Scanning tunneling microscopy and spectroscopy on Au islands on top of graphene/Rh(111)

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Using scanning probe techniques we investigated how graphene (gr) electronically interacts with substrates in the presence of metallic islands on top of the gr layer. In the case of rhodium (Rh) as a substrate, the band structure is significantly altered with respect to freestanding graphene due to the hybridization of the Rh *d* orbital with the p_z orbital of gr [1].

Using scanning tunneling spectroscopy (STS) the electronic properties of Au Islands on top of gr were investigated. The islands were deposited by in-situ evaporation. Subsequently their relative orientation with respect to the gr lattice was analyzed by scanning tunneling microscopy (STM) in as shown in Figure 1. The STS measurements on and in the vicinity of the islands show locally varying electronic properties of the Au/gr/Rh(111) system. One related phenomenon is an increase in conductivity at the boundary of the islands, compared to the conductivities at the center and also to that of gr. Measurements show that this increase in conductivity is restricted to that area of the islands which directly adjoins to the gr. An Rother phenomenon consits in conductance steps at the center of the gold islands observed at room temperature.

References

1. A. Holtsch, T. Euwens, B. Uder, S. Grandthyll, F. Müller, and U. Hartmann, Surf. Sci. 668 (2018) 107.

Figures

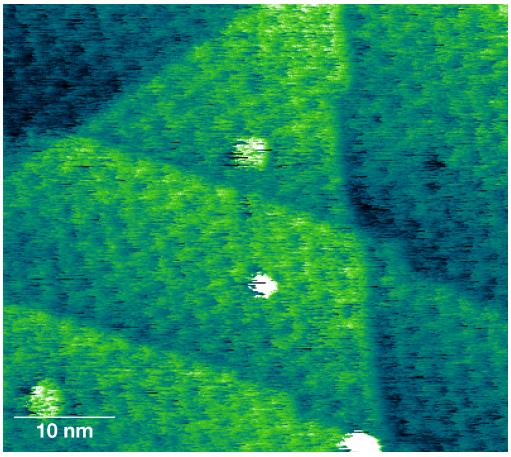

Figure 1. STM image of four Au islands on graphene/Rh(111). The graphene on Rh(111) forms a regular Moiré pattern that is clearly visible. Sample bias U = 0.1 V, tunneling setpoint I_T = 0.1 nA.