

The synthesis and study of structural and magnetic properties of FeCo nanowires

Aleksandra Stanisławska

AGH University of Science and Technology, Mickiewicza 30, 30-059 Cracow

Magnetic nanostructures such as FeCo nanowires have received recently special attention due to their potential application in magnetic recording devices and magnetic sensors. Depending on the shape anisotropy, magnetocrystalline anisotropy and dipole interactions, nanowires may show magnetic ordering in the nanowire axis. Therefore, the deposition process parameters and the geometry of the nanowires have a significant influence on the structural and magnetic properties.

In this work morphology and magnetic properties of FeCo nanowires with different Co concentration were investigated. The Fe, Co and FeCo nanowires were prepared by template-assisted electrodeposition process in the porous polycarbonate membranes. To obtain FeCo nanowires with different Co concentration the electrolytes with varied composition and cathodic current were applied. The morphology of nanowires and overdeposited structures studied by using scanning electron microscopy revealed the matrix of continuous nanowires with a high level of pore filling. The chemical composition of the FeCo nanowires were studied by energy-dispersive X-ray spectroscopy. X-ray diffraction confirmed the polycrystalline Fe bcc and Co hcp structure. The hysteresis loops measured by SQUID magnetometer demonstrated magnetic anisotropy of nanowires with easy axis along the nanowire axis.

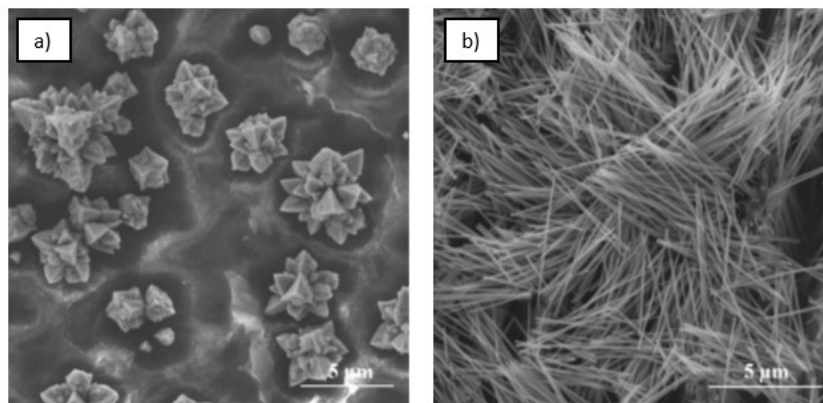


Figure 1. Scanning Electron Microscopy images of FeCo filled templates with flower-like overdeposition (a), FeCo nanowires (b).