Rational Guest Selection: A General Principle for Stabilizing Multi-Component Luminescent Materials

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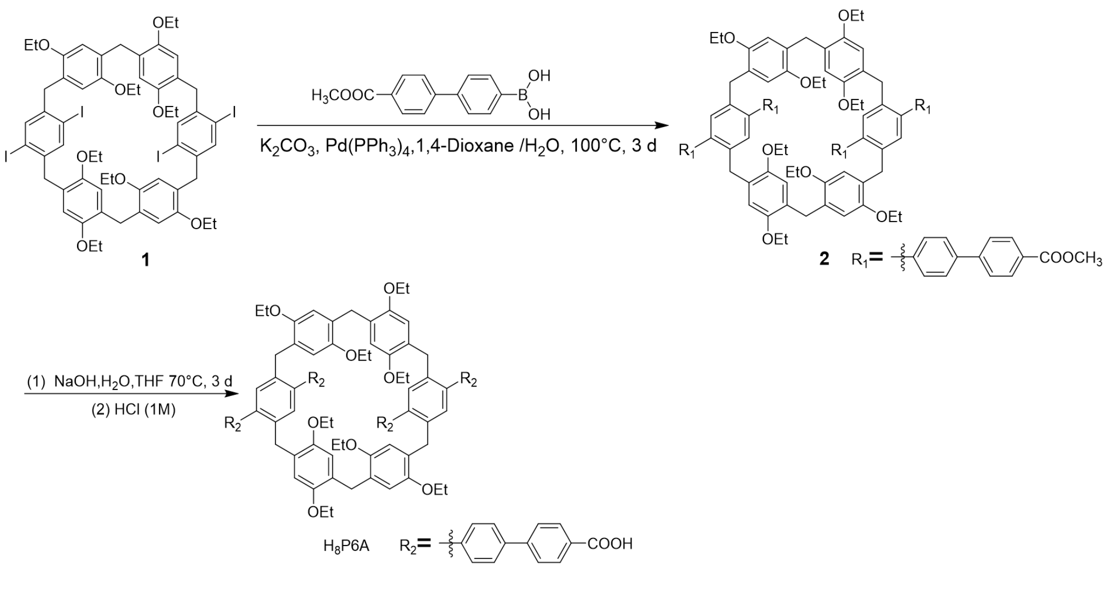
Experimental methods

[4-(4-Methoxycarbonylphenyl)phenyl]boronic acid was purchased from Leyan (Cat. No. 1061459, Leyan, Shanghai, China). Europium(III) nitrate hexahydrate, acetic acid, and N,N-dimethylformamide were purchased from Energy Chemical Technology Co., Ltd. (Shanghai, China). All reagents were obtained from commercial suppliers and used without further purification unless otherwise noted. ^{1}H and ^{13}C NMR spectra were recorded on a Bruker AVANCE III HD 600M spectrometer, and all chemical shifts are reported in ppm relative to TMS. ^{1}H and ^{13}C NMR were recorded on 600 MHz spectrometers in the indicated solvents at room temperature (298 K). UV-Vis absorption spectra were recorded on a UV-2600i UV-Vis spectrophotometer. Solution-phase fluorescence spectra were acquired using a fluorescence spectrophotometer with excitation at 296 nm (RF-6000 spectrophotometer). Quantum yield and fluorescence lifetime data were collected using an Edinburgh FLS1000. X-ray diffraction (XRD) measurements were carried out using a PANalytical X'Pert PRO powder diffractometer. Transmission electron micrographs (TEM) were recorded on a FEI Tecnai G2 F20S-TWINTMP. IR spectra were recorded on an RX-3050TX+ IR Tracer-100+GCMS-TQ8050 NX system. Dynamic light scattering (DLS) measurements were conducted on a Malvern Zetasizer ZSU3100 using a monochromatic coherent He-Ne laser (633 nm) as the light source and a detector set at a 90° scattering angle.

Compound **1** was prepared according to reported method.[1]



Compound **2**: Compound **1** (2 g, 1.4 mmol, 1 equiv.), [4-(4-Methoxycarbonylphenyl)phenyl]boronic acid (1.8 g, 7 mmol, 5 equiv.), and K_2CO_3 (400 mg, 2.9 mmol, 1.2 equiv.) were weighed into a 250-mL three-necked flask. A mixed solvent of 1,4-dioxane/water (3:1, 28 mL) was added. After purging with N_2, the catalyst $Pd(PPh_3)_4$ (400 mg, 0.35 mmol, 0.25 equiv.) was added under N_2 atmosphere. The reaction mixture was stirred at 100 °C for 3 days. Upon completion, the mixture was cooled to room temperature and quenched with water. The resulting mixture was filtered to afford a solid, which was washed with dichloromethane to collect the filtrate. The filtrate was concentrated under reduced pressure, then purified by column chromatography (PE:EA = 2:1, v/v) and recrystallized to give Compound **2** as a white solid (350 mg, 14.4% yield).

Compound H_8P6A: Compound **2** (200 mg, 0.115 mmol, 1 equiv.) was weighed into a 100-mL round-bottom flask, and THF (15 mL) was added. The mixture was stirred at 70 °C until a clear solution was obtained. Aqueous NaOH solution (92 mg, 2.3 mmol, 20 equiv. in 15 mL water) was added, and the reaction was refluxed for 3 days. After cooling to room temperature, the organic phase was removed by rotary evaporation. The aqueous residue was adjusted to weak acidity with 1 M HCl (3 mL), and the resulting precipitate was filtered. The filter cake was washed with water (20 mL × 3), and the product H_8P6A was collected and dried under vacuum to afford a white solid (190 mg, 98% yield). ^1H NMR (600 MHz, DMSO-d_6) δ: 12.97 (s, 4H), 8.02 (d, J = 7.9 Hz, 8H), 7.58 (d, J = 8.0 Hz, 8H), 7.41 (d, J = 7.8 Hz, 8H), 7.10 (d, J = 7.8 Hz, 8H), 6.97 (s, 4H), 6.60 (s, 4H), 5.97 (s, 4H), 3.87 (d, J = 14.7 Hz, 4H), 3.77 (d, J = 14.6 Hz, 4H), 3.64 (dq, J = 15.4, 8.1 Hz, 8H), 3.56 (s, 4H), 3.47 – 3.33 (m, 8H), 1.10 (t, J = 6.8 Hz, 12H), 0.95 (t, J = 6.8 Hz, 12H). ^{13}C NMR (151 MHz, DMSO-d_6) δ: 167.12, 166.01, 149.77, 149.65, 143.86, 141.22, 139.93, 137.15, 135.78, 131.65, 129.83, 129.48, 129.33, 127.27, 127.02, 126.49, 126.25, 114.89, 113.87, 63.35, 62.90, 33.73, 30.89, 14.71, 14.61.

The X-ray diffraction data of **Eu-P6MOF** (CCDC 2499388) was collected on a Bruker D8 VENTURE dual-wavelength Mo/Cu diffractometer equipped with INCOATEC I\mS DIAMOND CuKα radiation (λ=1.54178 Å) and a PHOTON II CMOS detector with a Helios Multi-layer Optic monochromator at 200 k and using an Oxford Cryosystems Cryostream 800 cryostat. These data are provided free of charge by the joint Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif. All data integration and empirical absorption correction were carried out using the SAINT program. Using Olex2 and SHELXTL, the structure was solved by direct method and refined matrix least-squares on F2 with anisotropic displacement. Non-hydrogen atoms were refined anisotropically, hydrogen atoms were constrained to ideal geometries.

Single crystal growth.

Eu-P6MOF: H_8P6A (3 mg, 0.0017 mmol, 1 equiv.) was weighed into a 4-mL vial and dissolved in DMF (500 μL). Aqueous 1 mol/L europium(III) nitrate hexahydrate solution (20 μL, 12 equiv.), 1 mol/L potassium carbonate aqueous solution (1.7 μL, 1 equiv.), and glacial acetic acid (80 μL) were added sequentially. After sonication for 10 minutes, the vial was placed in an oven at 120 °C. After 2 days, single crystals suitable for X-ray diffraction analysis were obtained as pale yellow crystals, which exhibited red fluorescence under a 365 nm UV lamp.

White-Light Tuning Experiment

All photoluminescence measurements for white-light tuning experiments were performed on an RF-6000 spectrofluorophotometer. The spectra were recorded under the following conditions: excitation wavelength (λex) = 296 nm, emission range= 310–750 nm, with both excitation and emission slit widths set to 5 nm.

Photostability Assessment

The photodegradation experiments were performed using a commercial UV analyzer (ZF-1 type) equipped with a 365 nm UV lamp. All measurements were conducted in a dark chamber to avoid interference from ambient light. The samples were placed directly below the UV lamp and irradiated vertically through a UV filter under constant geometric conditions. The lamp power was 6 W, and the irradiation conditions were kept identical for all samples to ensure meaningful comparison. All photostability tests were carried out at ambient temperature without external heating or cooling, and no noticeable temperature increase of the samples was observed during illumination.

Eu-P6MOF/C6/C1 System in DMF

Sample Information:
Eu-P6MOF: 3 mg was sonicated in 30 mL DMF for 3 hours to form a suspension.
Coumarin 6 (G): 1 mg dissolved in DMF and volumetrically diluted to 10 mL (1 mg/10 mL).
Coumarin 1 (B): 1 mg dissolved in DMF and volumetrically diluted to 10 mL (1 mg/10 mL).
White-Light Titration Experiment: A 2 mL aliquot of the **Eu-P6MOF** suspension (initial CIE coordinate: (0.6350, 0.3337)) was titrated sequentially with C6 (G) and C1 (B): first, C6 (G) was gradually added in 1 μL (0.1 μg) intervals until the CIE coordinate approached the red-green boundary, with a total addition of 3 μL (0.3 μg) and a final coordinate of (0.4305, 0.4788); subsequently, C1 (B) was titrated into the mixture with a total addition of 10 μL (1 μg), where 5 μL (0.5 μg) of addition achieved theoretical white light (CIE: (0.3337, 0.3346)), using 1 μL (0.1 μg) intervals for most additions and 0.5 μL (0.05 μg) intervals near the white-light point.
Photostability Assessment: Photostability was evaluated by irradiating a series of samples (listed below) under 365 nm light for 24 h, followed by fluorescence spectral measurement and calculation of corresponding CIE chromaticity coordinates.
Eu-P6MOF suspension (0.1 mg/mL, prepared by sonication in DMF for 3 hours, 2 mL aliquot);
Coumarin 1 (0.25 μg/mL, 5 μL of 0.1 mg/mL stock solution in 2 mL DMF);
Coumarin 6 (0.15 μg/mL, 3 μL of 0.1 mg/mL stock solution in 2 mL DMF);
Eu-P6MOF-C1 (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; C1: 0.1 mg/mL, 5 μL added thereto);

Eu-P6MOF-C6 (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; C6: 0.1 mg/mL, 3 μL added thereto);
Eu-P6MOF-C6-C1 (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; C1: 0.1 mg/mL, 5 μL added thereto; C6: 0.1 mg/mL, 3 μL added thereto).

Eu-P6MOF/C6/Perylene System in DMF

Sample Information:
Eu-P6MOF: 3 mg was sonicated in 30 mL DMF for 3 hours to form a suspension.
Coumarin 6 (G): 1 mg dissolved in DMF and volumetrically diluted to 10 mL (1 mg/10 mL).
Perylene (B): 1 mg dissolved in DMF and volumetrically diluted to 10 mL (1 mg/10 mL).
White-Light Titration Experiment: A 2 mL aliquot of the **Eu-P6MOF** suspension (initial CIE coordinate: (0.6382, 0.3320)) was titrated sequentially with C6 (G) and Perylene (B): first, C6 (G) was gradually added in 0.5 μL (0.05 μg) intervals until the CIE coordinate approached the red-green boundary, with a total addition of 2.5 μL (0.25 μg) and a final coordinate of (0.4310, 0.4785); subsequently, Perylene (B) was titrated into the mixture with a total addition of 15 μL (1.5 μg), where 10.5 μL (1.05 μg) of addition achieved theoretical white light (CIE: (0.3283, 0.3348)), using 2 μL (0.2 μg) intervals for most additions and 0.5 μL (0.05 μg) intervals near the white-light point.
Photostability Assessment: Photostability was evaluated by irradiating a series of samples (listed below) under 365 nm light for 24 h, followed by fluorescence spectral measurement and calculation of corresponding CIE chromaticity coordinates.
Perylene (0.525 μg/mL, 10.5 μL of 0.1 mg/mL stock solution in 2 mL DMF);
Eu-P6MOF-Perylene (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; Perylene: 0.1 mg/mL, 10.5 μL added thereto);
Eu-P6MOF-C6-Perylene (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; Perylene: 0.1 mg/mL, 10.5 μL added thereto; C6: 0.1 mg/mL, 2.5 μL added thereto).

