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An STM Study of Atomic Co Wires NADER ZAKI, DENIS POTAPENKO, Columbia University, PETER JOHNSON, DANDA ACHARYA, PERCY ZAHL, PETER SUTTER, Brookhaven National Lab, RICHARD OSGOOD, Columbia University — Due to stronger electron-electron interactions, 1-D systems are predicted and, in some cases, have been shown to exhibit unique and exotic electronic properties. One route to the formation of 1-D systems is by self-assembly using low-index vicinal crystal surfaces. In this regard, we have successfully formed 1-atom wide Co wires using Cu(775), a 7-atom wide stepped array with (111) terraces. Contrary to a recently reported DFT prediction, the Co wires are not laterally encapsulated but are positioned exactly at the step edge. We will present STM studies of this system performed at room temperature and STS measurements made at low temperature. While vicinal Cu(111) does exhibit "frizz" at the steps when scanning above cryogenic temperatures, the Co wires pin the edges, visually accentuating their presence under STM. Furthermore, we observe a lower local density of states for the Co wires as compared with the Cu steps, which also serves to differentiate the two metals. Cu(111) possess a surface projected bandgap which may electronically decouple the wire electrons that reside in this gap. However, we also see resonances at the Fermi level which suggests electronic coupling between the vicinal Cu surface and the Co electrons.

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