spectra from Ni films exhibit very rich structures. A Phase Accumulation Model calculation suggests only one of the three main features is consistent with metallic quantum well (MQW) State in Ni film. CO adsorption strongly modifies the spectrum by dramatically suppressing one of the main features indicating that this feature is a Ni surface resonance. Furthermore, by comparing spectra from Ni/Cu(100) with results from Cu/Ni/Cu(100), we suggest the third feature is a state confined to the Ni/Cu interface. Since the electronic structure of these films changes as a function of film thickness, it provides a very interesting opportunity to investigate how different electronic state can modify the chemisorption properties of Ni/Cu(100). We have used temperature programmed desorption (TPD) to investigate the bonding between CO and Ni in Ni/Cu(100) system.

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