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Ordering process in metallic thin films investigated with angle-resolved photoelectron spectroscopy DAH-AN LUH, National Central University, CHENG-MAW CHENG, National Synchrotron Radiation Research Center, CHI-TING TSAI, National Central University, KU-DING TSUEI, National Synchrotron Radiation Research Center, JIAN-MING TANG, University of New Hampshire — We report the observation of the ordering process in real time of a Ag thin film on a Au(111) surface by measuring the in-plane dispersion of quantum well states using temperature-dependent angle-resolved photoelectron spectroscopy. Low-temperature deposited Ag films on a Au(111) substrate were annealed to yield atomically flat films, and the in-plane dispersion of quantum well states was measured in real time during annealing. Our results revealed that isolated ordered patches, fully crystallized along the surface normal, are formed as an intermediate step in the process of film crystallization. We observed the transition from localized states in a partially ordered film to free-electron-like states in a fully ordered film. This process may be general in many other systems of metal thin films.

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