Electronic Supplementary Information (ESI)

A Luminescent lyotropic liquid crystal with UV irradiation induced photochromism

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1. Calculation of the lattice parameters (*D*) for lyotropic liquid crystals

The lattice parameters of LLC phases, *D*, denoting the distance between two adjacent cylinder centers for the hexagonal phase, can be obtained from the first Bragg scattering position (q_1) in SAXS curves according to eq. (1).

$$\text{Hexagonal phase: } D = 4\pi/\sqrt{3}q_1 \quad (1)$$

Table S1. The lattice parameters (*D*) for LLC samples before and after UV irradiation (4 h) with $Eu(DBM)_3BQ$ or BQ doped or undoped at $[C_{12}mim]Br$ concentration of 80%.

Samples	H_1	$Eu(DBM)_3BQ$-H_1	$Eu(DBM)_3BQ$-4h-H_1	BQ-H_1	BQ-4h-H_1
q_1(nm^{-1})	1.957	1.912	1.912	1.957	1.957
D (nm)	3.71	3.79	3.79	3.71	3.71

2. MS measurement for $Eu(DBM)_3BQ$ and $Eu(DBM)_3{\cdot}2H_2O$

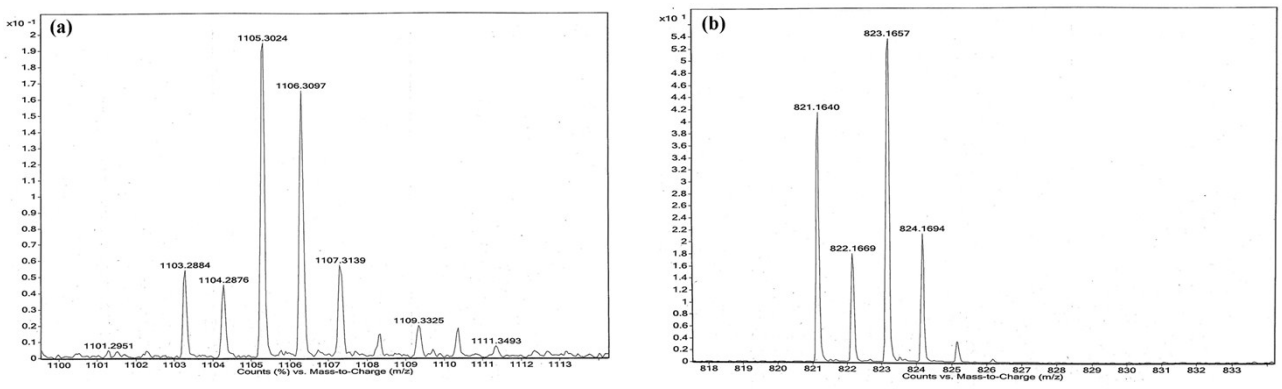

Fig. S1 MS spectra for $Eu(DBM)_3BQ$ (a) and $Eu(DBM)_3{\cdot}2H_2O$ (b).

3. Photograph of $Eu(DBM)_3BQ$ in LLCs under UV light

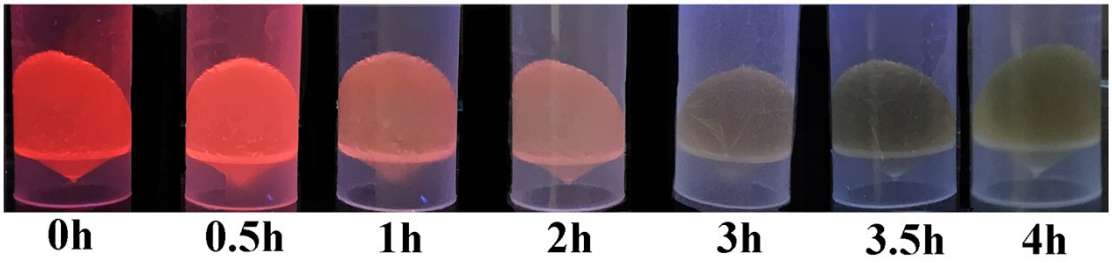

Fig. S2 Photographs taken under UV light at 305 nm for $Eu(DBM)_3BQ$ in LLCs, which were irradiated under continuously UV light one month before.

4. UV/vis absorption spectra of BQ, DBM and $Eu(DBM)_3BQ$

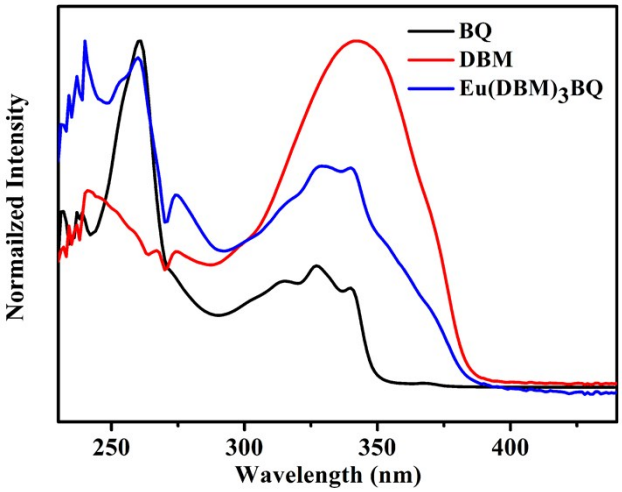

Fig. S3 UV/vis absorption spectra of $Eu(DBM)_3BQ$ (blue), BQ (black) and DBM (red) in chloroform solution (4.6×10^{-3} mol·L^{-1}).

