Quantitative magnetometry analysis and structural characterization of multisegmented cobalt–nickel nanowires

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Abstract

Understanding and measuring the magnetic properties of an individual nanowire and their relationship with crystalline structure and geometry are of scientific and technological great interest. In this work, we report the localized study of the magnetic flux distribution and the undisturbed magnetization of a single ferromagnetic nanowire that poses a bar-code like structure using off-axis electron holography (EH) under Lorentz conditions. The nanowires were grown by template-assisted electrodeposition, using AAO templates. Electron holography allows the visualization of the magnetic flux distribution within and surroundings as well as its quantification. The magnetic analysis performed at individual nanowires was correlated with the chemical composition and crystalline orientation of the nanowires.