Interfacial Core-Level Shifts at W(110)-Based Bimetallic Interfaces

D. MARK RIFFE, Utah State University — Due to their unique chemical, electronic, and magnetic properties, bimetallic epitaxial systems continue to receive a great deal of attention. A unique probe of these interfaces is core-level photoemission spectroscopy: by measuring shifts in core-level binding energies for interfacial atoms (compared to atoms in the bulk solid), qualitative information about atom-specific electronic structure can be inferred. In addition to this qualitative information, the interfacial binding-energy shifts have a thermodynamic interpretation that provides quantitative information about inter-metallic solution energies. Here we discuss W 4f7/2 core-level binding-energy shifts of the first layer of W(110) for a number of W(110)-M bimetallic layers, where M includes Na, K, Cs, Ba, Cr, Mn, Fe, Ni, Pd, Ag, Pt, and Au. Overall, the W interfacial core-level shifts correlate well with the difference in solution energies of Re in M and W in M [A. R. Miedema et. al, CALPHAD 1, 341 (1977)], in agreement with the partial-shift theory of Nilsson et. al [Phys. Rev. B 38, 10357 (1988)].