DEPOSITION OF GOLD NANOSTRUCTURES BY FIELD INDUCED DEPOSITION USING A GOLD COATED METAL STM TIP.

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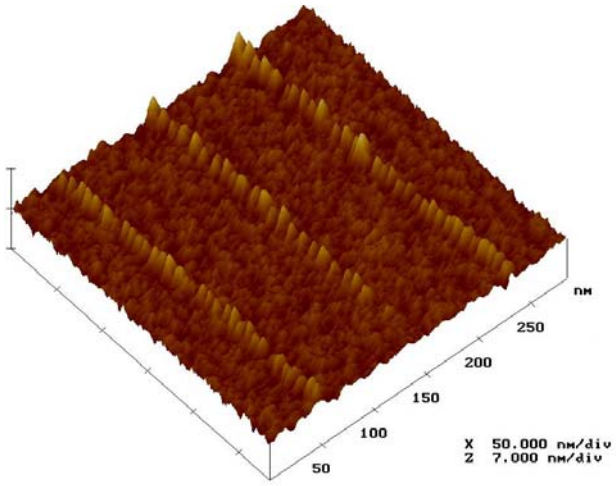
The feasibility of STM lithography by atom transfer from a STM tip to a sample was demonstrated more than 10 years ago [1]. The authors invoked the process of tip evaporation enhanced by the high electric field between the tip-sample gap, to explain the atom transfer. More recently, it has been suggested that the STM tip is elongated when a high bias is applied to the sample, till a physical tip-sample contact is established [2, 3]. The subsequent drastic tip-sample current increase (at least 3 to 4 orders of magnitude) induces the melting of the tip-sample bridge. To refind the current setpoint, the feedback loop of the STM acts to remove the tip leaving on the surface a molten metallic droplet which finally freezes. Thus, the deposition occurs via a process based on a field induced diffusion of metallic atoms along the lateral parts of the tip towards the tip apex.

Patterns of various metals can be deposited by this process, using different tip natures (W, Pt, Au, Cu) [1-4]. For stability reasons, platinum or tungsten wires are more suitable for STM experiments. We propose in this study a method of patterning of gold nanofeature using gold coated platinum or tungsten STM tips. SEM+EDX spectra exhibit the signature of gold. Furthermore, this work clearly demonstrates than the deposition is based on a field induced diffusion process and not on evaporation of the tip.



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