EPITAXY OF SOFTLY DEPOSITED SMALL Co NANOCLUSTERS ON Cu(001) SURFACES

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Cobalt clusters are considered as possible building blocks for magnetic storage devices. For any technical applications, the clusters must be deposited on surfaces or embedded in matrices. The physical properties of these supported clusters are usually size- and shape-dependent and clearly differ from both the atom and bulk material.

The **deposition at low energies** (~ meV/atom) of **Co nanoclusters on a Cu(001) substrate** is studied by **constant-temperature molecular-dynamics simulations**. Initially clusters had icosahedral or Wulff shapes and their number of atoms ranged from 13 to 1289. The deposition energy and the temperature were, respectively, 17 meV/atom and 300 K. Nevertheless changes in cluster morphology with both magnitudes were also analyzed. Atomic interactions are mimicked by a many-body potential based on the second moment tight binding approximation (TB-SMA).

A **different epitaxial behaviour** of the clusters has been found as a function of the **number of atoms**. Below a hundred of atoms, Co clusters grow epitaxially with the substrate, that is, they mimic the orientation of this. Larger clusters do not achieve full epitaxy since stacking faults arise. In these cases, the influence of the substrate is small and in a lot of cases this is reduced to the zone nearest to the interface. Hexagonal close-packed (hcp) arrangement of atoms, characteristic of the bulk cobalt, is not stabilized practically in any system. By increasing **the temperature and the deposition energy** one can enlarge the parts of the cluster grown epitaxially even attaining a complete epitaxy.