SUPPORTING INFORMATION

Colloidal semiconductor-magnetic heterostructures based on iron-oxide-functionalized brookite TiO_2 nanorods

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1. Fitting of SR-XRD patterns

We have evaluated the crystal-phase purity of the samples by fitting the experimental SR-XRD data with QUANTO software.[1] The shape anisotropy of the nanocrystals has been taken into account by implememting an empirical function was to model variations of both peak width and shape as a function of 2θ and *hkl* indices.[2] The experimental XRD patterns reported in Figure 2 in the main manuscript are examined here. In our approach, the samples were supposed to be entirely composed of either TiO_2 brookite (**Fig. S1**), inverse spinel cubic IO in either magnetite or maghemite (**Fig. S2**), or TiO_2 brookite/IO mixture (**Fig. S3**), and the quality of the obtained fits was evaluated by means of a goodness-of-fit statistical indicator (GoF). Given the high count rate of the pattern intensity, GoF values of <6-7 were considered to be satisfactory. The high fit quality and good GoF indexes indeed proved that the initial assumptions were reliable.

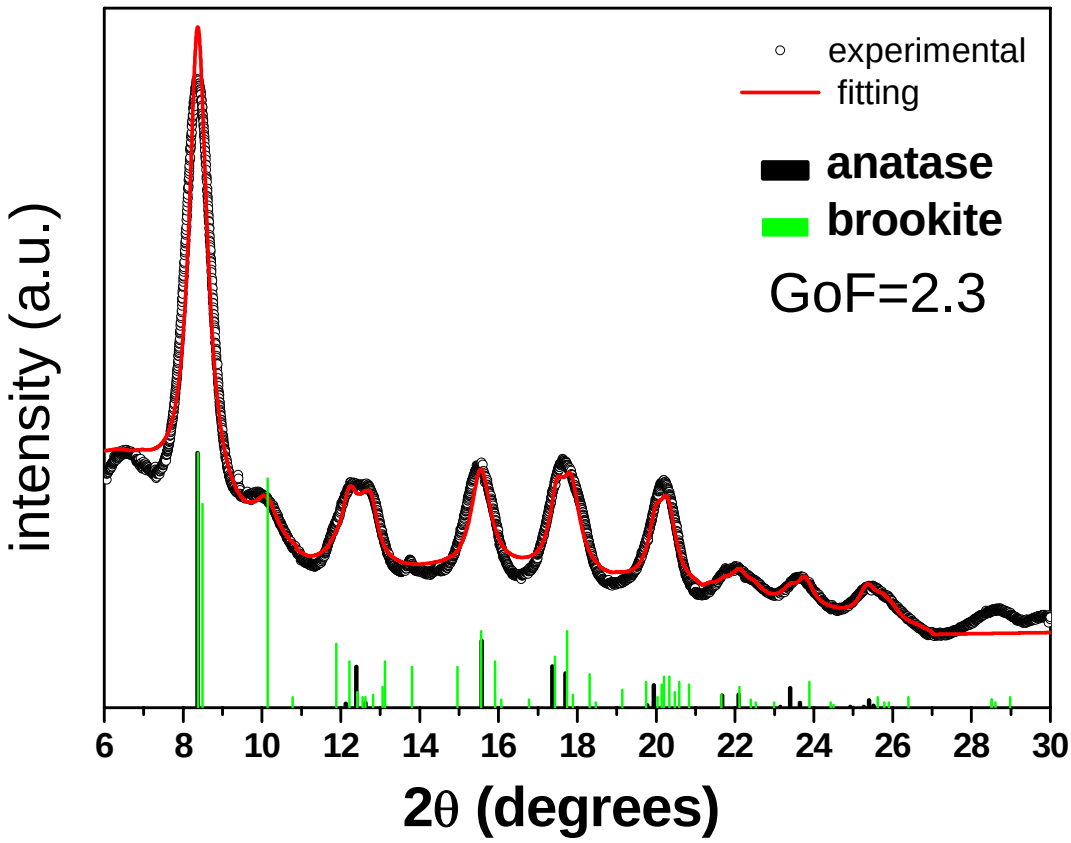

Figure S1 Comparison between the experimental SR-XRD pattern of TiO_2 nanorods (which corresponds to Figure 2a of the main manuscript) and the corresponding fitting. The latter was performed upon assuming that the sample was made of brookite only. The GoF was 2.3.

