Electronic Supplementary Information (ESI)

Luminescent Vesicle and Lyotropic Liquid Crystal in Ethylammonium Nitrate from a Partially Amphiphilic Eu Complex

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1. POM textures of [C_{12}mim]Br aggregate in different phases

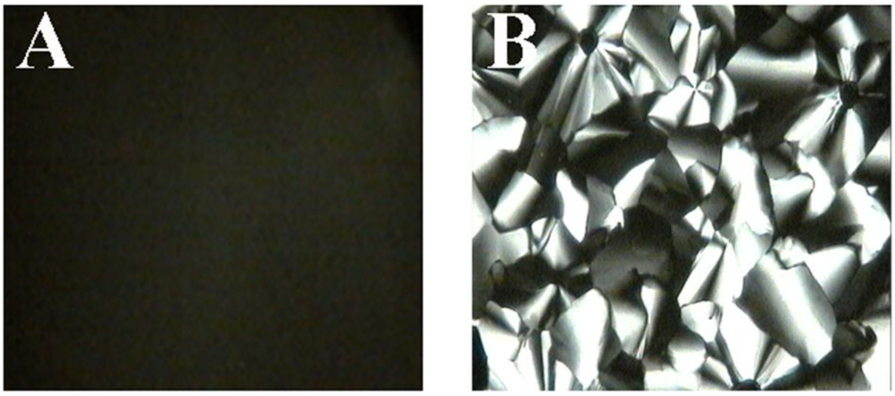

Figure S1. POM textures for [C_{12}mim]Br aggregates at [C_{12}mim]Br concentrations (wt%) of 50 (A) and 75 (B).

2. The luminescence decay curves and visual appearance of various Eu(III) aggregates

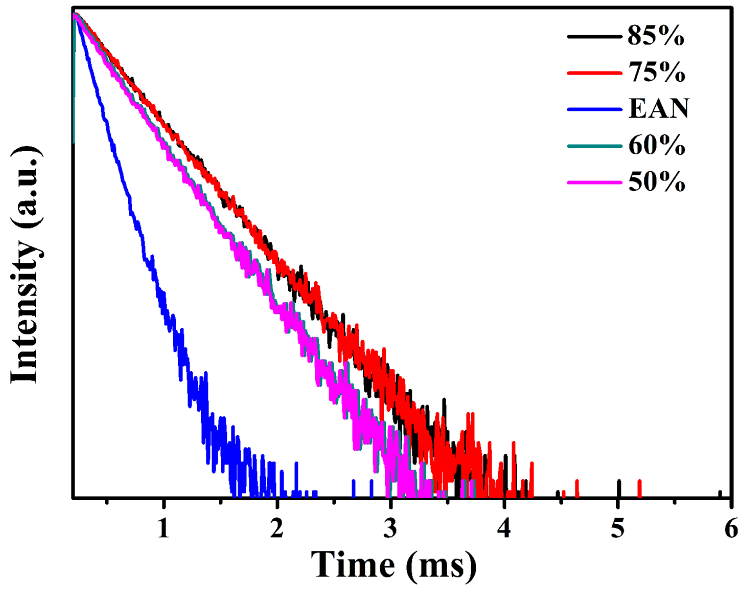

Figure S2. Luminescence decay curves of Eu(III) in aggregate samples and pure EAN under excitation at 340 nm and observed at 617 nm at room temperature.

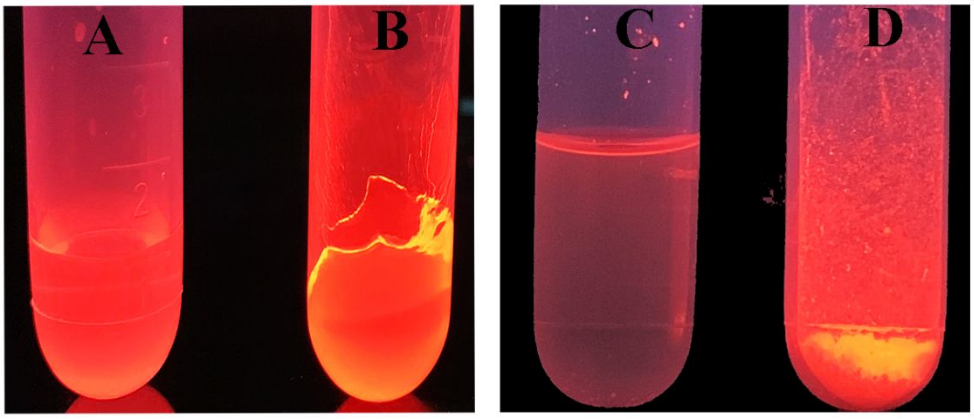

Figure S3. Visual images of luminescent Eu(III) in different status under UV light (λmax = 365 nm).(A) vesicle; (B) LLC; (C) EAN solution; (D) Eu(III) solid

3. Calculation of the radiative (k_r) or nonradiative (k_{nr}) rate constants and internal quantum efficiency (Q_{in})

Because of its stable intensity, the $^5D_0 \rightarrow {}^7F_1$ transition can be taken as a reference for the calculation of internal quantum efficiency (Q_{in}). On the basis of intensity parameters obtained from the emission spectra, the total radiative rate of $^5D_0$ can be given by eq. (1),

$$k_r = \sum_{J=0}^{4} k_{0\rightarrow J} = k_{01} \sum_{J=0}^{4} \left(\frac{S_{0J}}{S_{01}}\right)\left(\frac{v_{01}}{v_{0J}}\right) \quad (1)$$

where S_{0J} and v_{0J} were the integrated intensities and energy barycentres of $^5D_0 \rightarrow {}^7F_J$ ($J = 0 \sim 4$) transitions in the emission curves, respectively.[1,2] k_{01} was the Einstein coefficient of spontaneous emission for $^5D_0 \rightarrow {}^7F_1$ transition and could be determined as ~ 50 s^{-1} in air for solid samples.[3]

Based on the fitted lifetimes (τ), the total decay rate of $^5D_0$ (k_{tot}) could be calculated by eq. (2).[1,2]

$$k_{tot} = \frac{1}{\tau} = k_r + k_{nr} \quad (2)$$

Assuming that only nonradiative and radiative decay processes were involved in the depopulation of $^5D_0$ state, the internal emission quantum efficiency (Q_{in}) could be determined using the eq. (3).

$$Q = \frac{k_r}{k_r + k_{nr}} \quad (3)$$

References

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2. Yin, S. Y.; Sun, H.; Yan, Y.; Li, W.; Wu, L. X. Hydrogen-bonding-induced supramolecular liquid crystals and luminescent properties of europium-substituted polyoxometalate hybrids. *J. Phys. Chem. B* **2009**, *113*, 2355–2364.

3. Hazenkamp, M. F.; Blasse, G. Rare-earth ions adsorbed onto porous glass: luminescence as a characterizing tool. *Chem. Mater*. **1990**, *2*, 2105–110.