SUPPORTING INFORMATION

Three-dimensional Reconstruction of colloidal Fe_2P nanorod assembly by Coherent Diffractive Imaging

Yuriy Chushkin,[1] Federico Zontone,[1] Enju Lima,[2] Liberato De Caro[3], Pablo Guardia[4], Liberato Manna[4] and C. Giannini[3]

[1] European Synchrotron Radiation Facility, B.P. 220, F-38043 Grenoble, France
[2] Photon Sciences Directorate, Brookhaven National Laboratory, Upton, NY, 11973 USA

[3] Istituto di Cristallografia (IC-CNR) via Amendola 122/O, 70126 Bari, Italy
[4] Istituto Italiano di Tecnologia, via Morego, 30, 16163 Genova (Italy)

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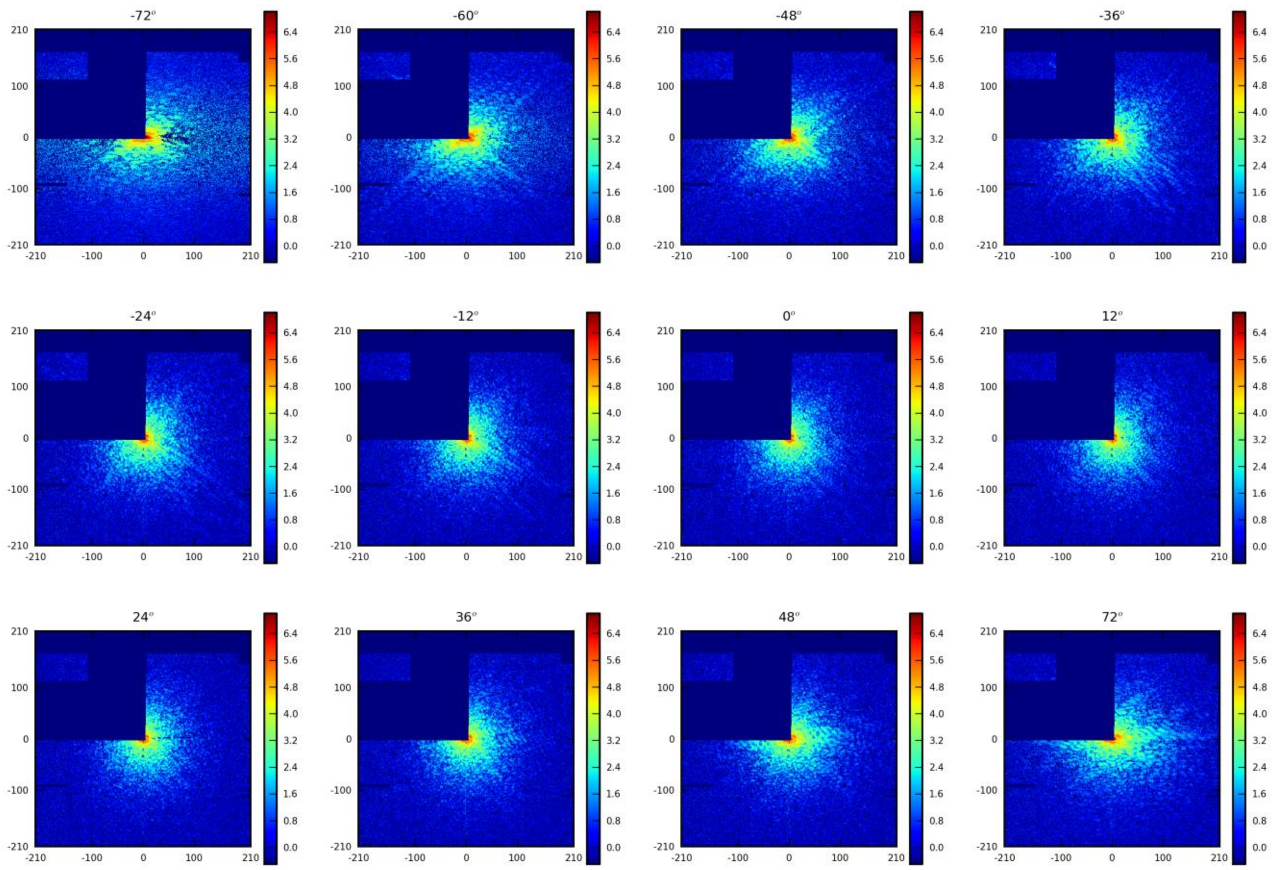