Eu-P6MOF/C6/Perylene System in EtOH

Sample Information:
Eu-P6MOF: 3 mg was sonicated in 30 mL EtOH for 3 hours to form a suspension.
Coumarin6 (G): 1 mg in 10 mL volumetric flask (EtOH, q.s.), then diluted 10 × (100 μL + 900 μL EtOH) to 0.01 mg/mL.
Perylene (B): 1 mg in 10 mL volumetric flask (EtOH, q.s.), then diluted 10 × (100 μL + 900 μL EtOH) to 0.01 mg/mL.
White-Light Titration Experiment: A 2 mL aliquot of the **Eu-P6MOF** suspension (initial CIE coordinate: (0.6086, 0.3285)) was titrated sequentially with C6 (G) and Perylene (B): first, C6 (G) was gradually added with 2 μL (0.02 μg) intervals up to 8 μL, followed by a final 0.5 μL (0.005 μg) addition until the CIE coordinate approached the red-green boundary, with a total addition of 8.5 μL (0.085 μg) and a

final coordinate of (0.4227, 0.4397); subsequently, Perylene (B) was titrated into the mixture with a total addition of 50 μL (0.5 μg), where 30 μL (0.3 μg) of addition achieved theoretical white light (CIE: (0.3393, 0.3272)), using 5 μL (0.05 μg) intervals for most additions and 2.5 μL (0.025 μg) intervals near the white-light point.

Photostability Assessment: Photostability was evaluated by irradiating a series of samples (listed below) under 365 nm light for 24 h, followed by fluorescence spectral measurement and calculation of corresponding CIE chromaticity coordinates.

Eu-P6MOF suspension (0.1 mg/mL, prepared by sonication in EtOH for 3 hours, 2 mL aliquot);

Coumarin 6 (0.0425 μg/mL, 8.5 μL of 0.01 mg/mL stock solution in 2 mL EtOH);

Perylene (0.15 μg/mL, 30 μL of 0.01 mg/mL stock solution in 2 mL EtOH);

Eu-P6MOF-C6-Perylene (**Eu-P6MOF**: 0.1 mg/mL suspension in EtOH, 2 mL; Perylene : 0.01 mg/mL, 30 μL added thereto; C6: 0.01 mg/mL, 8.5 μL added thereto).

Eu-P6MOF/C6/C1 System in EtOH

Sample Information:

Eu-P6MOF: 3 mg was sonicated in 30 mL EtOH for 3 hours to form a suspension.

Coumarin 6 (G): 1 mg in 10 mL volumetric flask (EtOH, q.s.), then diluted 10 × (100 μL + 900 μL EtOH) to 0.01 mg/mL.

Coumarin 1 (B): 1 mg in 10 mL volumetric flask (EtOH, q.s.), then diluted 10 × (100 μL + 900 μL EtOH) to 0.01 mg/mL.

White-Light Titration Experiment: A 2 mL aliquot of the **Eu-P6MOF** suspension (initial CIE coordinate: (0.6092, 0.3298)) was titrated sequentially with C6 (G) and C1 (B): first, C6 (G) was gradually added with 2 μL (0.02 μg) intervals up to 8 μL, followed by a final 0.5 μL (0.005 μg) addition until the CIE coordinate approached the red-green boundary, with a total addition of 8.5 μL (0.085 μg) and a final coordinate of (0.4254, 0.4449); subsequently, C1 (B) was titrated into the mixture with a total addition of 20 μL (0.2 μg), where 14 μL (0.14 μg) of addition achieved theoretical white light (CIE: (0.3375, 0.3299)), using 2.5 μL (0.025 μg) intervals for most additions and 0.5 μL (0.005 μg) intervals near the white-light point.

Photostability Assessment: Photostability was evaluated by irradiating a series of samples (listed below) under 365 nm light for 24 h, followed by fluorescence spectral measurement and calculation of corresponding CIE chromaticity coordinates.

Coumarin 1 (0.07 μg/mL, 14 μL of 0.01 mg/mL stock solution in 2 mL EtOH);

Eu-P6MOF-C6-C1 (**Eu-P6MOF**: 0.1 mg/mL suspension in EtOH, 2 mL; C1: 0.01 mg/mL, 14 μL added thereto; C6: 0.01 mg/mL, 8.5 μL added thereto).

Characterization

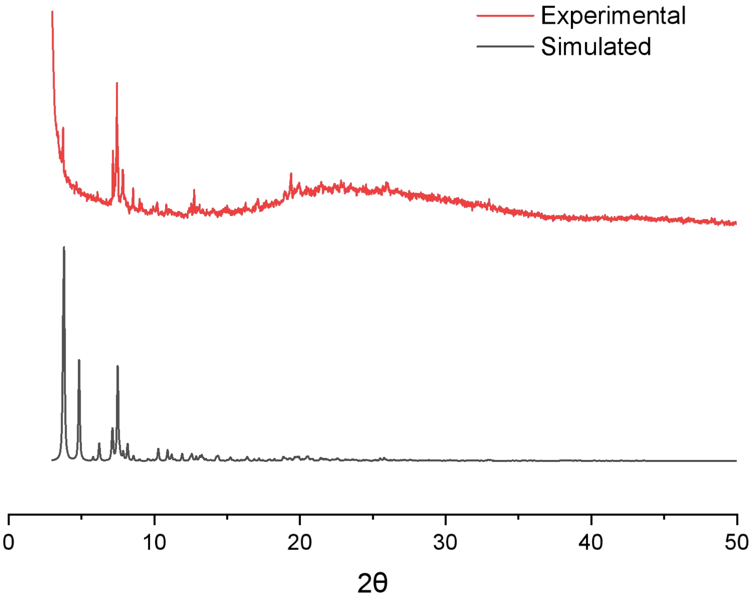


Figure S1. PXRD spectra of **Eu-P6MOF.**

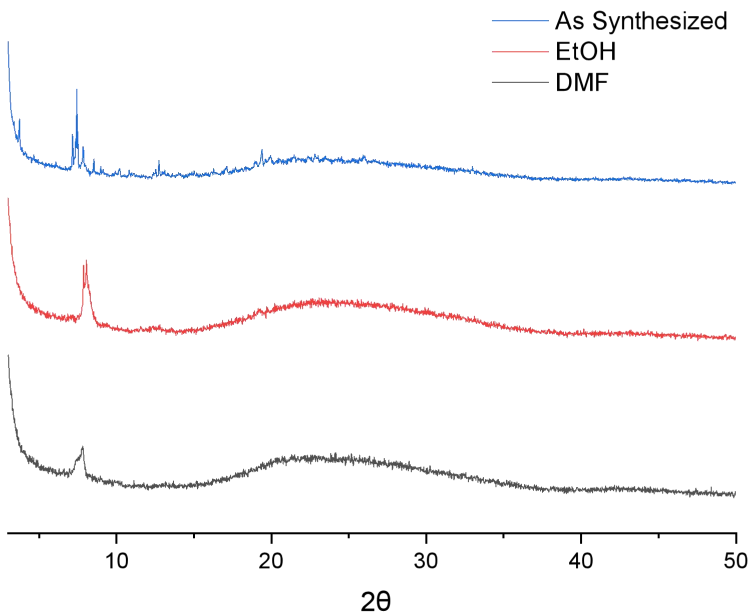


Figure S2. PXRD of **Eu-P6MOF** after being immersed in DMF and EtOH.

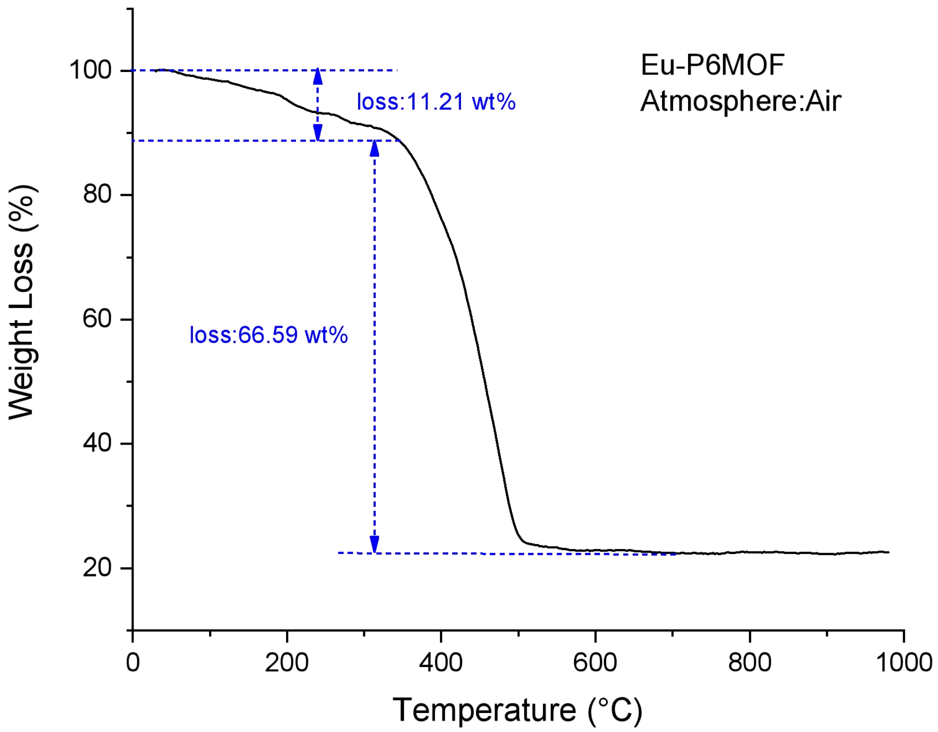


Figure S3. TG spectra of **Eu-P6MOF.**

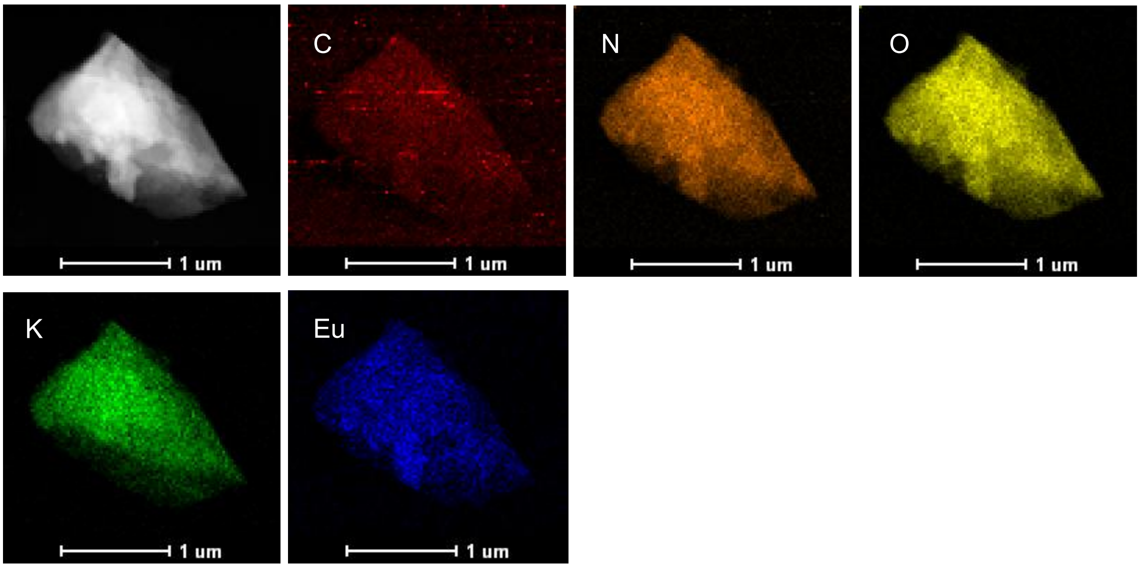


Figure S4. Elemental mapping images of **Eu-P6MOF**.

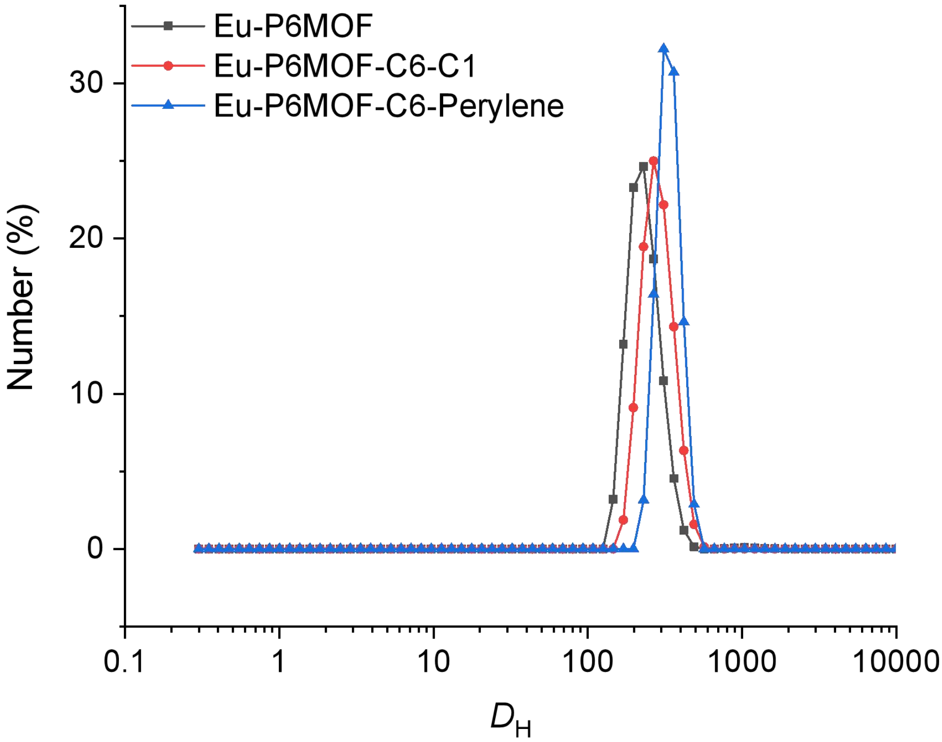


Figure S5. The hydrodynamic diameters (D_H) of the aggregates of **Eu-P6MOF**, **Eu-P6MOF-C6-C1** and **Eu-P6MOF-C6-Perylene** in EtOH at 25 °C.

