

## Structure and magnetic anisotropy of $Co/Au(111)$ films

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Numerical calculations combined with the theoretical analysis, concerning  $Co/Au(111)$  and  $Ag/Co/Au(111)$  thin films, aim at a microscopic interpretation of empirical data obtained by A. Maziewski and his group. The data show rather striking properties of surface and interface magnetism in these materials, and indicate their strong magnetic anisotropy. The structural and magnetic properties of thin  $Co$  films epitaxially grown on  $Au(111)$  substrates, are investigated using ab-initio local density calculations. It is shown that there is a large lattice mismatch between  $Co$  and  $Au(111)$ , which causes a growth mode of the polygonal  $Co$  islands of two atomic layers with a  $hcp$  structure. The lattice mismatch at the  $Co - Au$  interface leads to a buildup of the lattice strain. An enhancement of the magnetic moment on the free surface as well as at the  $hcp/fcc$  interface is found. The influence of the capping  $Ag$  layers on the film's relaxation and on its magnetic moment has been also considered. In order to obtain energy of the magnetic anisotropy for the cobalt films, we perform relativistic spin-polarized local spin density calculations. We analyze an influence of  $Ag$ , which plays a prominent role as a substantial effect of the shape anisotropy in  $Co/Au(111)$  films. It is also proved that magnetic anisotropy of  $Co/Au(111)$  and that of  $Ag/Co/Au(111)$  films essentially differ from each other.

9.7 cm

13.4 cm

### Subject category :

3. Transition Metals, Alloys and Compounds

### Presentation mode :

poster

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