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Band Mapping in Higher-Energy X-Ray Photoemission: Phonon Effects and Comparison to One-Step Theory JAN MINAR, Ludwig Maximillian University, Munich, LUKASZ PLUCINSKI, IFF9, Research Center Juelich, BRIAN SELL, Otterbein College, Westerville, Ohio, JUERGEN BRAUN, Hildesheim University, HUBERT EBERT, Ludwig Maximillian University, Munich, CLAUS SCHNEIDER, IFF-9, Juelich Research Center, CHARLES FADLEY, UC Davis and LBNL Mat. Sci. Div. — In view of the present interest in more bulk sensitive band mapping via x-ray photoemission, we have studied the temperature dependence of W(110) angle-resolved spectra excited at photon energies of 260, 870 eV, and 1254 eV and between 300K and 780K. Experimental results are compared to both a free-electron final-state model and theoretical one-step model calculations. At 300K, clear band dispersions can be observed in the data. The ratio between direct and non-direct transitions is approximately estimated from a Debye-Waller factor. One-step theoretical calculations reproduce well band dispersions and matrix element effects in the measured spectra at room temperature, but including phonon effects via complex phase shifts does not predict density-of-states related features observed in higher-temperature spectra. We will also discuss the implications of this work for future experiments on other materials and at even higher photon energies up to 10 keV.

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