

Size-selected cobalt nanoparticles deposited on the Cu(001)-c(2x2)N grid pattern

T. Veltum, K. Elshimi, J. Andrews, H. Bettermann, M. Getzlaff

Institute of Applied Physics, Heinrich-Heine-University Duesseldorf, 40225 Duesseldorf, Germany

getzlaff@uni-duesseldorf.de

Recently, the interest on Cu-N compounds surfaces has experienced an explosive attraction, related with the possibility of producing self-assembled patterns of square islands that can be used as a nanotemplate for growing different nanoscopic systems or for ordered nanoparticle deposition [1,2]. Supported clusters and nanoparticles on the other hand are rather interesting objects not only from a fundamental point of view but also for technological applications due to the strong size dependence of their properties.

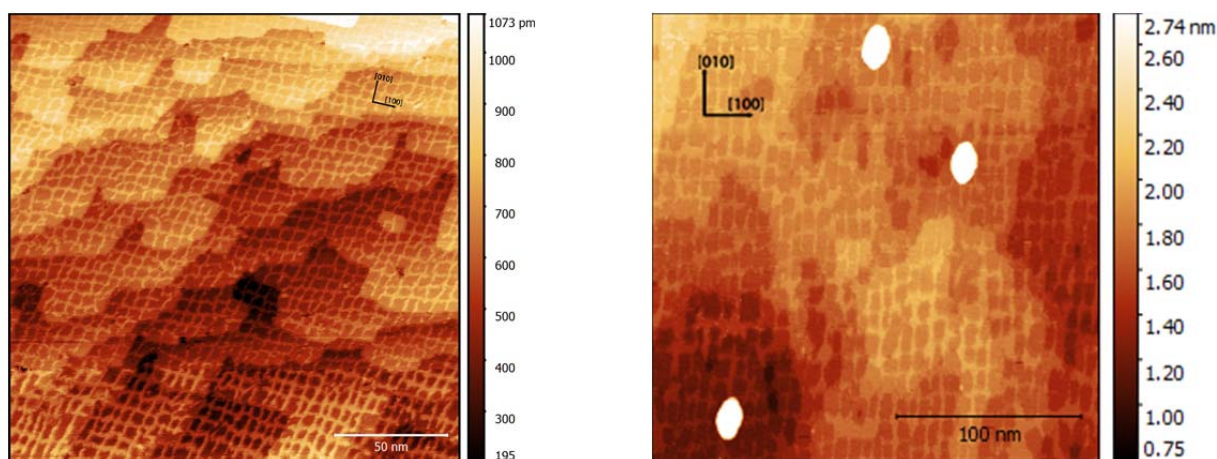


Figure: STM image of the grid pattern of the Cu(001)-c(2x2)N surface without and with deposited Co nanoparticles.

This contribution focuses on Co nanoparticles produced from the gas phase, using a magnetron sputter source (Haberland type). The nanoparticles are mass/charge filtered and deposited on the grid pattern of the Cu(001)-c(2x2)N surface.

The Cu surface is cleaned using the well-known in situ by repeated cycles of Ar⁺ sputtering followed by annealing. The grid pattern is prepared by sputtering the surface with activated nitrogen at E = 500 eV with an ion dose around 1×10^{15} ions/cm² followed by annealing.

Several studies were performed to grow nanoparticles on this pattern [3-5] which showed that the nanoparticles preferentially grow on the clean Cu intersections and lines between the patches. We deposit nanoparticles of various sizes between 2 nm and 10 nm on the grid pattern and check their position on the surface (see Figure). We have found similar preferential sites for deposited nanoparticles with heights of up to 7 nm.

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