Supplementary Material (ESI) for Chemical Communications

Shape-Dependent Magnetic Properties of Low-Dimensional Nanoscale Prussian Blue (PB) Analogue $SmFe(CN)_6 \cdot 4H_2O$

Hao-Ling Sun,[a] Hongtao Shi,[b] Fei Zhao,[a] Limin Qi *[b] and Song Gao*[a]

Supporting Information:

Experimental Section

Synthesis of low-dimensional nanoscale $SmFe(CN)_6 \cdot 4H_2O$. The synthesis of $SmFe(CN)_6 \cdot 4H_2O$ nanostructures was simply achieved by the reaction of $Fe(CN)_6^{3-}$ and Sm^{3+} ions solubilized in the reverse micelles.

$SmFe(CN)_6 \cdot 4H_2O$ nanorods were prepared in the polyoxyethylene (5) nonylphenyl ether (NP-5) reverse micelle system. Typically, 0.24 g of NP-5 was first dissolved in 10 mL of cyclohexane. Then, 100 μL of 0.3 $molL^{-1}$ $K_3Fe(CN)_6$ solution was added with shaking, which was followed by the addition of 100 μL of 0. 5 $molL^{-1}$ $SmCl_3$ and vigorous shaking, giving reactant concentrations of $[Fe(CN)_6^{3-}]$ = 0.15 $molL^{-1}$ and $[Sm^{3+}]$ = 0.25 $molL^{-1}$ with respect to the aqueous phase of the reverse micelles. Finally, the resultant mixture was incubated for 24 hours at 50 °C, resulting in the formation of red precipitate.

$SmFe(CN)_6 \cdot 4H_2O$ nanobelts were prepared in the cetyltrimethylammonium bromide (CTAB) reverse micelle system. Typically, 0.24 g of CTAB and 160 μL n-hexanol was first dissolved in 4 mL of cyclohexane under heating. Then, 120 μL of 0.3 $molL^{-1}$ $K_3Fe(CN)_6$ solution was added with shaking followed by the addition of 120 μL of 0.5 $molL^{-1}$ $SmCl_3$ and incubation for 24 hours at 50 °C.

For comparison purpose, the synthesis was also carried out in aqueous solution. The $SmFe(CN)_6 \cdot 4H_2O$ microrods were prepared by mixing aqueous solutions of 0.3 mol L^{-1} $K_3Fe(CN)_6$ and 0.5 mol L^{-1} $SmCl_3$ with a volume ratio of 1:1, which was followed by incubation for 6 hours at 50 °C.

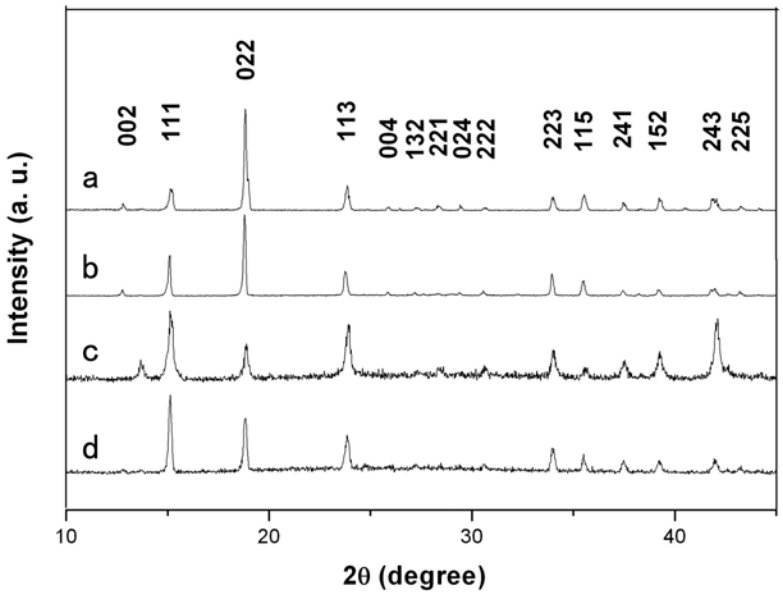

Fig. S1. XRD patterns of different $SmFe(CN)_6 \cdot 4H_2O$ crystals: (a) microrods obtained in aqueous solution; (b) nanorods obtained in NP-5 reverse micelles; (c) nanobelts obtained in CTAB/*n*-hexanol reverse micelles; (d) narrow nanobelts obtained in CTAB/*n*-decanol reverse micelles.

