Electronic Supplementary Information

Monodispersed GdF_3 ultrathin-nanowires: oriented attachment, luminescence, and relaxivity for MRI contrast agent

Yang Tian,* Hong-Yu Yang, Kai Li, and Xue Jin

Department of Chemistry, Capital Normal University, Beijing, P. R. China, 100048

Corresponding author: tianyang@mail.sdu.edu.cn

Fig. S1 TEM image of the GdF_3 nanocrystals prepared by reacting for 24 h

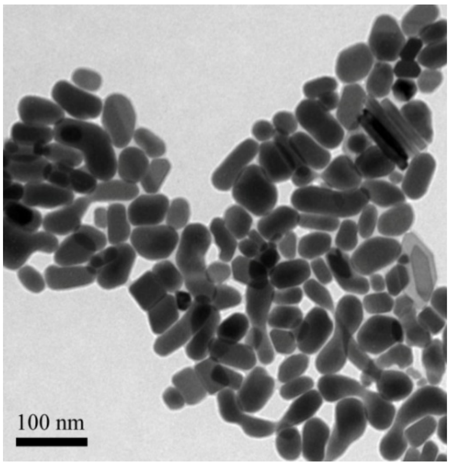


Fig. S2 TEM image of the product obtained from the reaction lasting for 5 min.

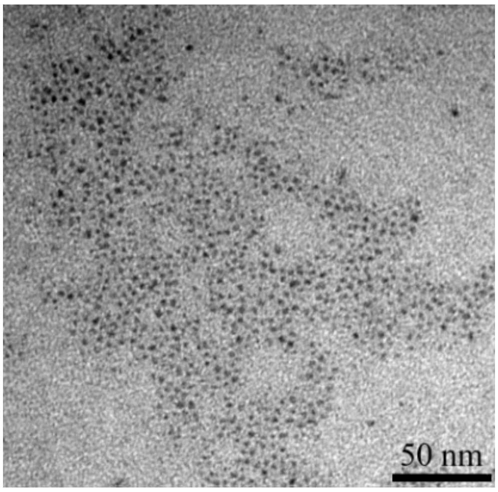


Fig. S3 TEM image of the product obtained from the reaction lasting for 10 min.

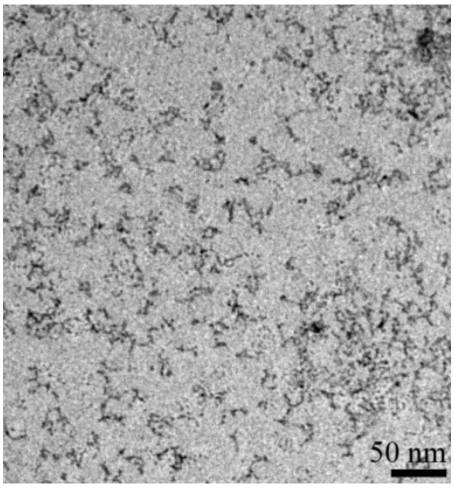


Fig. S4 Fast Fourier transform (FFT) of twin-crystal

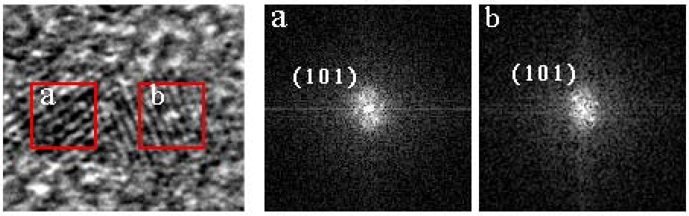


Fig. S5 TEM image of the ultrasthin GdF_3 nanowires doped with Eu^{3+}

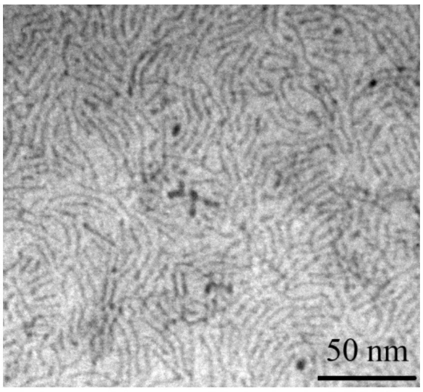


Fig. S6 EDX spectrum of the obtained GdF_3 nanowires doped with Eu^{3+}

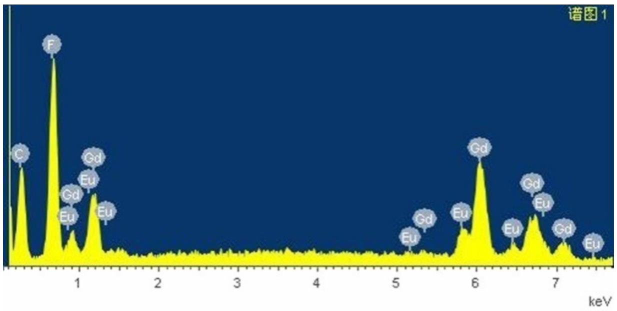
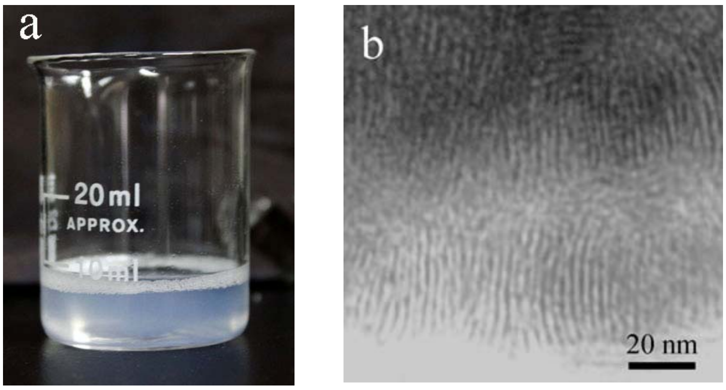


Table S1 Decay components of the obtained Eu^{3+}-doping GdF_3 nanowires with concentrations of 5 mol %, 10 mol %, and 20 mol %.

Eu^{3+}concentration (mol %)	τ_1 (ms)	τ_1 component (%)	τ_2 (ms)	τ_2 component (%)
5	1.41	15.47	4.31	84.53
10	1.25	18.06	3.73	81.94
20	1.15	13.74	3.56	86.26

Fig. S7 Photograph (a) and TEM image (b) of the ultrathin GdF_3 nanowires in the water after being modified with PF127.

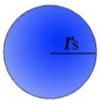


Surface-to-volume ratio calculations for 0D nanoparticles and 1D nanowires:

The surface-to-volume ratio described as the following equation:

$$A = \frac{S}{V}$$

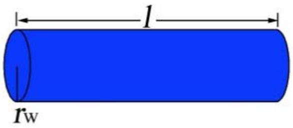
The radius of spherical nanoparticles is r_s. The specific surface area of spherical nanoparticles can be calculated by the equation:



$$A_s = \frac{4\pi r_s^2}{\frac{4}{3}\pi r_s^3}$$

$$A_s = \frac{3}{r_s}$$

The radius of nanowires is r_w and the length is l. For ultrathin nanowires, $r_w \ll l$. A_w can be obtained in the same way:



$$A_w = \frac{2\pi r_w^2 + 2\pi r_w l}{\pi r_w^2 l} = \frac{2\pi r_w (r_w + l)}{\pi r_w^2 l}$$

$$= \frac{2(r_w + l)}{r_w l} \approx \frac{2l}{r_w l} (r_w \ll l)$$

$$A_w = \frac{2}{r_w}$$