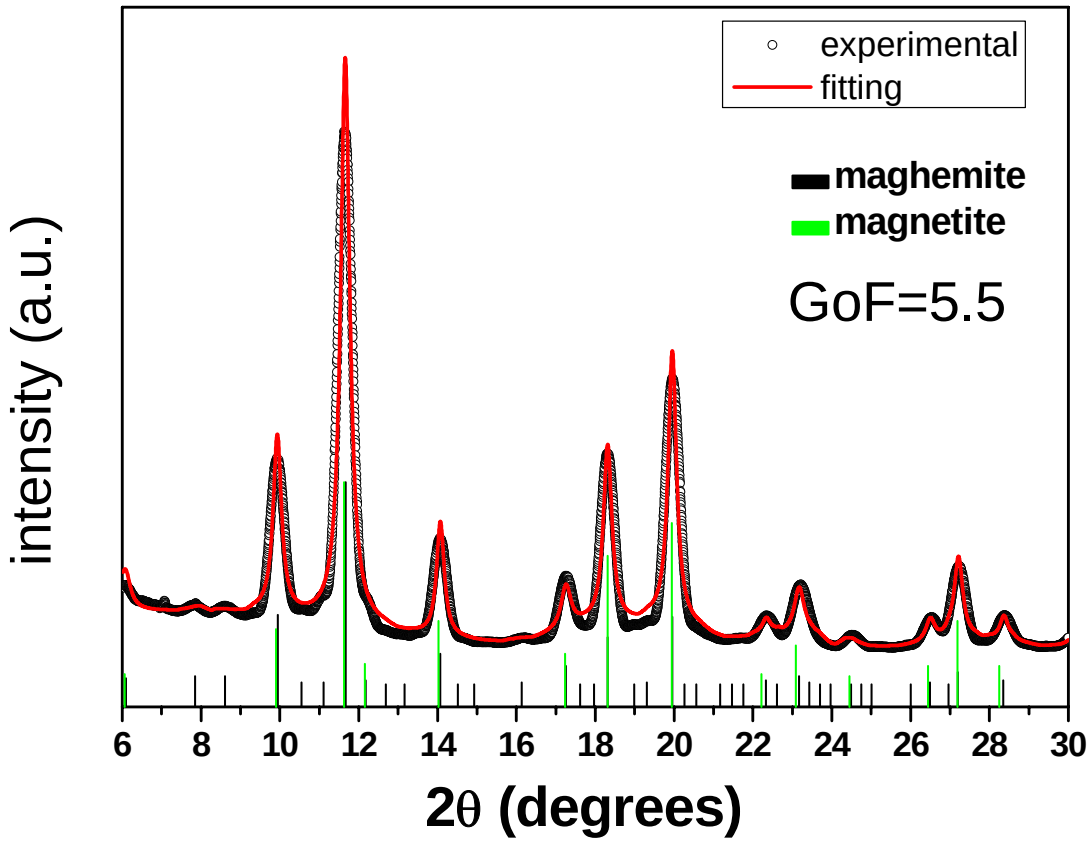

Figure S2 Comparison between the experimental SR-XRD pattern of IO NCs (which corresponds to Figure 2c of the manuscript) and the corresponding fitting. The latter was performed upon assuming that the sample was made of maghemite only. The GoF was 5.8.

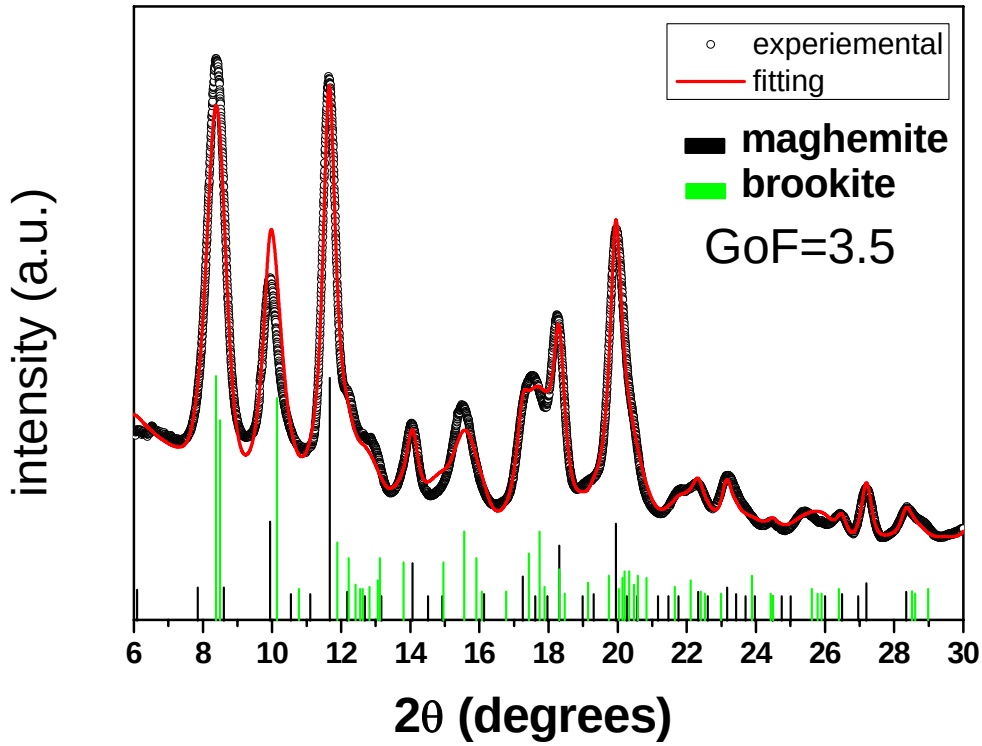

Figure S3 Comparison between the experimental SR-XRD pattern of *b*-TiO_2/IO HNCs (which corresponds to Figure 2b of the manuscript) and the fitting. The latter was performed assuming that the sample was made of brookite TiO_2 and maghemite. The GoF was 3.5.

