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From Order to Disorder and Back: Co on Narrow Stepped Cu
NADER ZAKI, DENIS POTAPENKO, RICHARD OSGOOD, JR., Columbia University, PETER JOHNSON, Brookhaven National Lab — Bimetallic surface systems allow a ready template to explore the compositional dependence of surface phases. When these systems involve a vicinal substrate, the surface also becomes a template for nanoscale-phase formations. In this regard, we examine the bimetallic system of Co on Cu(775), due the wide-spread interest in the magnetic phenomena of the related Co/Cu(111). We present an STM imaging study of this surface to show that it is possible to observe self-assembly of reduced-dimension quantum structures. These observations show a rich set of bimetallic phase transitions as a function of coverage - moving from wires at low coverage to step-induced ordered islands at high coverage. At coverage of less than 0.1ML, we observe growth of sharp, straight 2-atom-wide Co wires; topographic measurements suggest an interesting interpretation of recent DFT computations on such a system. Increasing coverage causes a marked change of the step spacing and causes the surface to be covered with an ordered array of 2-D islands beyond a critical deposition amount. Thus, as coverage increases, the Cu step structure evolves from straight ordered step edges to concave-shaped edges and then from disordered to ordered islands.

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