Three dimensional magnetic nanowires grown by focused electron-beam induced deposition - SUPPLEMENTARY INFORMATION

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MOKE MEASUREMENTS ON 3D NANOWIRES

As explained in the main manuscript, MOKE measurements on 3D nanowires (NWs) present additional sources of noise due to the vibration of the wires and a large amount of diffusive scattering when light is reflected. To illustrate this, we have studied changes in the MOKE signal for a 9 μm-long NW, when the laser spot is focused on different points along the length of the wire (see figure S1(g)). Figures S1(a)-(f) show a series of MOKE loops measured at 2 microns intervals. Square hysteresis loops are obtained when the laser is focused close to the base of the pillar, whereas the signal becomes distorted as the laser moves towards the upper part of the NW. In addition, figure S1(h) shows the normalised MOKE intensity as a function of the position of the laser, showing that MOKE measurements in 3D-NWs are optimum when performed with the laser focused about 2-3 μm away from the base of the wire.

When the laser is placed far from the base of the wires (figures S1(d)-(f)) we observe two additional contributions which superimpose to the normal loop, hindering a clear observation of details during the switching of the magnetization: a strong quadratic-with-the-field signal, due to mechanical noise during the measurements, and a strong quadratic-with-the-magnetization signal. This second contribution depends strongly on analyser and quarter-wave plate angles, and gives loops which resemble those found for materials with a strong quadratic-MOKE [S1, S2]. Because of the non-trivial geometrical configuration of the

measurements, as well as to the deformation of the NWs as they are being probed, the interpretation of this contribution is complex [S3], and requires further studies.

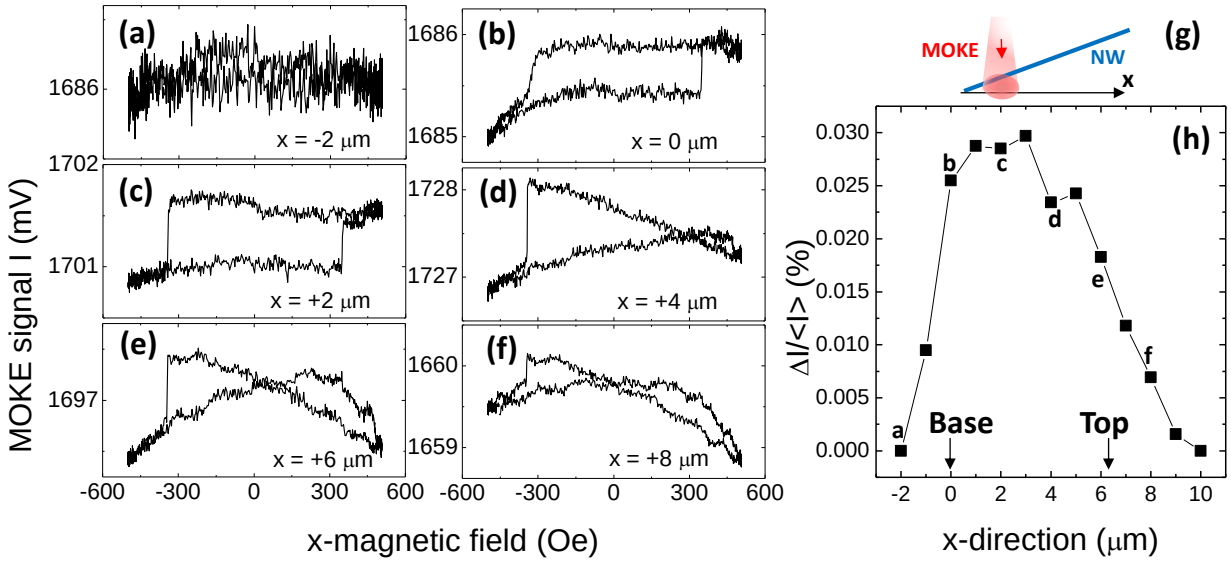

Figure S1: (a) to (f) MOKE loops obtained with the laser spot focused on different points along the length of the NW. **(g)** Scheme of the measurements: the laser is focused every 1 μm along the x-direction (projection of the wire axis on the substrate). **(h)** Normalised MOKE intensity as a function of the x-direction.

REFERENCES

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