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Mapping the Copper energy band using the quantum well states

J. WU, J. CHOI, T. OWENS, Z. Q. QIU, Dept. of Phys., UC-Berkeley, Berkeley, E. ROTENBERG, N. V. SMITH, Advanced Light Source, LBNL, Berkeley, CA 94720 — Quantum well states (QWS) of copper electrons in Cu/Co/Cu(100) system are investigated using Angle Resolved Photoemission Electron Spectroscopy (ARPES). The samples were grown epitaxially at room temperature and measured in situ at beamline 7 of the Advanced Light Source (ALS). Photoemission intensity oscillates with both the electron energy and the Cu film thickness. By counting the thickness oscillation periodicity at a given energy, we can determine the out-of-plane electron momentum without the need of the phase value in the phase accumulation model. This allows the experimental determination of the E-k relation (energy band) for the Cu film. We here report the Cu energy band determined in this way at different in-plane momentum. In addition, by fitting the oscillation as a function of the Cu thickness, we also determined the phase value of the quantization condition as a function of the energy and in-plane momentum.

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