Vicinal Noble Metal Surfaces and Templates

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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). Thus, there is ample room for surface state engineering by manipulating and nanostructuring on vicinal surfaces. We have studied by STM a large variety of self-assembled 1D structures using vicinal noble metal surfaces with different step type and miscut angle, as well as depositing submonolayers or thin layers of a different noble metal on top. We show some examples in the figure. Ag/Cu superlattices are produced by Ag-induced faceting of Cu(223), and Au faceted structures are fine tuned selecting miscut angle and step type. We have focused on systems which display the highest lateral coherence in real space, such that angle-resolved photoemission measurements in reciprocal space are meaningful. For those, we present new photoemission results.

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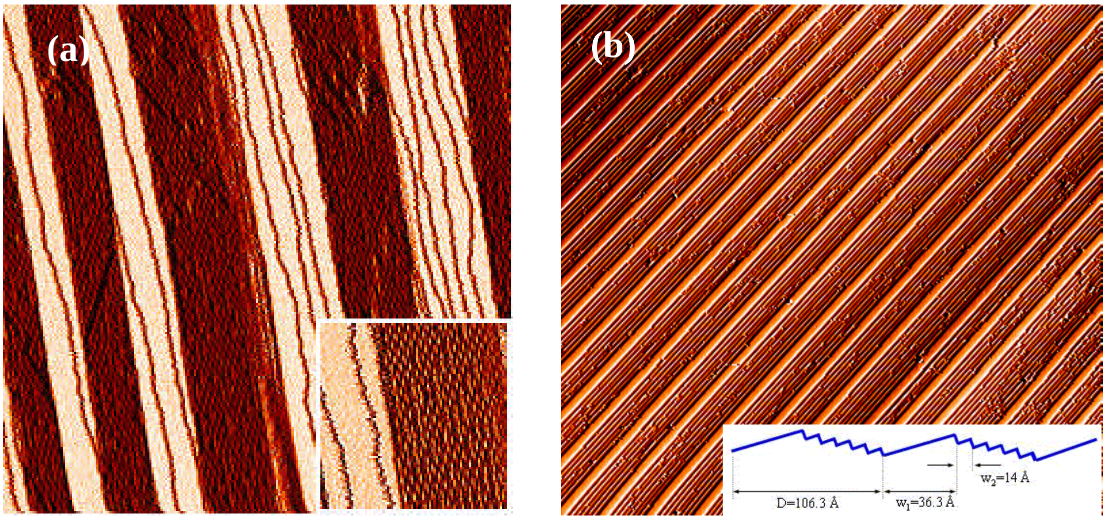

Fig.1: (a) Ag/Cu striped structure after adsorption of 0.55 ML of Ag on Cu(223). The zoom reveals the details of the Moiré within the Ag-covered facet. (100nm^2 image). (b) Au(433) has 8º miscut towards (11-2), resulting in a two-phase system with six-step bunches alternating with unreconstructed terraces. (200nm^2 image).

References

[1] A. Mugarza and J. E. Ortega, J. Phys. Cond. Mat. **15**, S3281 (2003).