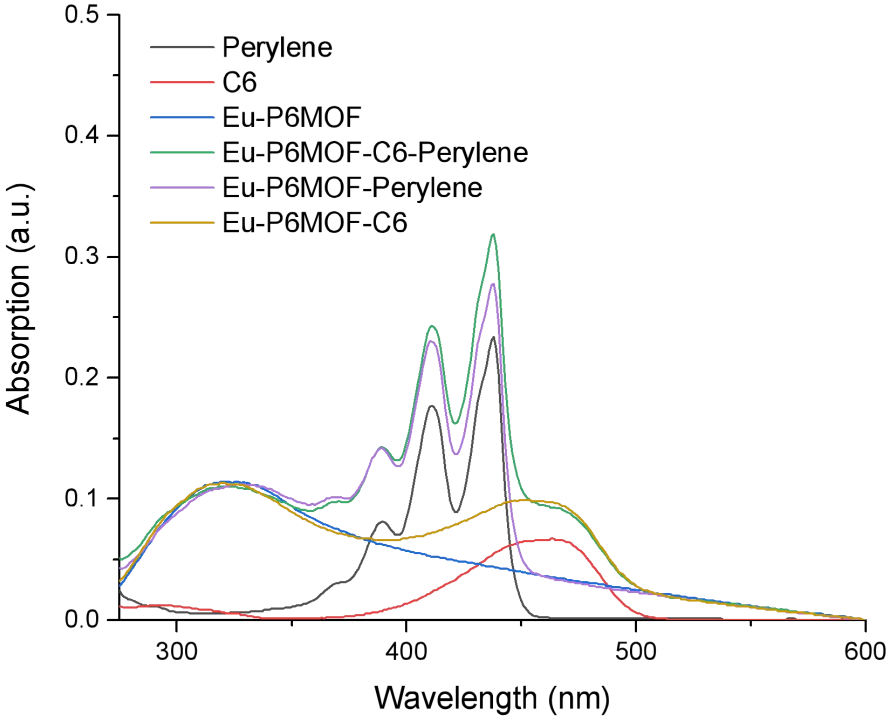


Figure S6. The UV-Vis spectra of **Eu-P6MOF**, C6, Perylene, **Eu-P6MOF-C6**, **Eu-P6MOF-Perylene**, and **Eu-P6MOF-C6-Perylene** in DMF.

Fluorescence titration experiments

Fluorescence titration experiments were carried out to investigate the interaction between dye molecules and the Eu-P6MOF framework in DMF.

Preparation of dye solutions

Dilute dye solutions were prepared by adding aliquots of dye stock solutions (0.1 mg/mL in DMF) into 2 mL of DMF. The dye amounts were selected according to the relative dye loading used in the white-light host–guest composite systems to ensure comparable experimental conditions.The dye solutions were prepared as follows:

Coumarin 6: 2.5 μL of stock solution (0.1 mg/mL in DMF) in 2 mL DMF

Coumarin 1: 5 μL of stock solution (0.1 mg/mL in DMF) in 2 mL DMF

Perylene: 10.5 μL of stock solution (0.1 mg/mL in DMF) in 2 mL DMF

Eu-P6MOF suspension: 20 mg of **Eu-P6MOF** dispersed in 400 μL of DMF

Fluorescence titration procedure

The **Eu-P6MOF** suspension was gradually added to the dye solutions in 10 μL aliquots, corresponding to 0.5 mg of **Eu-P6MOF** per addition. After each addition, the mixture was gently mixed. The fluorescence emission spectra were recorded under an excitation wavelength of 296 nm over the spectral range of 310–750 nm.

During the titration process, the characteristic emission peaks of the dye molecules were monitored to evaluate the changes in fluorescence intensity. The emission intensity at the characteristic peak wavelength was plotted as a function of the amount of **Eu-P6MOF** added. For all three dye systems (Coumarin 6, Coumarin 1, and perylene), gradual quenching of the dye fluorescence was observed with increasing **Eu-P6MOF** addition. The resulting fluorescence intensity versus MOF loading curves were further fitted using an exponential decay model (ExpDec1) to visualize the variation trend. The fitting results show that the fluorescence intensity gradually approaches a plateau with increasing MOF addition. The near-plateau regions can be approximately identified at around 11 mg for Coumarin 6 and around 20 mg for Coumarin 1 and Perylene.

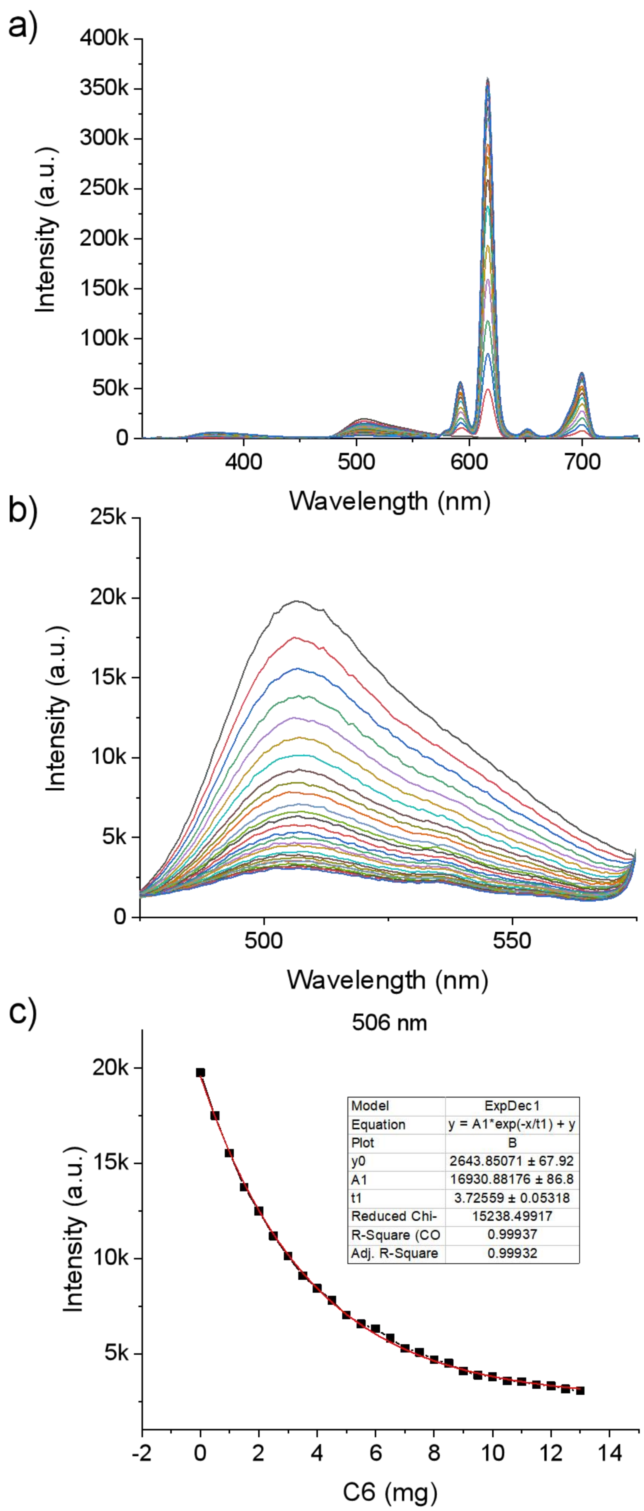


Figure S7. a) Fluorescence titration spectra of Coumarin 6 upon incremental addition of **Eu-P6MOF** in DMF. b) Evolution of the characteristic emission peak of Coumarin 6 during fluorescence titration. c) Fluorescence intensity versus the amount of **Eu-P6MOF** added for the Coumarin 6 system with exponential decay fitting.

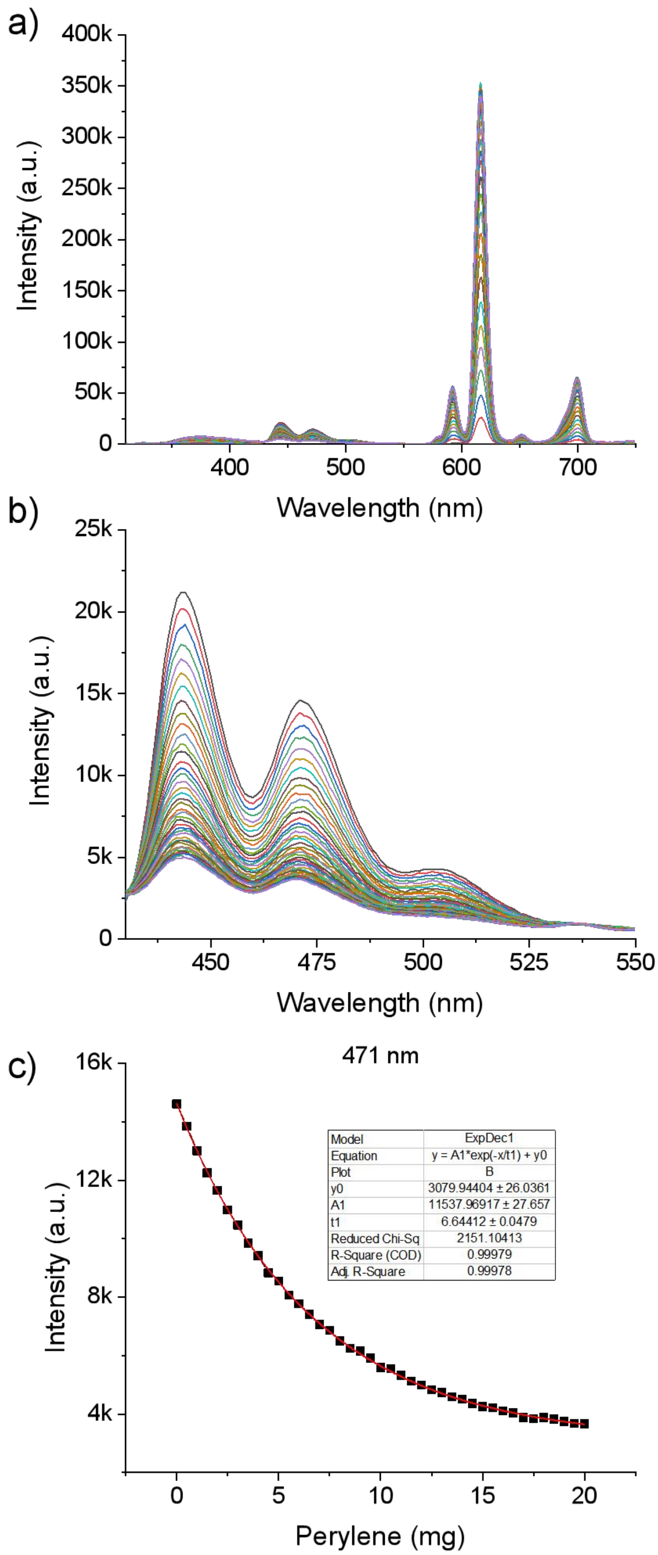


Figure S8. a) Fluorescence titration spectra of perylene upon incremental addition of **Eu-P6MOF** in DMF. b) Evolution of the characteristic emission peak of perylene during fluorescence titration. c) Fluorescence intensity versus the amount of **Eu-P6MOF** added for the Perylene system with exponential decay fitting.

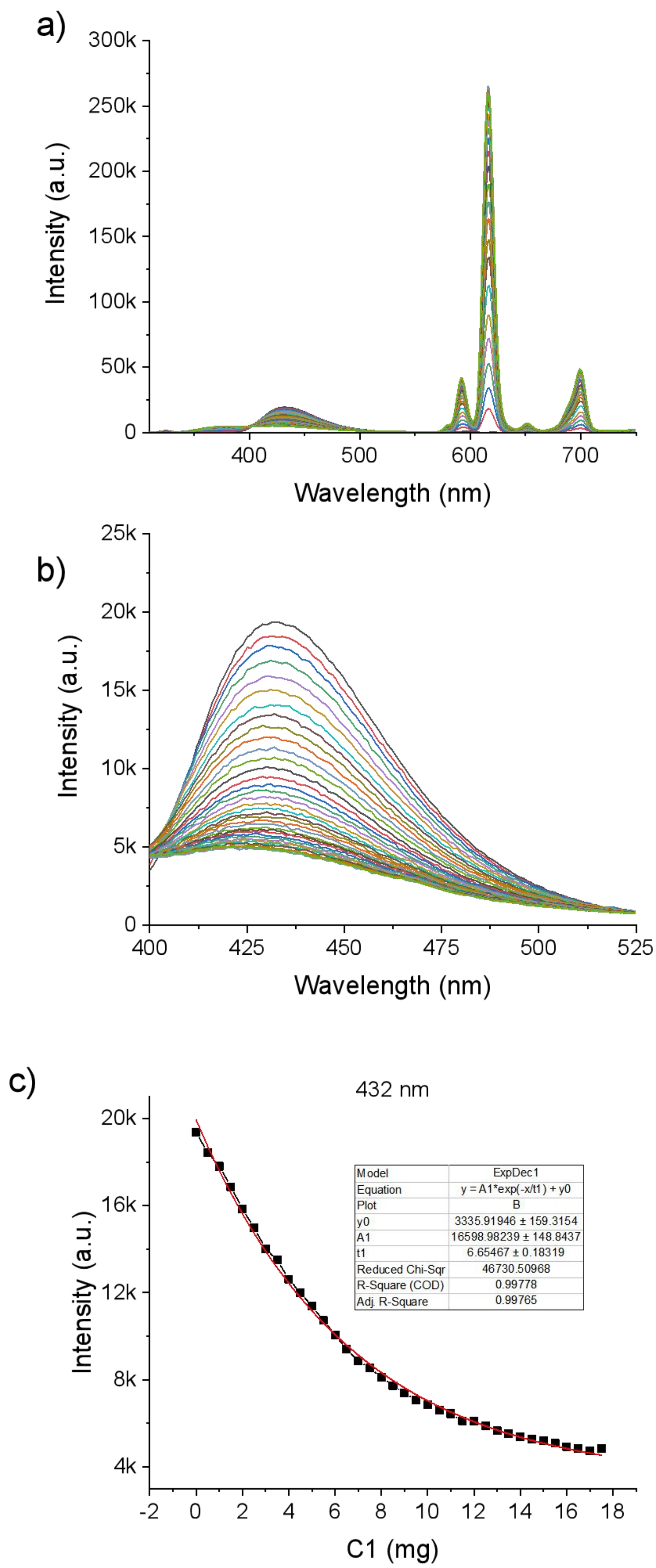


Figure S9. a) Fluorescence titration spectra of Coumarin 1 upon incremental addition of **Eu-P6MOF** in DMF. b) Evolution of the characteristic emission peak of Coumarin 1 during fluorescence titration. c) Fluorescence intensity versus the amount of **Eu-P6MOF** added for the Coumarin 1 system with exponential decay fitting.

