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Epitaxial growth of Cu films on Ag(111) characterized on monitoring the evolution of their surface states DAH-AN LUH, CHIH-HAO HUANG, Department of Physics, National Central University, CHENG-MAW CHENG, KU-DING TSUEI, National Synchrotron Radiation Research Center — The growth of Cu on Ag(111) attracts interest because of its unusual growth behavior. Previous STM work indicated that, when Cu was deposited on Ag(111) at room temperature, Cu islands formed with a Cu coverage as small as 0.02 ML. However, a (99) reconstruction was observed on the surface of these Cu islands, suggesting that the surface of the Cu islands on Ag(111) might be covered with one atomic layer of Ag. The suggestion was not verified because the STM lacked the capability to discern various chemical species. To address the issue, we characterized the growth of Cu films on Ag(111) with a novel approach based on ARPES. On monitoring the evolution of the surface states, we showed that the surface of the Cu islands on Ag(111) with the (99) reconstruction was indeed covered with Ag. Our results also showed that the mobility of Ag on Cu(111) greatly depends on temperature. Ag does not migrate on the surface of the Cu islands at a low temperature, but does at 300 K and significantly at 380 K. In addition, the migration of Ag on Cu is associated with the existence of the Ag(111) surface; Ag atoms migrate to the Cu(111) surface not through the Cu film but along the walls of the holes in the Cu films that penetrate deeply into the Ag substrate.

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