5. DFT calculation on ground energy of BQ conformations

Geometries of BQ molecule optimized as a function of the dihedral angle between the two quinoline planes using the DFT based the model at the B3LYP /6-31G(d,p) level. The result shows two stable conformers of BQ which one having a dihedral angle of about 90 ° (*cis*) and the other

being 180 ° (*trans*) (Fig. S3). Ground state energy of the cis and trans conformers are -222.471 eV and -222.786 eV respectively.

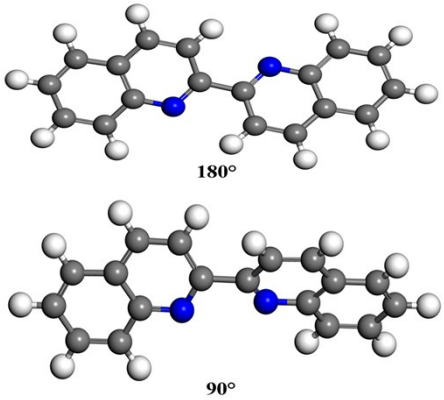

Fig. S4 Geometries of two conformers of BQ (180 ° and 90 °) using DFT based method with B3LYP/6-31G(d,p) basis sets.

6. Luminescence properties of $Eu(DBM)_3 \cdot 2H_2O$

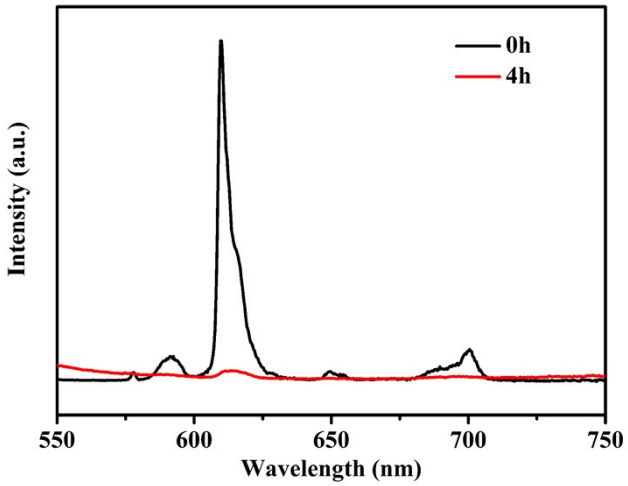

Fig. S5 Emission spectra $Eu(DBM)_3 \cdot 2H_2O$ in chloroform solutions (4.6×10^{-3} mol·L^{-1}) before (black line) and after (red line) UV irradiation at 302 nm for 4 hours.

7. SAXS patterns for LLC samples doped with BQ

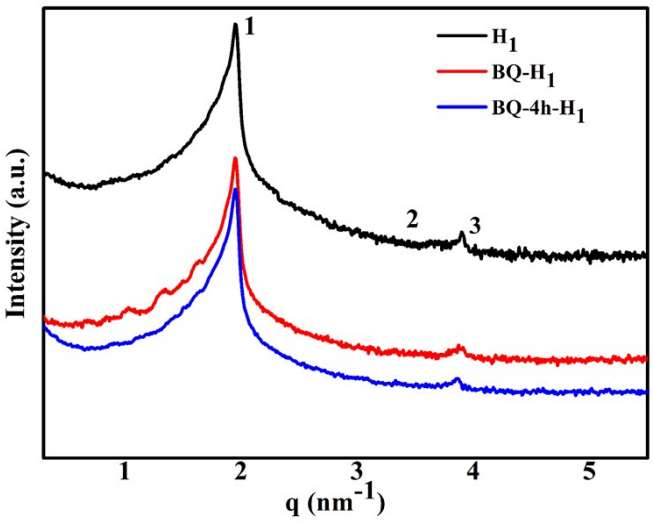

Fig. S6 SAXS patterns for LLC samples at [C_{12}mim]Br concentration of 80% before and after UV irradiation (4 h) with BQ doped or undoped.

8. Fluorescence life time of 2,2' biquinoline (BQ) in LLC

Table S2. Fluorescence life time of 2,2' biquinoline (BQ) before and after UV irradiation

Samples	τ_1 (ns)	Contribution (%)	τ_2 (ns)	Contribution (%)	χ^2
BQ（0h）	0.974	46.3	4.885	53.7	1.005
BQ（2h）	1.09	32.4	4.263	67.6	1.007