Lorentz microscopy sheds light on the role of dipolar interactions in magnetic hyperthermia

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Supplementary Information

Figure SI.1

Hysteresis loops measured at low temperature (i.e., in the blocked state) on CO-NPs (left panel) and TD-NPs (right panel) samples, which do not evidence a substantial difference in magnetic anisotropy between the two samples. Coercive field values are 26 mT for CO-NPs at 30 K and 33 mT for TD-NPs at 3 K.
Inverse of magnetic moment as a function of temperature for TD-NPs sample, showing that inter-particle interactions in the TD-NPs sample are lower than in the CO-NPs sample, but not negligible. The ZFC and FC curves of this sample show in fact a Curie-Weiss temperature dependence $M = A(T - T_0)$ in the temperature region from 200 to 300 K, i.e., well above the blocking temperature. A $T_0$ value of +67 K was deduced, indicating that inter-particle interactions favour magnetic ordering.

Figure SI.2
Figure SI.3

Mean inner potential (MIP) contribution as obtained by Lorentz microscopy investigation for the CO-NPs sample. The image is relative to the same area of the sample shown in Fig. 5; the image scale bar is 0.5 µm.