Surface state engineering on Ag/Cu nanostructures

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Vicinal noble metal surfaces with 1D arrays of monatomic steps are attractive model systems to investigate electronic properties in self-assembled nanostructures using angle-resolved photoemission [1]. Their fundamental ingredient is the Shockley-type surface state that scatters at step edges leading to superlattice bands (2D states) or eventually to electron confinement within terraces (1D QW states). A variety of complex nanostructures and arrays can be achieved by adsorption of an additional material, making it possible to engineer surface states. This is the case of Ag adsorption on vicinal Cu(111) surfaces with different step density. Submonolayer amounts of Ag lead to one-dimensional hill-and-valley (faceted) nanostructures in Cu(335), by contrast with the row-by-row growth and Ag stripe formation on the low step density surface Cu(778). In the later case layer-by-layer growth is extended up to the third monolayer, leading to step lattice replication at the film surface. In all cases the STM images display well ordered arrays over micron size areas that make photoemission meaningful. We will show the evolution of Ag and Cu surface states in those structures.

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References

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