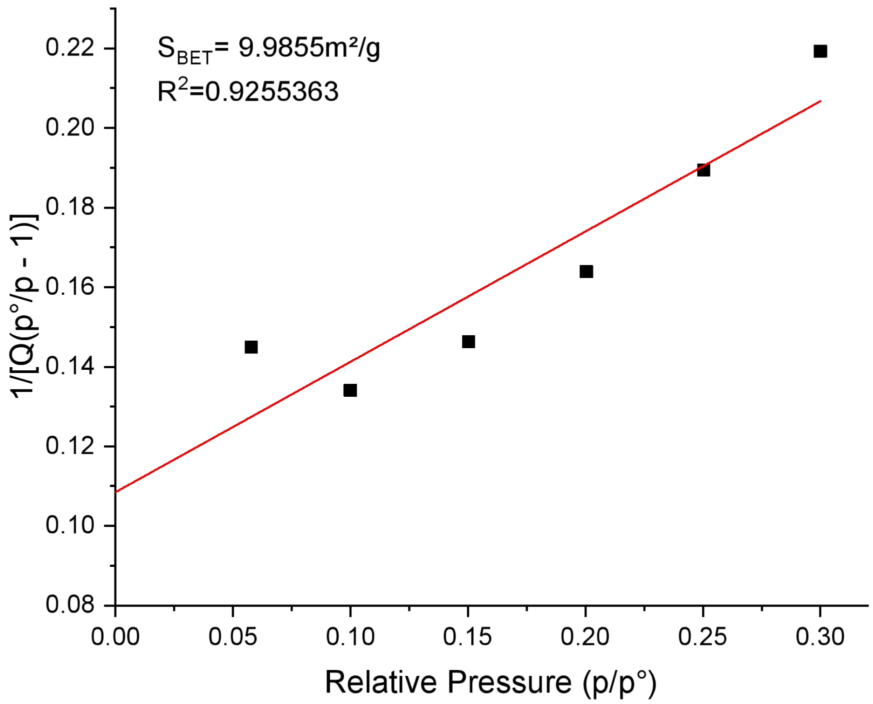


Figure S10. BET surface area plot for **Eu-P6MOF**.

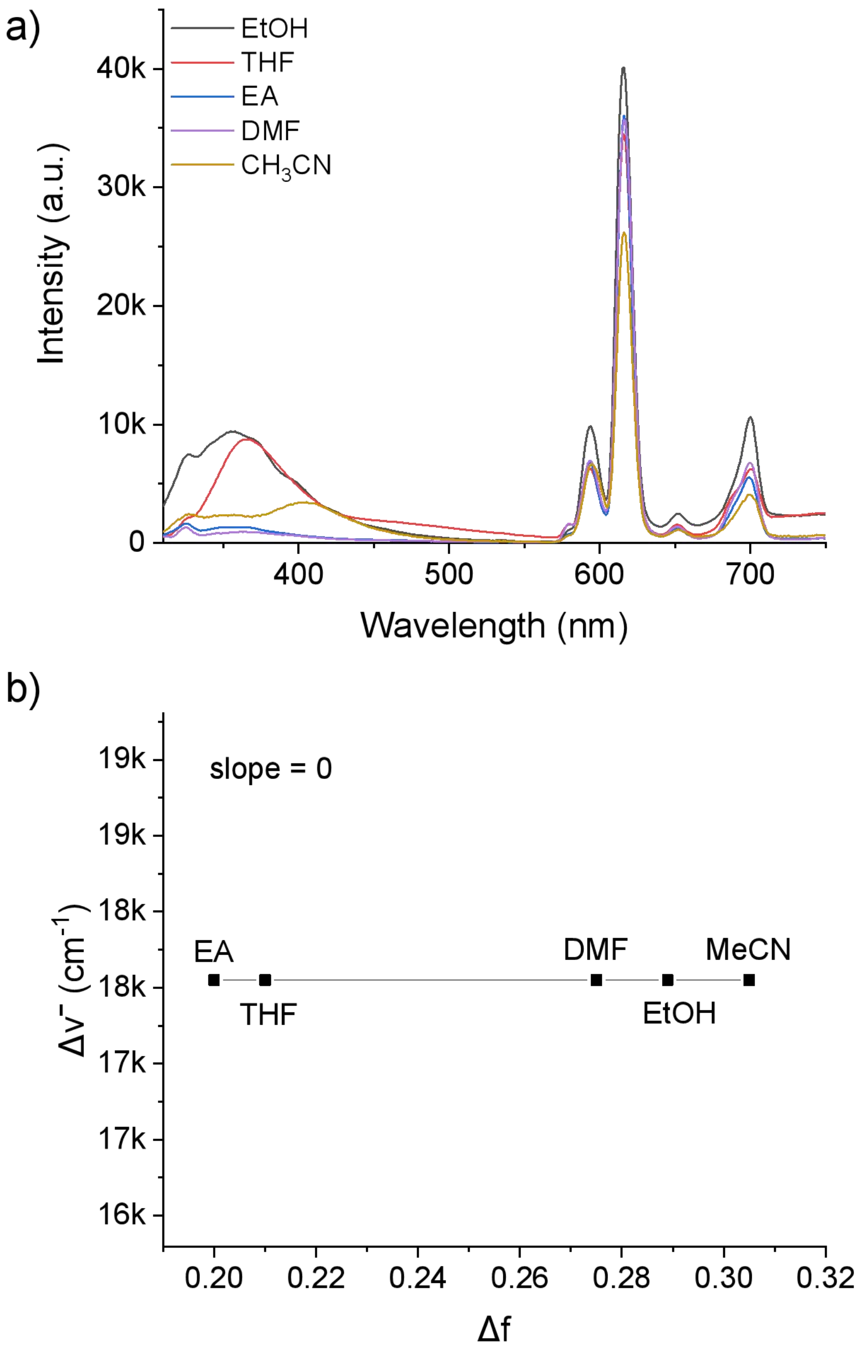
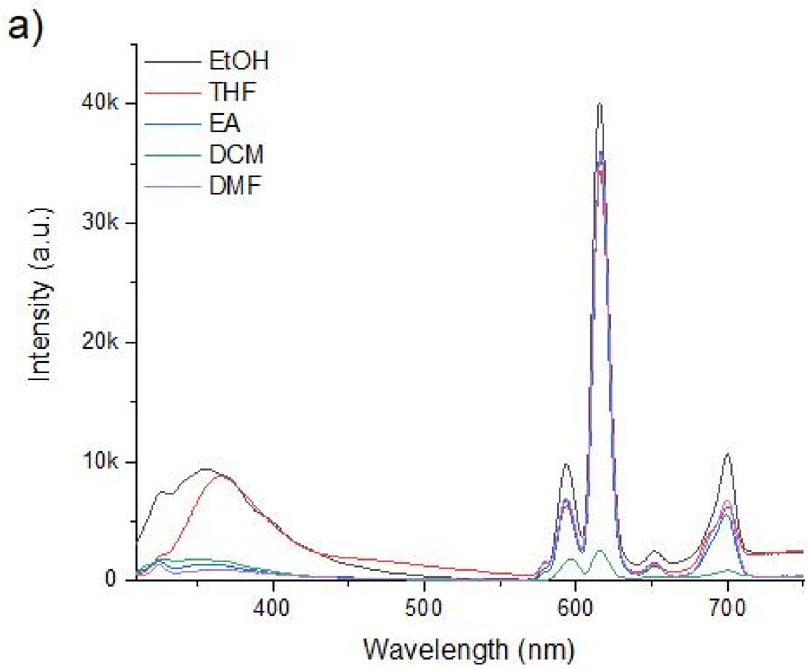


Figure S11. (a) Fluorescence spectra of **Eu-P6MOF** recorded in solvents with different polarities (DMF, EtOH, EA, THF, and CH_3CN) under excitation at 296 nm. (b) Lippert–Mataga plot constructed from the emission maxima of **Eu-P6MOF** in solvents with different polarities



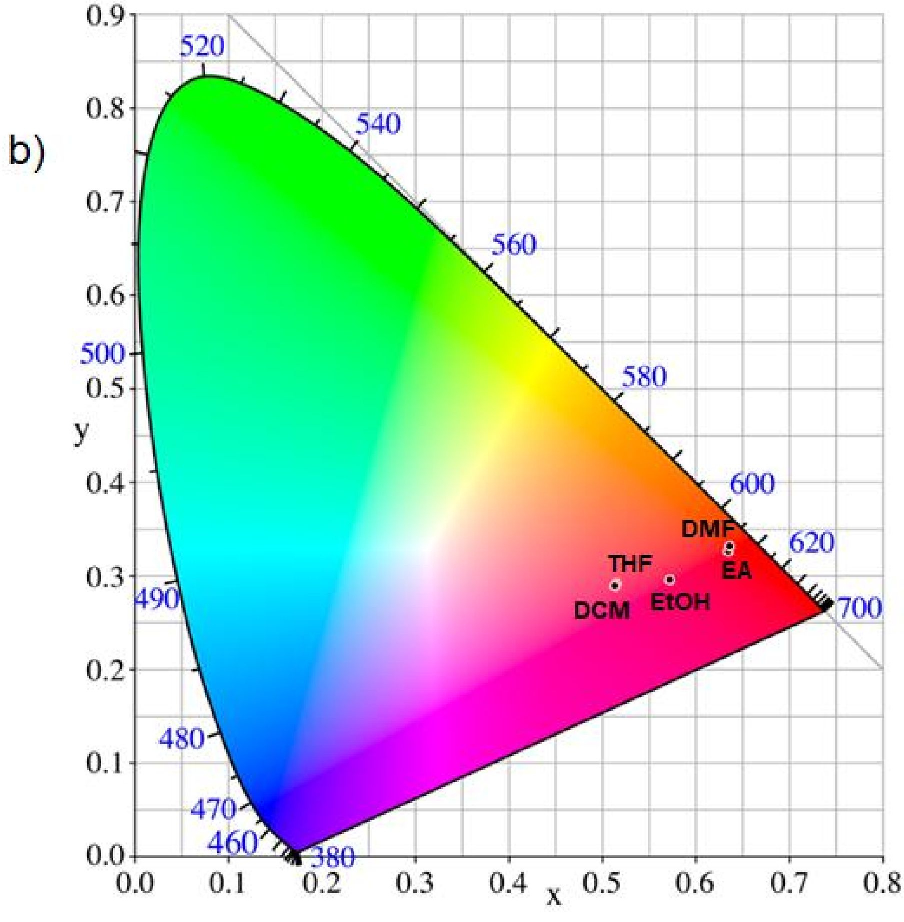


Figure S12. (a) Fluorescence spectra of **Eu-P6MOF** recorded in solvents with different polarities (DMF, EtOH, EA, THF, and CH_3CN) under excitation at 296 nm and its corresponding (b) CIE coordinates.

