Supplementary Information for: Helical surface magnetization in nanowires: the role of chirality

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Structure of the nanowires measured by Transmission Electron Microscopy

Figure S.1 shows a TEM image, in Z-contrast mode, of one NW with chemical barriers approximately 20 nm wide, separated 250 nm from each other. The composition profiles along different NWs measured by energy dispersive X-ray spectroscopy (EDX), show sharp changes in the Fe/Ni ratio at the chemical barriers. The composition change from $Fe_{30}Ni_{70}$ to $Fe_{80}Ni_{20}$.

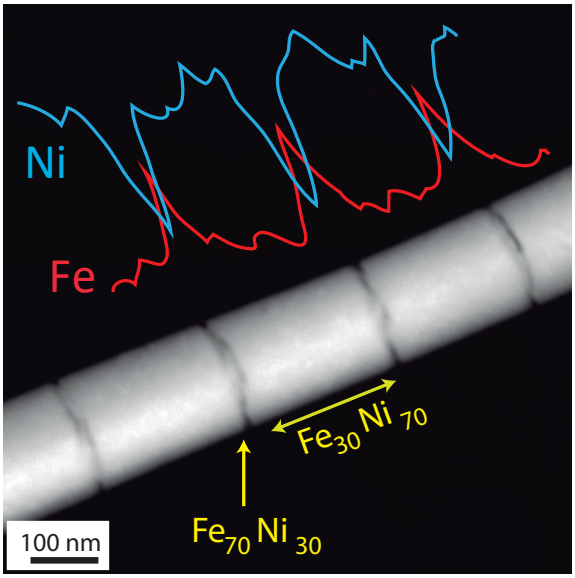

Fig. S.1 TEM image of a individual NW together with the relative Ni and Fe content, measured by energy dispersive x-ray spectroscopy.

Photoemission Electron Microscopy (PEEM)

Figure S.2 shows the chemical and magnetic contrast images of one permalloy nanowire with chemical barriers separated 250 nm. Images are taken with the X-ray beam perpendicular to the nanowire. From the magnetic contrast image, Figure S.2.b, it is clear that the magnetic structure consist in a core/shell structure, with the magnetization in the outer part of the NW in the azimuthal direction and axial magnetization in the inner part of the NW. However, due to the proximity of the chemical barriers, it is difficult to correlate chemical barriers and DWs due to the spatial resolution in these images.

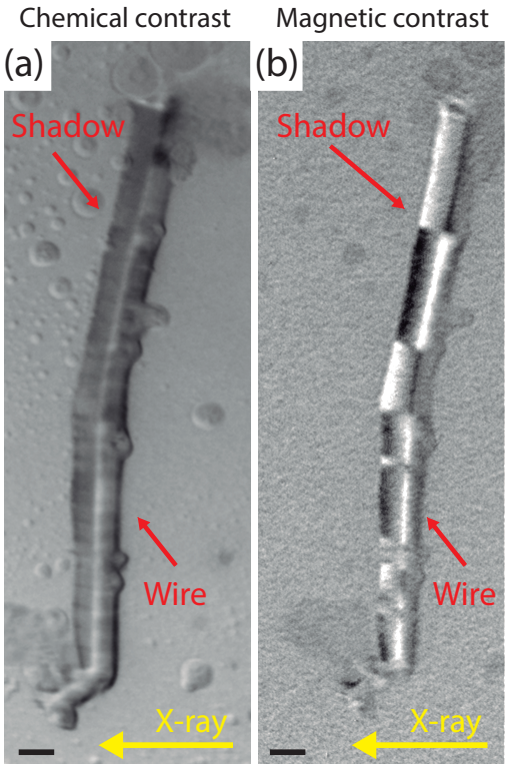

Fig. S.2 PEEM images of an individual NW. (a) Chemical contrast, taken as as the difference in X-ray absorption at the Fe L_3 and Ni L_3 absorption edges and (b) XMCD image taken as the pixel by pixel difference of two images taken at Fe-edge with opposite photon helicity. The scale bar is 500 nm

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