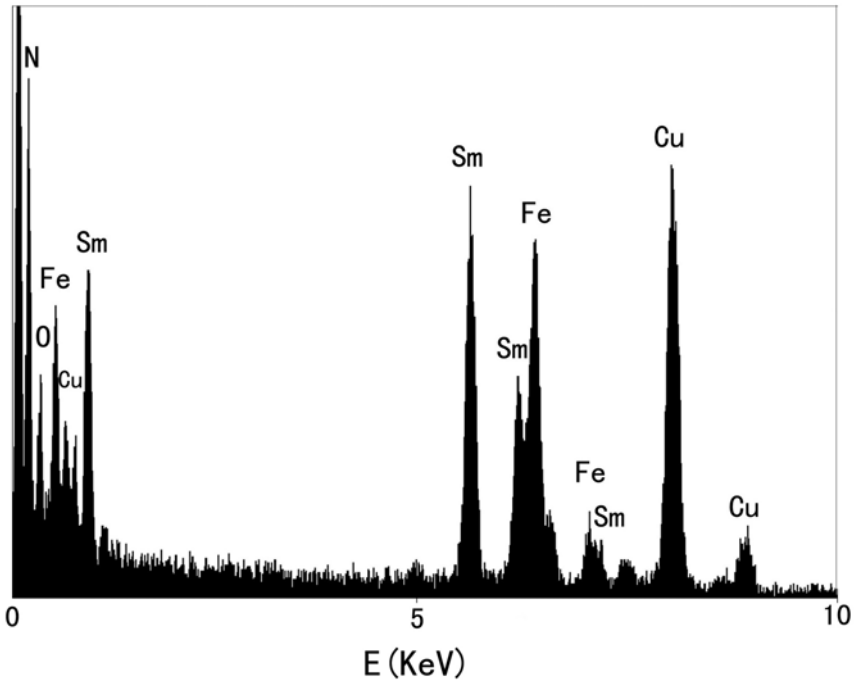

Fig. S2. EDS spectrums of $SmFe(CN)_6 \cdot 4H_2O$ nanobelts obtained in CTAB/*n*-hexanol reverse micelles.

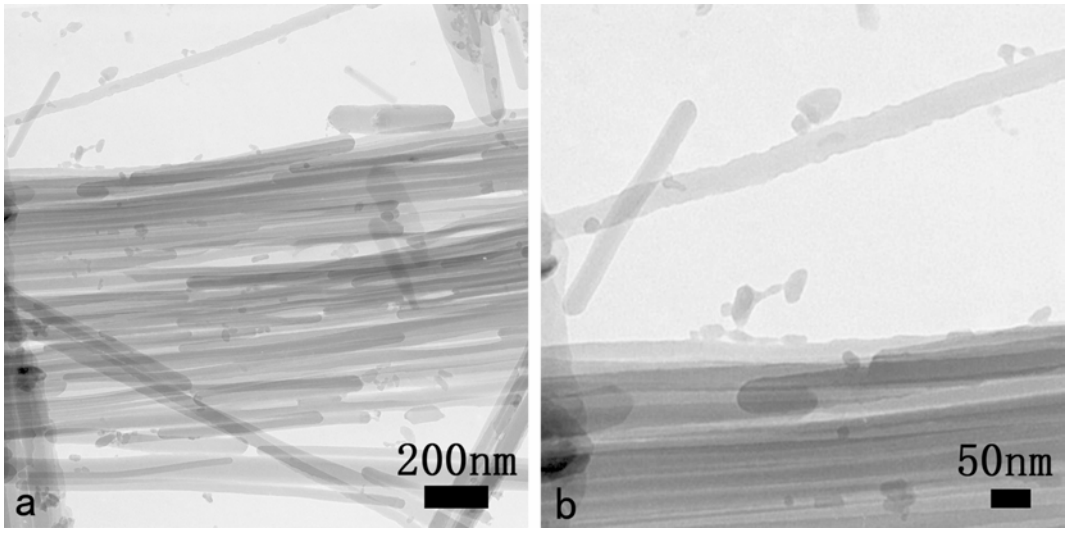

Fig. S3. TEM images of $SmFe(CN)_6 \cdot 4H_2O$ narrow nanobelts obtained in CTAB/*n*-decanol reverse micelles.

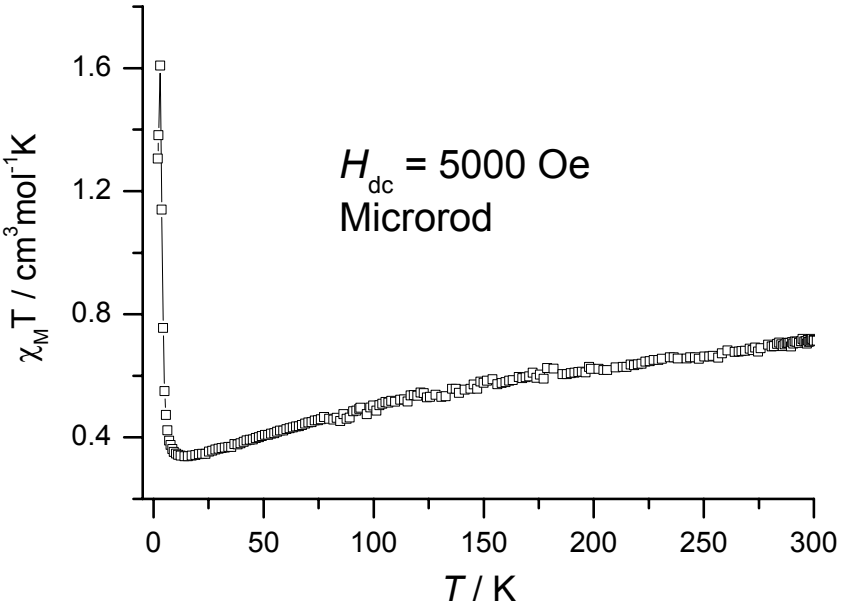

Fig. S4. Temperature dependence of $\chi_M T$ for $SmFe(CN)_6 \cdot 4H_2O$ microrods.