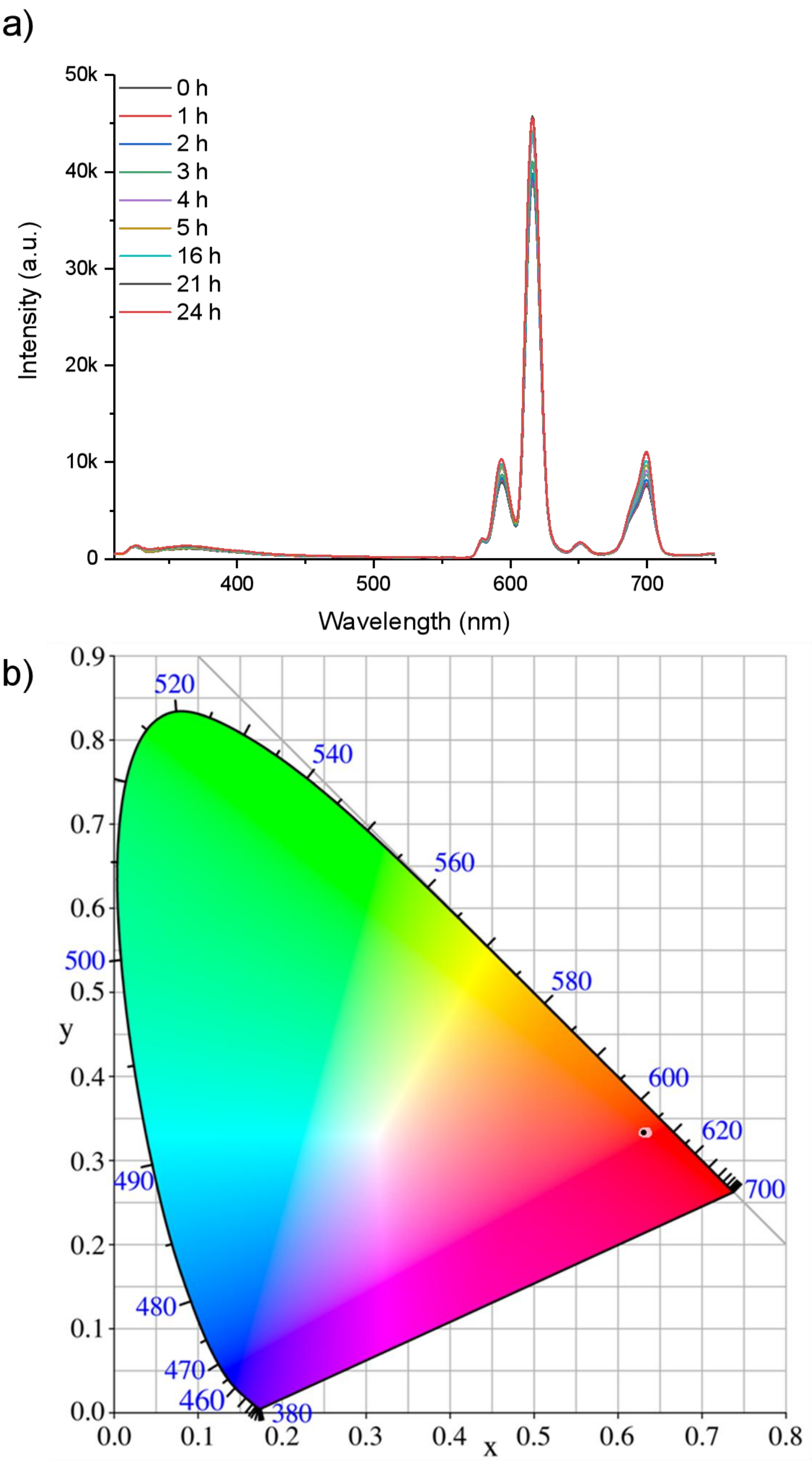


Figure S13. Photostability of **Eu-P6MOF** suspension (0.1 mg/mL, prepared by sonication in DMF for 3 hours, 2 mL aliquot) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

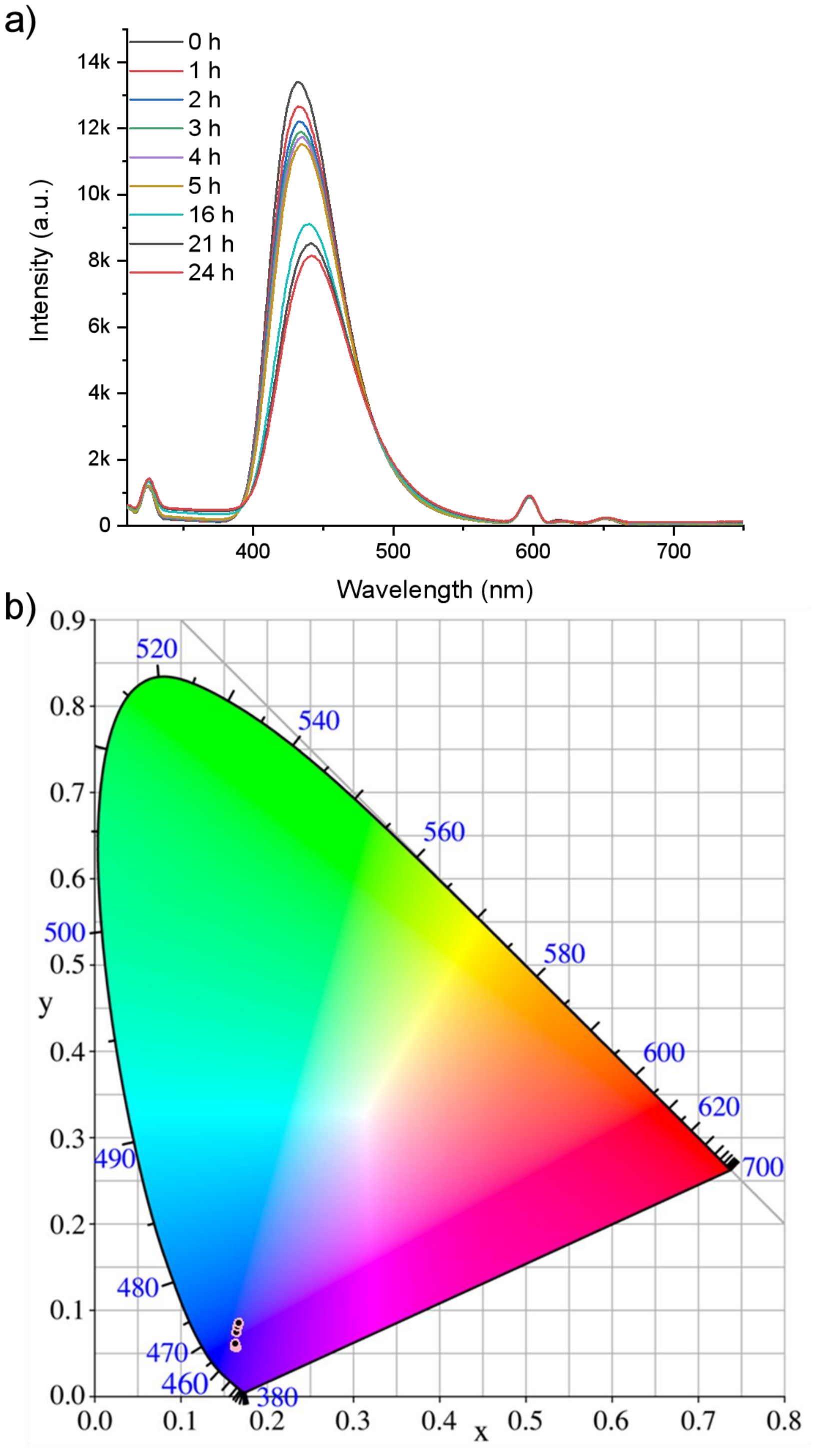


Figure S14. Photostability of Coumarin 1 (0.25 µg/mL, 5 µL of 0.1 mg/mL stock solution in 2 mL DMF) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

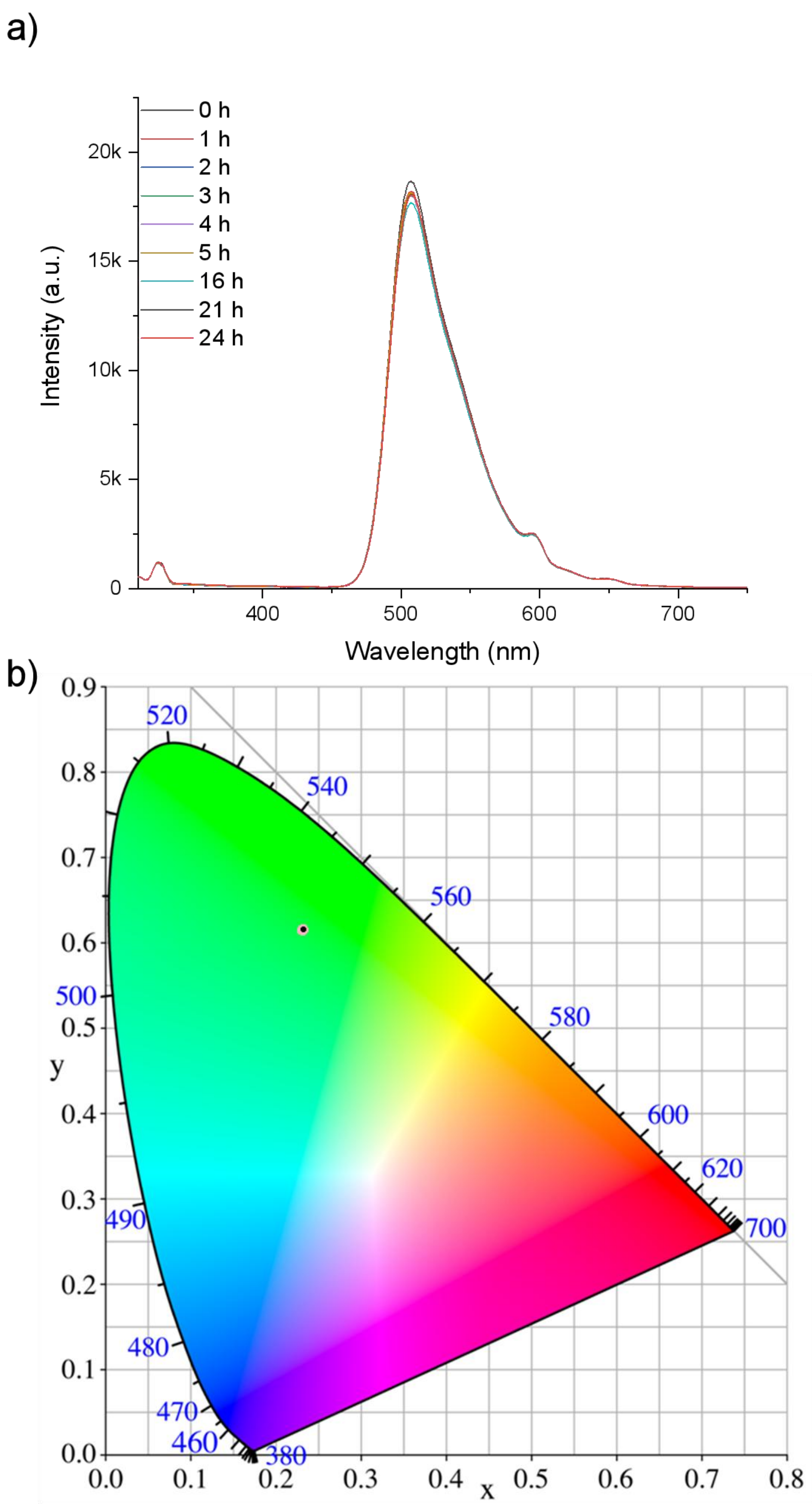


Figure S15. Photostability of Coumarin 6 (0.15 μg/mL, 3 μL of 0.1 mg/mL stock solution in 2 mL DMF) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

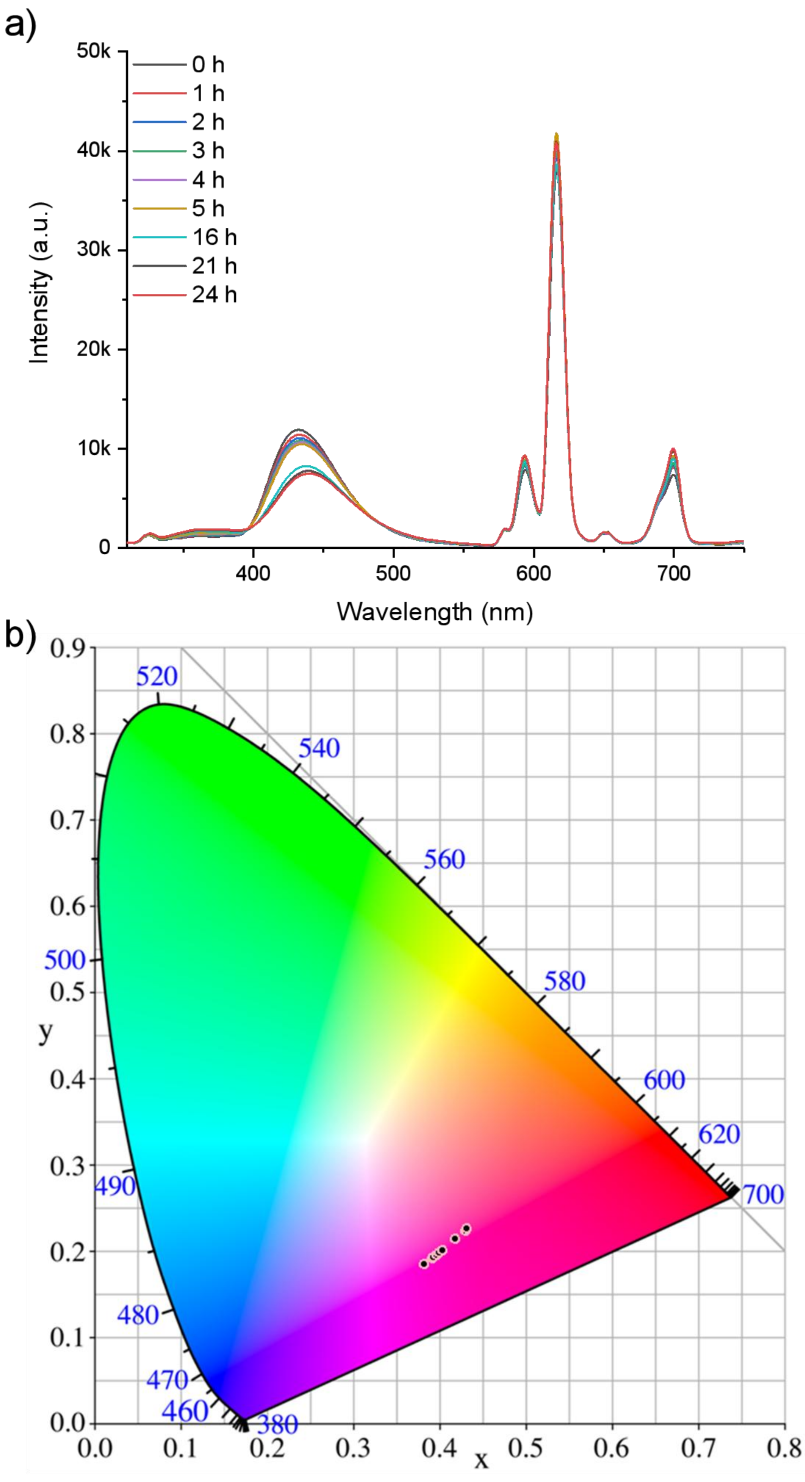


Figure S16. Photostability of **Eu-P6MOF-C1** (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; C1: 0.1 mg/mL, 5 μL added thereto) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

