Mapping the magnetic and crystal structure in cobalt nanowires.

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Abstract.

Using off-axis electron holography under Lorentz microscopy conditions to experimentally determine the magnetization distribution in individual cobalt (Co) nanowires, and scanning precession-electron diffraction to obtain their crystalline orientation phase map, allowed us to directly visualize with high accuracy the effect of crystallographic texture on the magnetization of nanowires. The influence of grain boundaries and disorientations on the magnetic structure is correlated on the basis of micromagnetic analysis in order to establish the detailed relationship between magnetic and crystalline structure. This approach demonstrates the applicability of the method employed and provides further understanding on the effect of crystalline structure on magnetic properties at the nanometric scale.