

# Assembly of 1D Coaxial Nanoribbons into 2D Multicolor Luminescence Array Membrane Endowed with Tunable Anisotropically Electrical Conduction and Magnetism *via* Electrospinning

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## Supplementary Information

### Synthesis of Tb(TTA)<sub>3</sub>(TPPO)<sub>2</sub> complexes and Eu(TTA)<sub>3</sub>(TPPO)<sub>2</sub> complexes

Tb(TTA)<sub>3</sub>(TPPO)<sub>2</sub> was synthesized according to the traditional method as described in the literature<sup>1</sup>. 1.8690 g of Tb<sub>4</sub>O<sub>7</sub> was dissolved in 20 mL of concentrated HNO<sub>3</sub> at 60 °C. Then Tb(NO<sub>3</sub>)<sub>3</sub>·6H<sub>2</sub>O powders were acquired by evaporation of excess HNO<sub>3</sub> and water by heating. Tb(NO<sub>3</sub>)<sub>3</sub> ethanol solution was prepared by adding 20 mL of anhydrous ethanol into the above Tb(NO<sub>3</sub>)<sub>3</sub>·6H<sub>2</sub>O. 6.6670 g of TTA and 5.5680 g of TPPO were dissolved in 200 mL of ethanol. Tb(NO<sub>3</sub>)<sub>3</sub> ethanol solution was then added into the mixture solution of TTA and TPPO under magnetic stirring for 3 h at 60 °C. The precipitates were collected by filtration and dried for 12 h at 60 °C. The synthetic method of Eu(TTA)<sub>3</sub>(TPPO)<sub>2</sub> complex was similar to the above method except that the using dosage of Eu<sub>2</sub>O<sub>3</sub> was 1.7596 g.

### Preparation of PMMA

PMMA used in this study was prepared by oxidative polymerization of MMA<sup>2</sup>. Refined MMA (100 mL) and BPO (0.1000 g) were mixed in a 250-mL three-necked flask with a backflow device and stirred vigorously at 90-95 °C. When the viscosity of the solution reached a certain value just like that of glycerol, the heating was stopped and it was left to naturally cool down to room temperature. The obtained gelatinous solution was then loaded into test tubes, and the influx height was 5-7 cm. After that, the tubes were put in an electric vacuum oven for 48 h at 50 °C, and the gelatinous solution was then solidified. Finally, the temperature in the oven was raised to 110 °C for 2 h to terminate the reaction.

### Preparation process and magnetism of Fe<sub>3</sub>O<sub>4</sub> nanoparticles

Monodispersed Fe<sub>3</sub>O<sub>4</sub> NPs with a narrow size distribution were prepared using the chemical co-precipitation method<sup>3</sup>. In order to prevent the particles from aggregating, PEG was used as the protective agent. In a typical procedure, 5.4060 g of FeCl<sub>3</sub>·6H<sub>2</sub>O, 2.7800 g of FeSO<sub>4</sub>·7H<sub>2</sub>O, 4.0400 g of NH<sub>4</sub>NO<sub>3</sub> and 1.9000 g of PEG were added into 100 mL of deionized water to form a uniform solution under the protection of argon atmosphere with vigorous stirring at 50 °C. After the mixture had been bubbled with argon for 30 min, 0.1 mol·L<sup>-1</sup> of NH<sub>3</sub>·H<sub>2</sub>O was dropwise added into the mixture until the pH value was above 11. Black precipitates were formed quickly, and the resultant solution was kept stirring for another 30 min under argon at 50 °C. Subsequently, the product was separated by using a magnet and washed with distilled water three times, and then dried in an electric vacuum oven at 60 °C for 12 h.

To improve the monodispersity, stability and solubility of Fe<sub>3</sub>O<sub>4</sub> NPs in the spinning solution, the as-prepared Fe<sub>3</sub>O<sub>4</sub> NPs were then coated with OA as below: 2.0000 g of the as-prepared Fe<sub>3</sub>O<sub>4</sub> NPs were ultrasonically dispersed in 100 mL of deionized water for 20 min. The suspension was heated to 80 °C under argon atmosphere with vigorous mechanical stirring for 30 min and then 1 mL of OA was dropwise added. Reaction was stopped after heating and stirring the mixture for 40 min. The precipitates were collected from the solution by magnetic separation, washed with ethyl alcohol for three times, and then dried in an electric vacuum oven at 60 °C for 6 h.

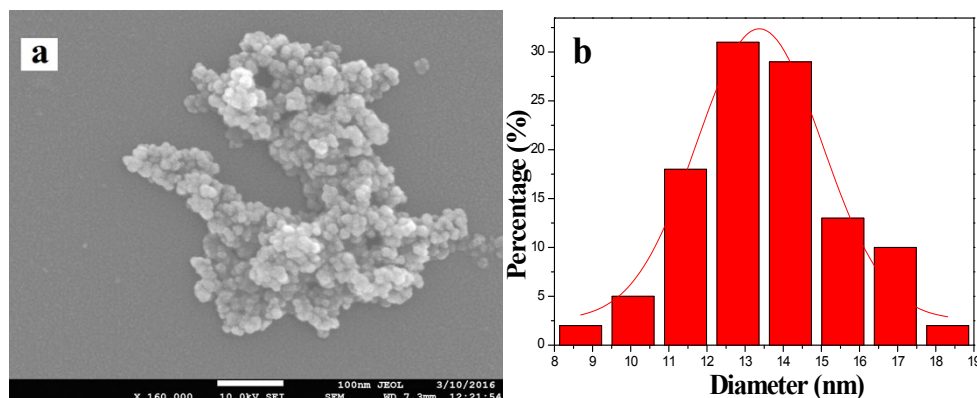
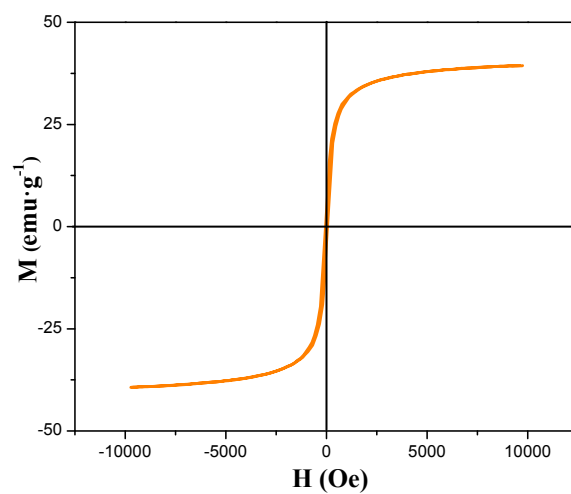


Fig. S1: SEM image (a) and histogram (b) of particle size of Fe<sub>3</sub>O<sub>4</sub> nanoparticles.



**Fig. S2:** Hysteresis loop for OA modified Fe<sub>3</sub>O<sub>4</sub> NPs.

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