Figure S1. *The measured 2D diffraction data shown at various sample tilts.*

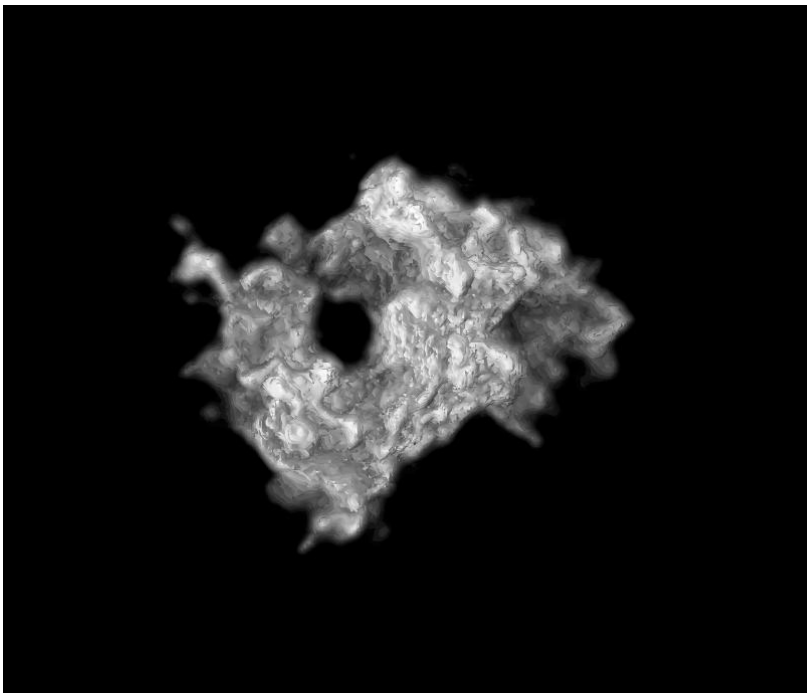


Figure S2. *3D animation of the semi-transparent iso-surface rendering.*

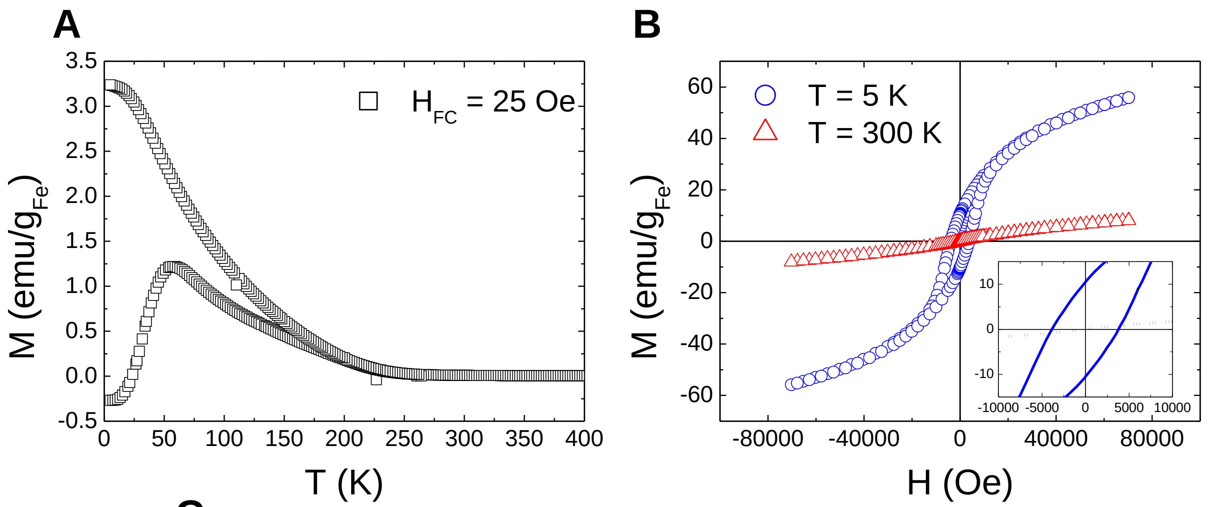
Synthesis of the Fe_2P nanorods:

Chemicals: Iron pentacarbonyl (>99.99%), 1-Octadecene (90%) and Oleylamine (70%) were purchased from Sigma-Aldrich. All solvents used were of analytical grade and were purchased from Sigma-Aldrich. Tri-n-octylphosphine (TOP, 97%) was purchased from Strem Chemicals. All chemicals were used as received.

Synthesis of (38 ± 12 nm / 4 ± 1 nm) Fe_2P nanorods: 40 mL of Octadecene and 4 mL of Oelylamine were loaded in a 100 ml three neck flask and degassed for 60 minutes at 100 C. After degassing the solution was heated up to 300 C and a solution of 20 ml of TOP and 0.4 ml of iron pentacarbonyl was injected. The solution was allowed to react for 30 minutes and rapidly cooled down. After cooling down to room temperature, 80 mL of 2-propanol was added and the whole solution was centrifuged at 8500 rpm. After removing the supernatant, the black precipitate was dispersed in 2-3 mL of toluene and the washing procedure was repeated at least one more time. Finally the collected particles were dispersed in 5 mL of chloroform.

Magnetic Characteriation of Fe_2P nanorods

Magnetic characterization was carried out in a Quantum Design SQUID magnetometer. Zero-field-cooling (ZFC) and field-cooling (FC) magnetization curves were measured at 25 Oe in the temperature range 5-400 K. (Figure 1A). Hysteresis loops $M(H)$ were measured under a maximum applied field of 70 kOe at 5 K and 300 K (Figure 1B), in order to evaluate the coercive field, H_C, and saturation magnetization, M_S. Saturation magnetization was obtained by extrapolating to zero field the experimental $M(H)$ curve from the high-field range where the magnetization varies linearly with H. Namely, $M(H) \approx M_S + \chi_d H$. Hysteresis loops were normalized to the total iron amount. Finally the blocking temperature (T_B) was obtained from the maximum magnetization value in the ZFC curve. The magnetic parameters are summarized in the table of Figure S3 (C). The sample shows high coercive fields (ferromagnetism) at 5 K and almost zero coercive fields at 300K (paramagnetism) together with low saturation magnetization values.



C

T_B(K)	M_S(emu/g_{Fe})		χ_d(emu/Oeg_{Fe})		H_C(Oe)	
	5 K	300 K	5 K	300 K	5 K	
57	36	2	8 10^{-5}	3 10_{-4}	3850	8

Figure S3. *A) Zero field cooling and field cooling (H_{FC} = 25 Oe). B) Hysteresis loops up to 7 tesla at 5 K (blue circles ○) and 300 K (red triangles Δ). Inset: detail of the low-field region to evaluate the coercive fields. C) Table with the magnetic parameters; Blocking temperature (T_B), saturation magnetization (M_S), high field susceptibility (χ_d), and coercive fields (H_C) at 5 K and 300 K for Fe_2P nanorods.*