Supplementary Information

Exchange bias and Verwey transition in Fe_5C_2/Fe_3O_4 core/shell nanoparticles

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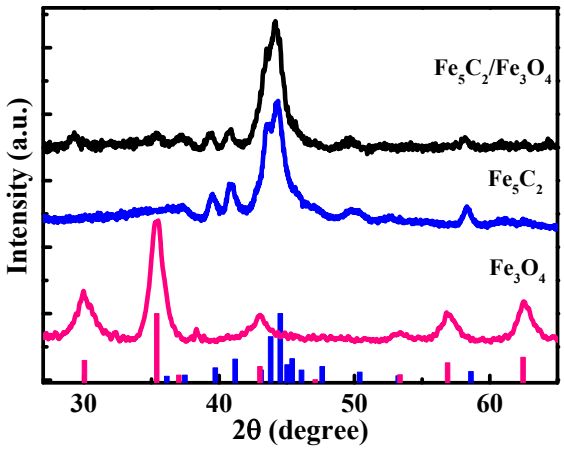

Fig. S1. *The XRD patterns of pure Fe_3O_4 and Fe_5C_2 nanoparticles, and Fe_5C_2/Fe_3O_4 core/shell nanoparticles. The Fe_3O_4 crystallizes in a spinel cubic structure, while the Fe_5C_2 crystallizes in a monoclinic structure, according to the ICDD card no. 001-1111 and 051-0997, respectively.*

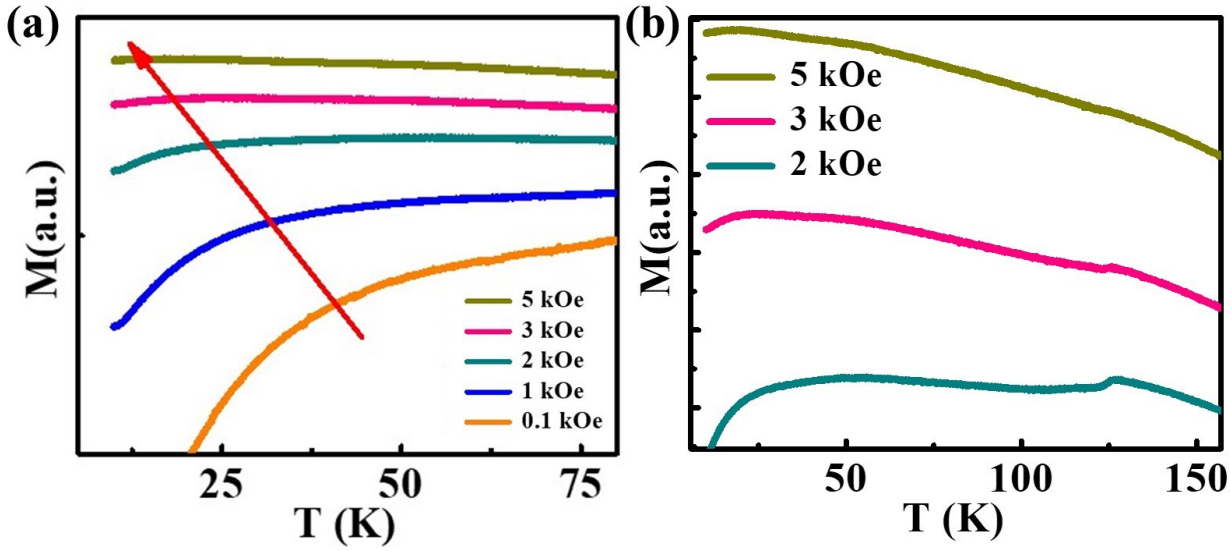

Fig. S2. *(a) Field dependent blocking behavior of Fe_3O_4 shell in Fe_5C_2/Fe_3O_4 core/shell nanoparticles. (b) Effect of magnetic field on the Verwey transition temperature.*

Table S1: Mössbauer parameters: Hyperfine Field (H_{hf}), Quadrupole Splitting (Q_S), and Isomer Shift (IS) for Fe_5C_2/Fe_3O_4 core/shell nanoparticles at room temperature.

Phases	**Iron sites**	**Hyperfine field (H_{hf}), kOe**	**Quadrupole splitting (Q_S), mm/s**	**Isomer shift (IS), mm/s**
Fe_3O_4	sextet A	486.981	-0.0092	0.289
	sextet B	455.997	-0.061	0.693
Fe_5C_2	sextet I	188.55	-0.0317	0.231
	sextet II	215.63	0.228	0.269
	sextet III	215.27	-0.0735	0.23