

**Cu and Ag Deposition at Pt Single Crystal Electrodes:
Nucleation, Structure and Nanostructuring**

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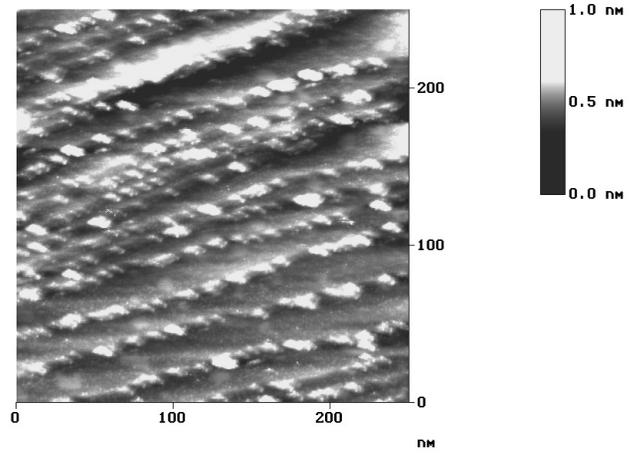
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The structure and growth of metal deposits is largely determined by the lattice mismatch between substrate and deposit. Cu and Ag deposition at Pt are well suited to study fundamental aspects of such effects by STM, because of their lattice mismatch with Pt of -8% or +4% for Cu or Ag, resp., and because of their nobility, which leads to a larger stability range and less interference with oxygen adsorption or oxide formation.

Cu deposition at Pt(111) leads to large clusters of several hundred nm diameter (Fig.1). The size and shape (hexagonal or triangular) are influenced by the deposition potential and additional Cl⁻ in the electrolyte. The atomic structure on top of the cluster shows that it is grown epitaxially.

Cu deposition onto a monolayer of Ag on Pt leads to alloying in the first layer, as revealed by both STM and electrochemical experiments. At least up to 3 Cu layers are then deposited in a layer by layer growth. Deposition at steps is inhibited, similar to the case of Cu deposition at Ag(111).

Preferential deposition at steps can, on the other hand, be induced by decoration of the steps of Pt(111) with Ag, blocking the residual terrace sites by adsorbing ethane, and subsequent deposition of Cu (Fig.2).



Pt(111) surface after deposition of 10-20% Ag UPD, ethene adsorption at 0,1V vs. Cu/Cu²⁺ and Cu deposition at -0,1V from 0,05M H₂SO₄ / 10⁻⁴ M CuSO₄.

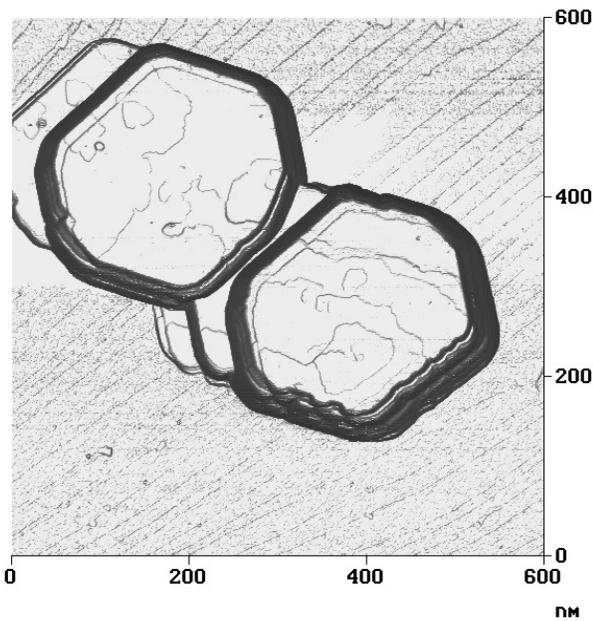


Fig.1: Cu deposited at Pt(111) during a potential sweep with 5mV/s to -100mV vs. Cu/ Cu²⁺ in 0,05M H₂SO₄ / 10⁻⁴ M CuSO₄.