



Observation of an fcc–Co nanolayer grown between CoO and amorphous Si

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Abstract

The thermodynamically crystallographic phase of Co at ambient conditions is hexagonal-close-packed. However, it has been found that given a crystallographic support from a suitable substrate, the high-temperature face-centered-cubic phase can be stabilized in thin films. We performed cross-sectional high-resolution transmission electron microscopy on a Si substrate/Si buffer/Co/CoO/Cu₄₁Ni₅₉/Nb/Cu₄₁Ni₅₉/Si-cap heterostructure (all layer thicknesses in the nanometer range). We analyzed lattice spacings and angles of the Co layer and neighbouring layers. While in the present study, there is no obvious support for an fcc structure by the amorphous Si buffer and the CoO (spinel structure), only an fcc phase of the Co layer (of about 5 nm thickness) is in agreement with the obtained results. However, the detailed mechanism of phase stabilization remains unresolved.