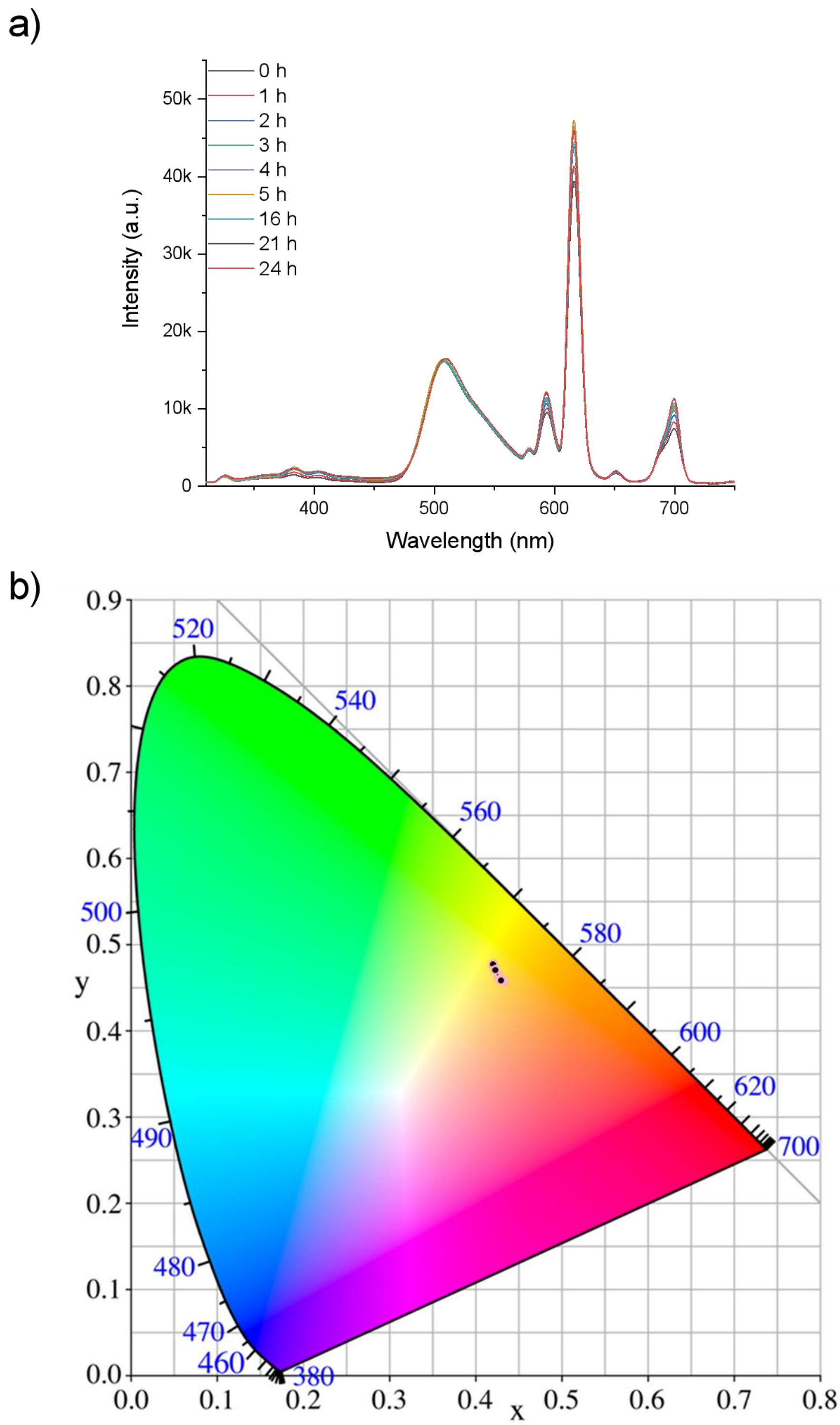


Figure S17. Photostability of **Eu-P6MOF-C6** (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; C6: 0.1 mg/mL, 3 μL added thereto) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

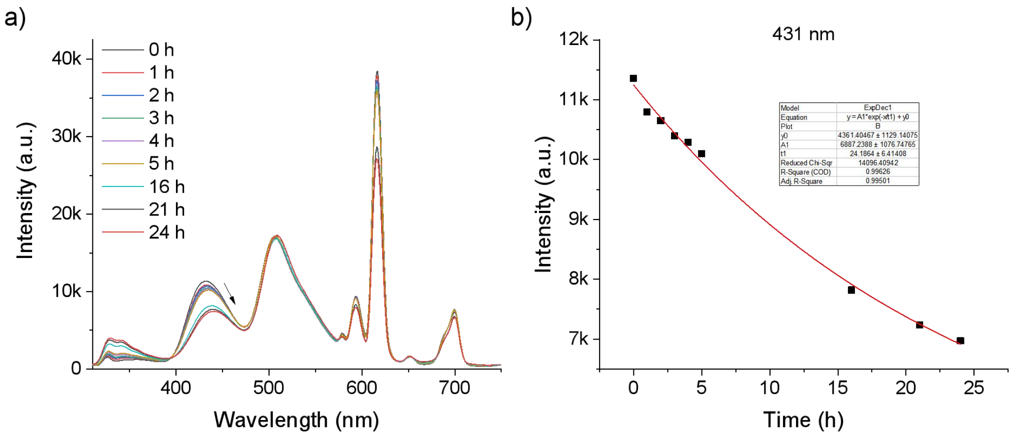


Figure S18. (a) Photostability test of the **Eu-P6MOF-C6-C1** composite under continuous irradiation. (b) Time-dependent fluorescence decay at 431 nm with single-exponential fitting (ExpDec1), affording a photodegradation rate constant k = 0.041 h^{-1} and a half-life $t_{1/2}$ = 16.63 h.

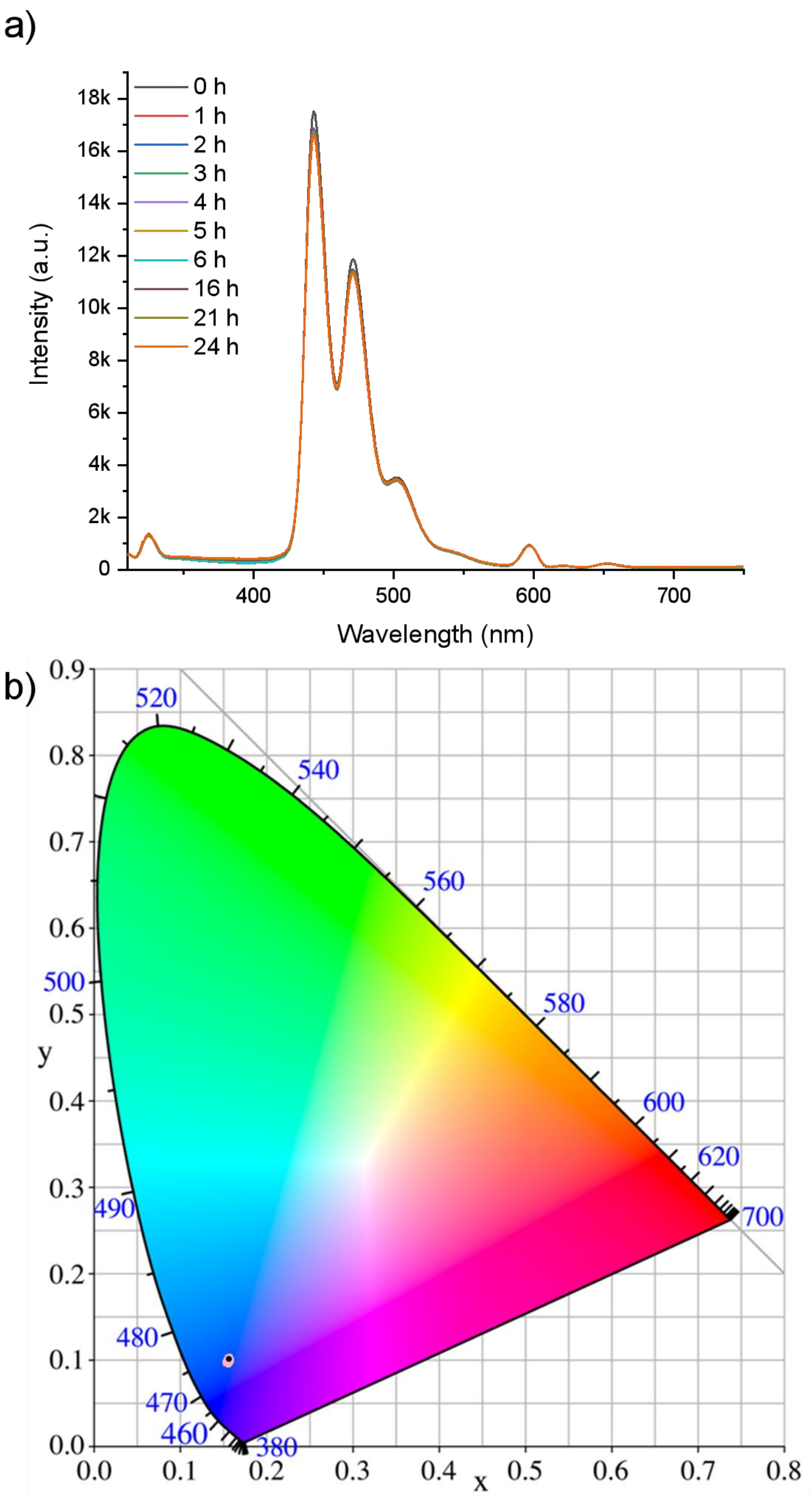


Figure S19. Photostability of Perylene (0.525 μg/mL, 10.5 μL of 0.1 mg/mL stock solution in 2 mL DMF) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

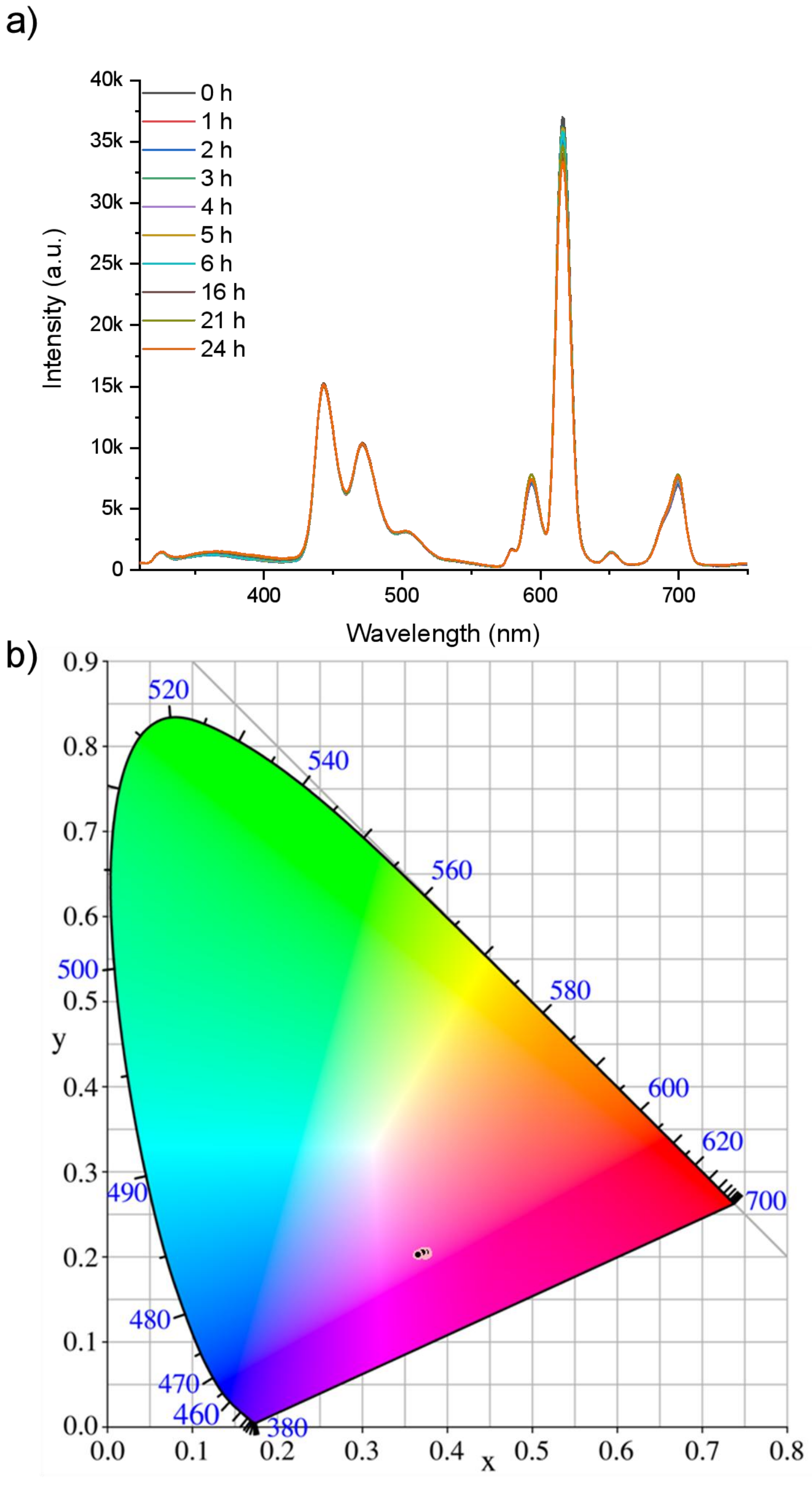


Figure S20. Photostability **of Eu-P6MOF-Perylene** (**Eu-P6MOF**: 0.1 mg/mL suspension in DMF, 2 mL; Perylene: 0.1 mg/mL, 10.5 μL added thereto) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