2. Statistical size analysis on the IO domains of the samples investigated by SQUID magnetometry

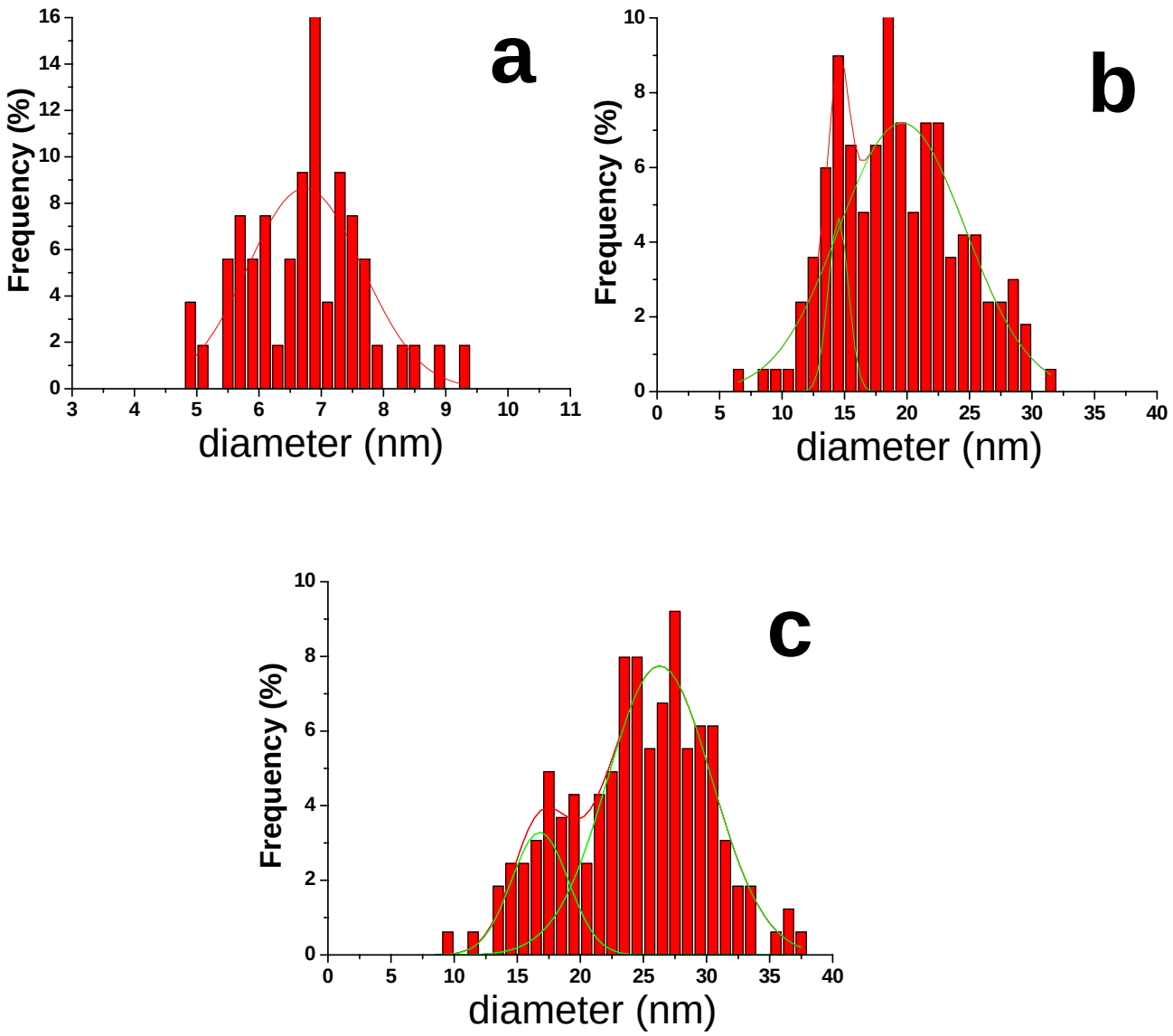

Figure S4 Statistical analysis (based on TEM size determination) of the dimensions of the IO domains in the *b*-TiO_2/IO HNCs analyzed by SQUID magnetometry. The samples correspond to those in Figure 6 in the main manuscript, for which the median values of the IO domain sizes are: ~7 (**a**); ~19 nm (**b**), and ~25 nm (**c**), respectively.

References

1. Altomare, A.; Burla, M. C.; Giacovazzo, C.; Guagliardi, A.; Moliterni, A. G. G.; Polidori, G.; Rizzi, R., Quanto: a Rietveld program for quantitative phase analysis of polycrystalline mixtures. *Journal of Applied Crystallography* **2001,** 34, 392-397.

2. LeBail, A.; Jouanneaux, A., A qualitative account for anisotropic broadening in whole-powder-diffraction-pattern fitting by second-rank tensors. *Journal of Applied Crystallography* **1997,** 30, 265-271