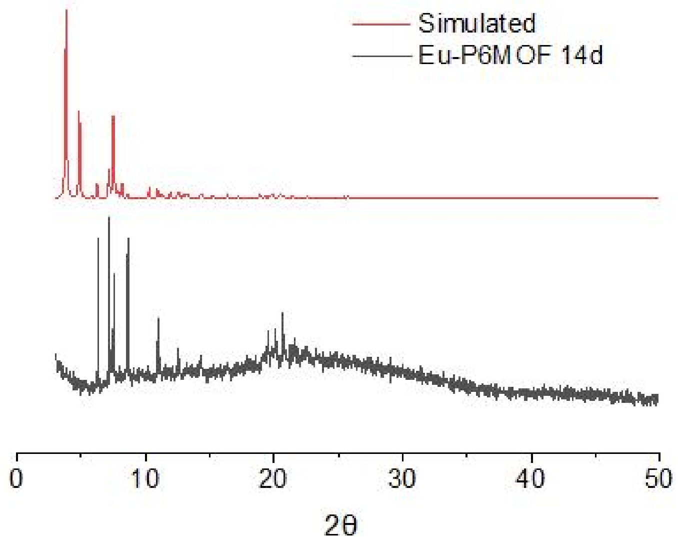


Figure S21. PXRD pattern of **Eu-P6MOF** recovered from the **Eu-P6MOF-C6-Perylene** white-light system in DMF after 14 days of storage.

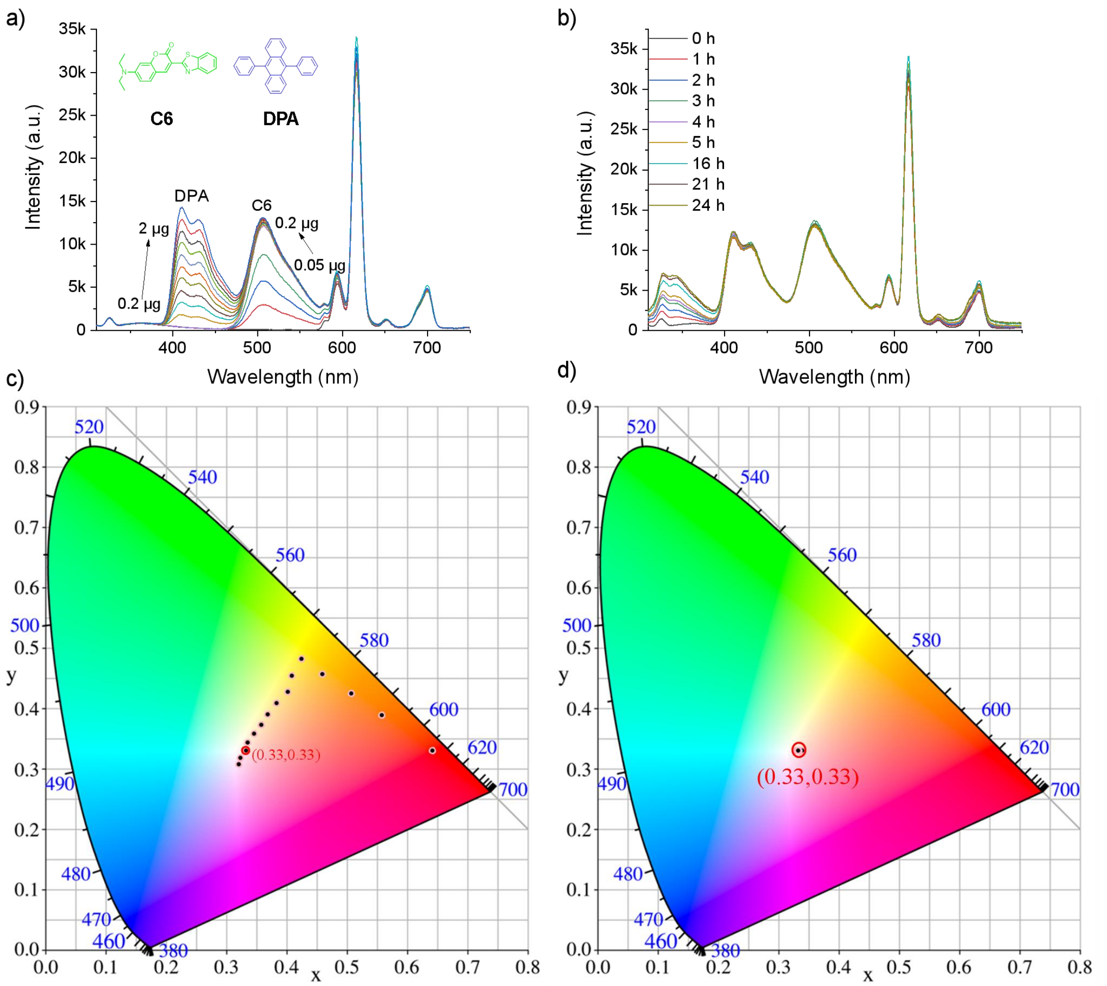


Figure S22. White-light tuning and photostability evaluation of host-guest composites. (a-d) In DMF: (a) Emission spectra demonstrating white-light tuning upon sequential addition of C6 and DPA to **Eu-P6MOF**. (b) Photostability test of the resulting **Eu-P6MOF-C6-DPA** composite under prolonged illumination. (c-d) Corresponding CIE 1931 chromaticity diagrams for (a-b), respectively.

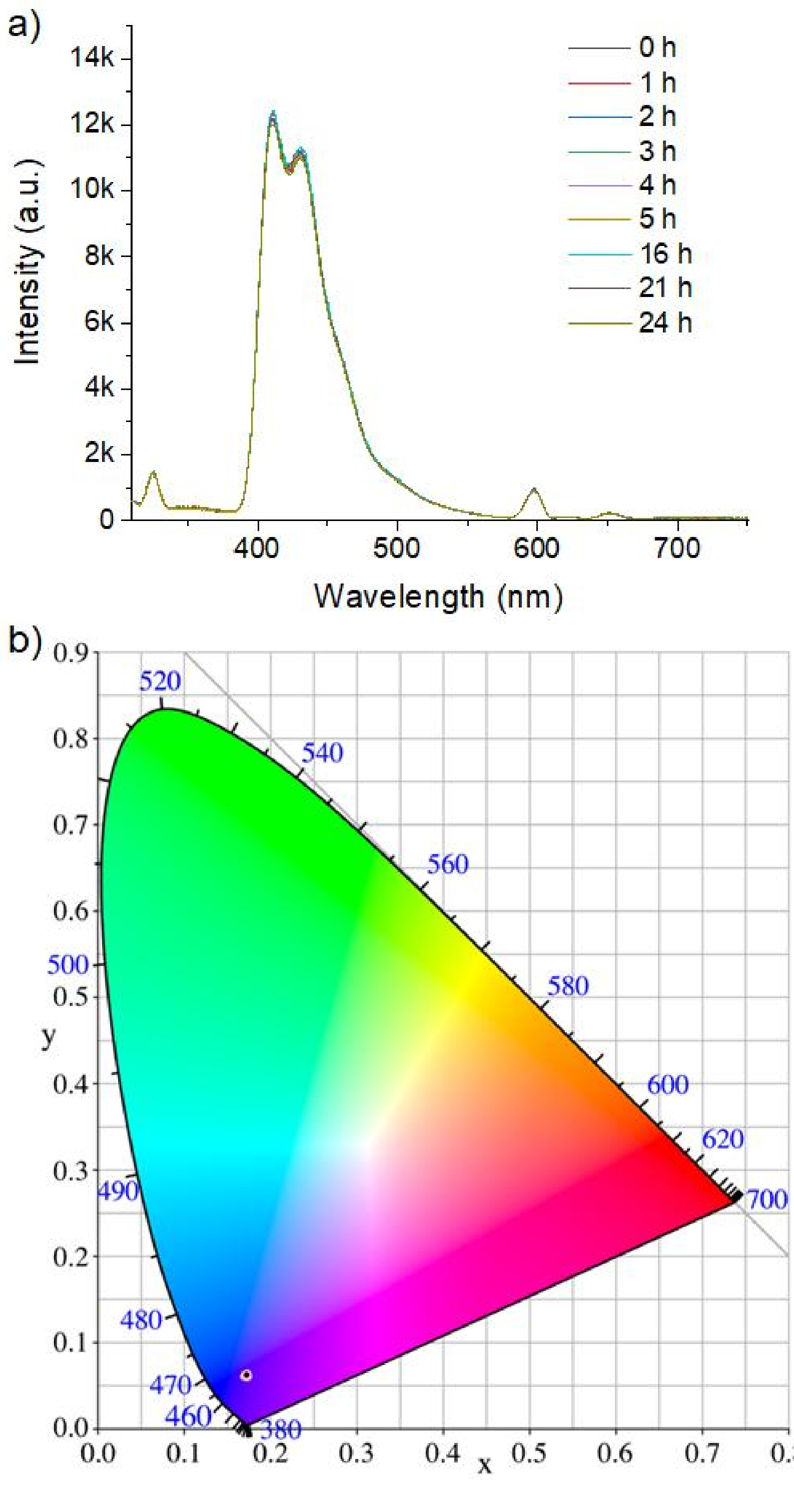


Figure S23. Photostability of **DPA** (0.8 µg/mL, 16 µL of 0.1 mg/mL stock solution in 2 mL DMF) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

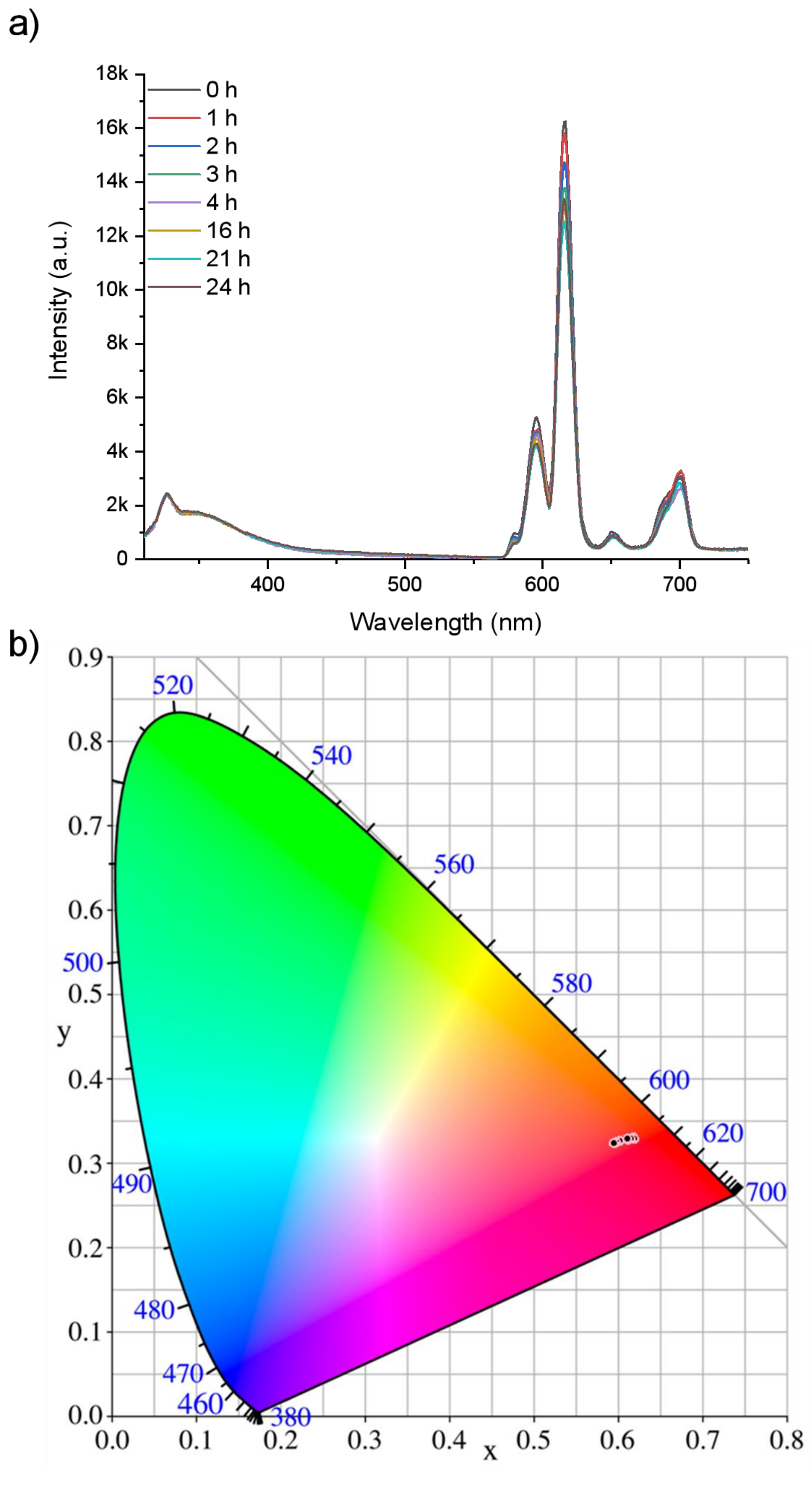


Figure S24. Photostability of **Eu-P6MOF** suspension (0.1 mg/mL, prepared by sonication in EtOH for 3 hours, 2 mL aliquot) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

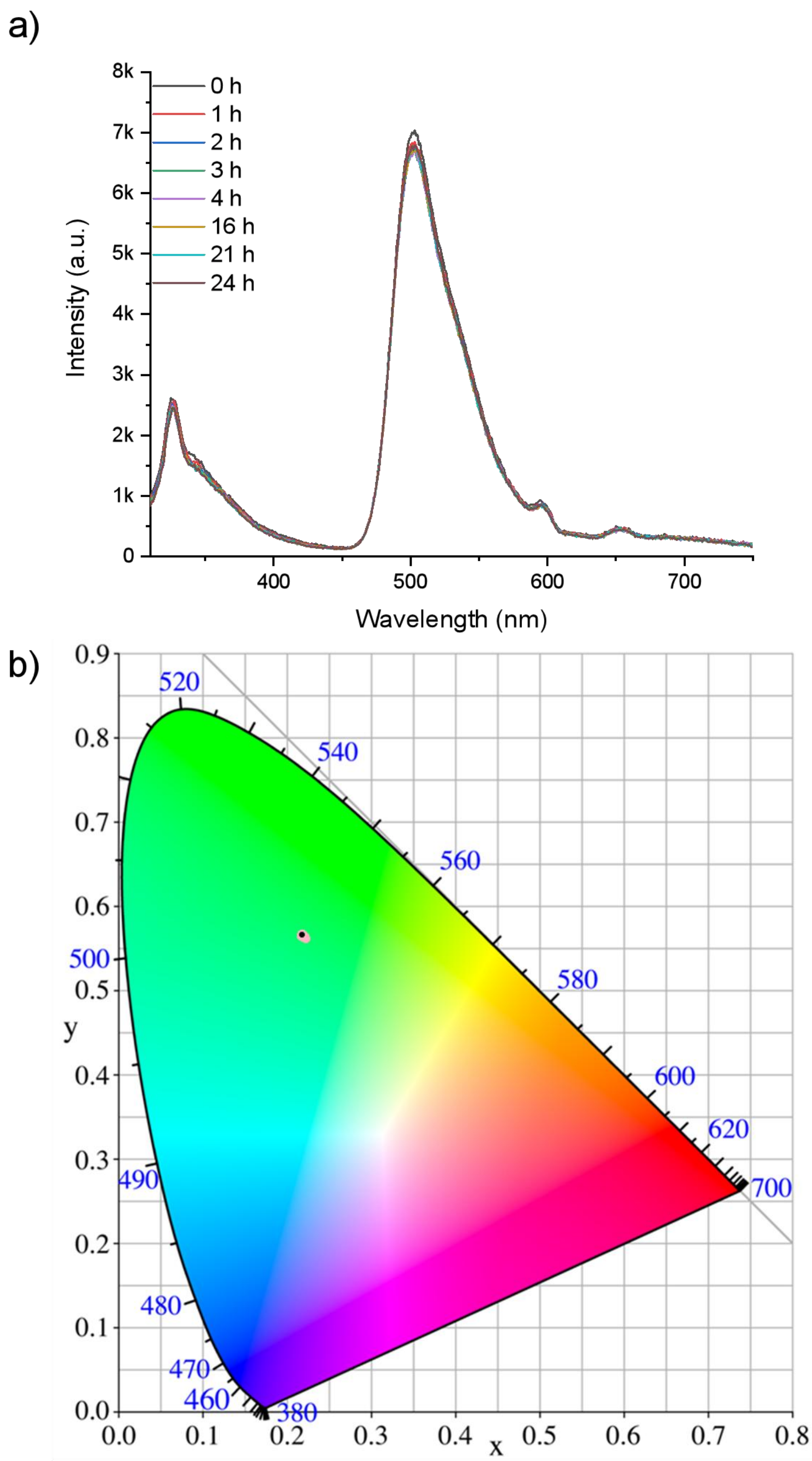


Figure S25. Photostability of **Coumarin6** (0.0425 µg/mL, 8.5 µL of 0.01 mg/mL stock solution in 2 mL EtOH) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

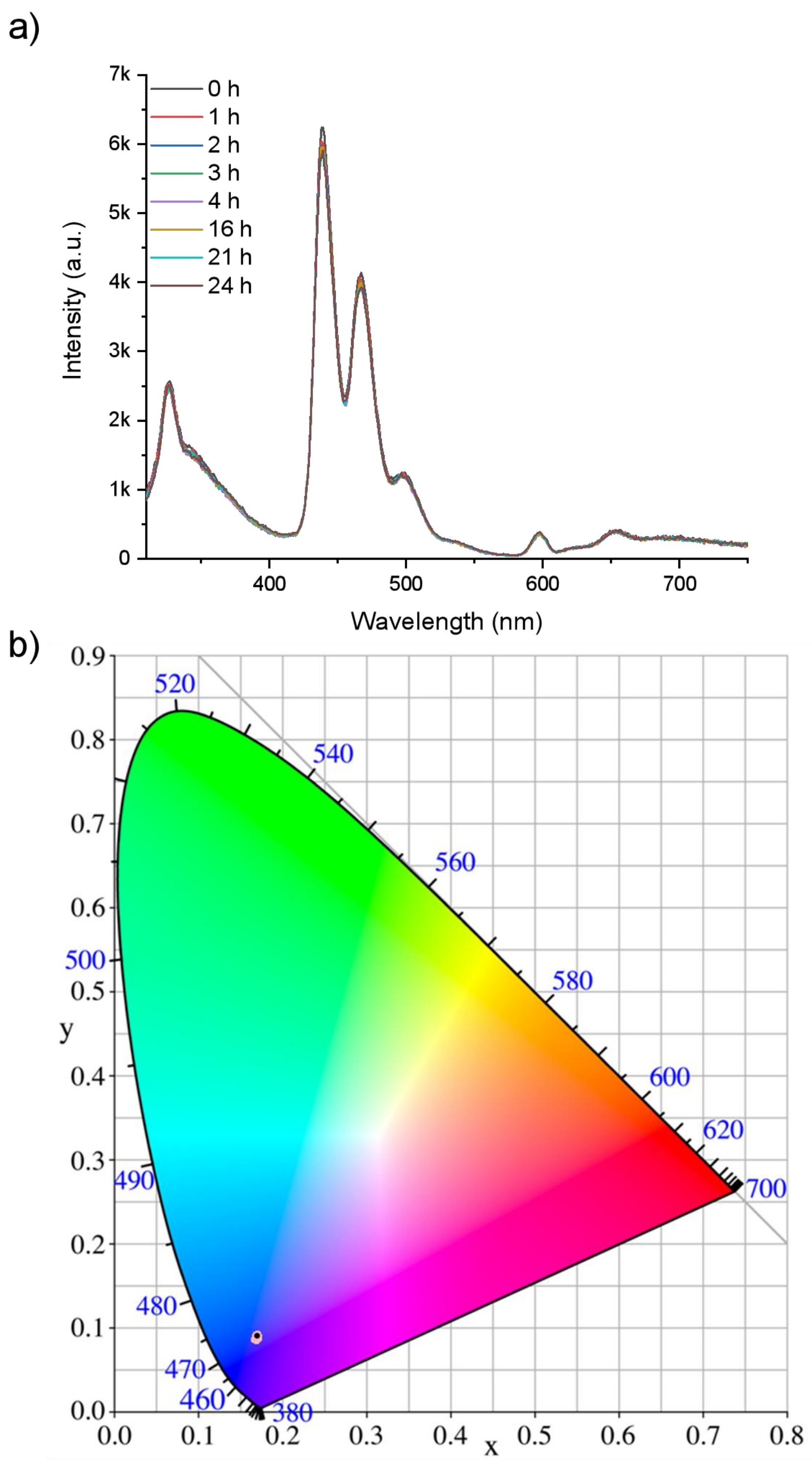


Figure S26. Photostability of **Perylene** (0. 15 µg/mL, 30 µL of 0.01 mg/mL stock solution in 2 mL EtOH) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

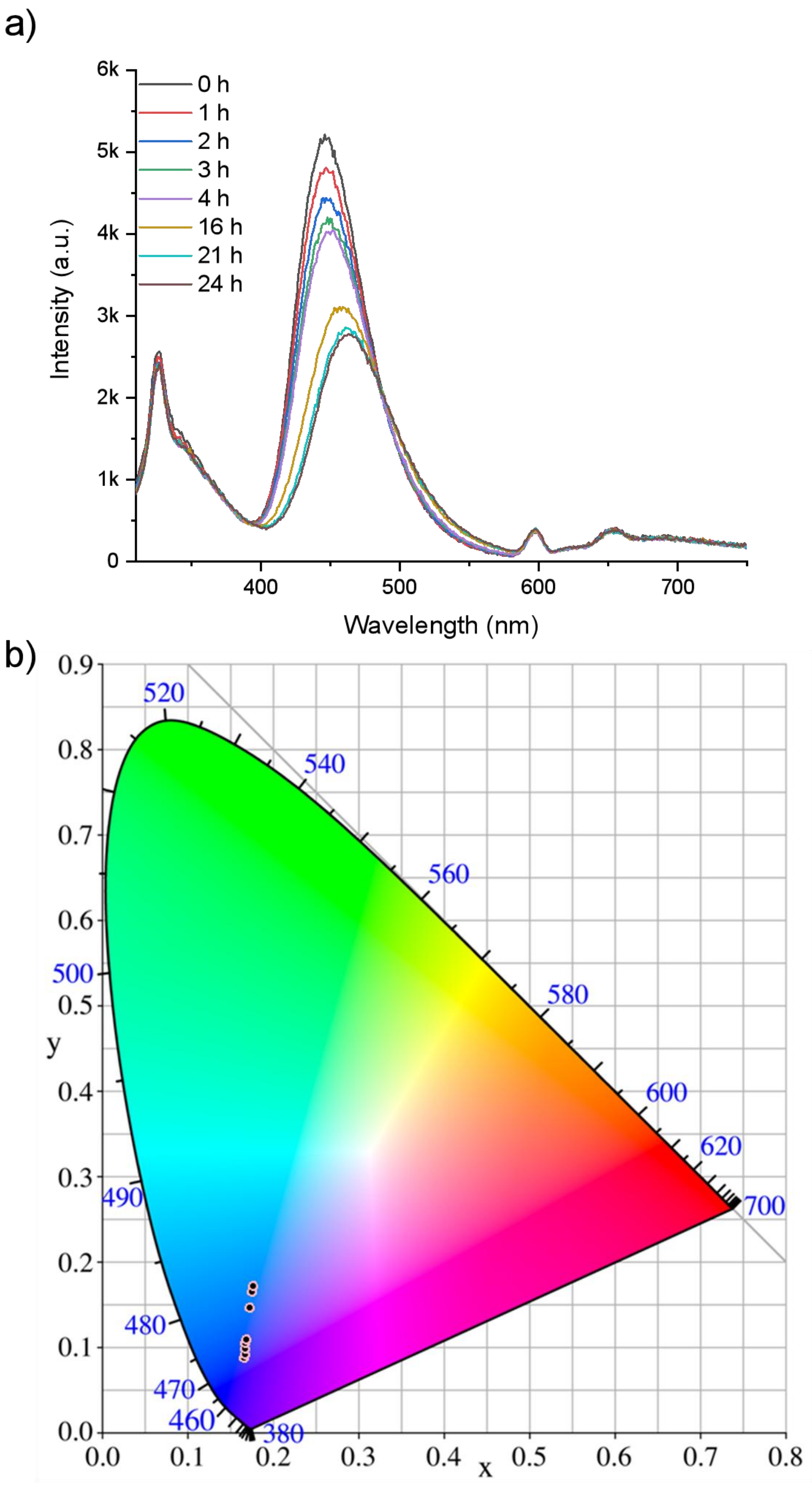


Figure S27. Photostability of **Coumarin1** (0.07 µg/mL, 14 µL of 0.01 mg/mL stock solution in 2 mL EtOH) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

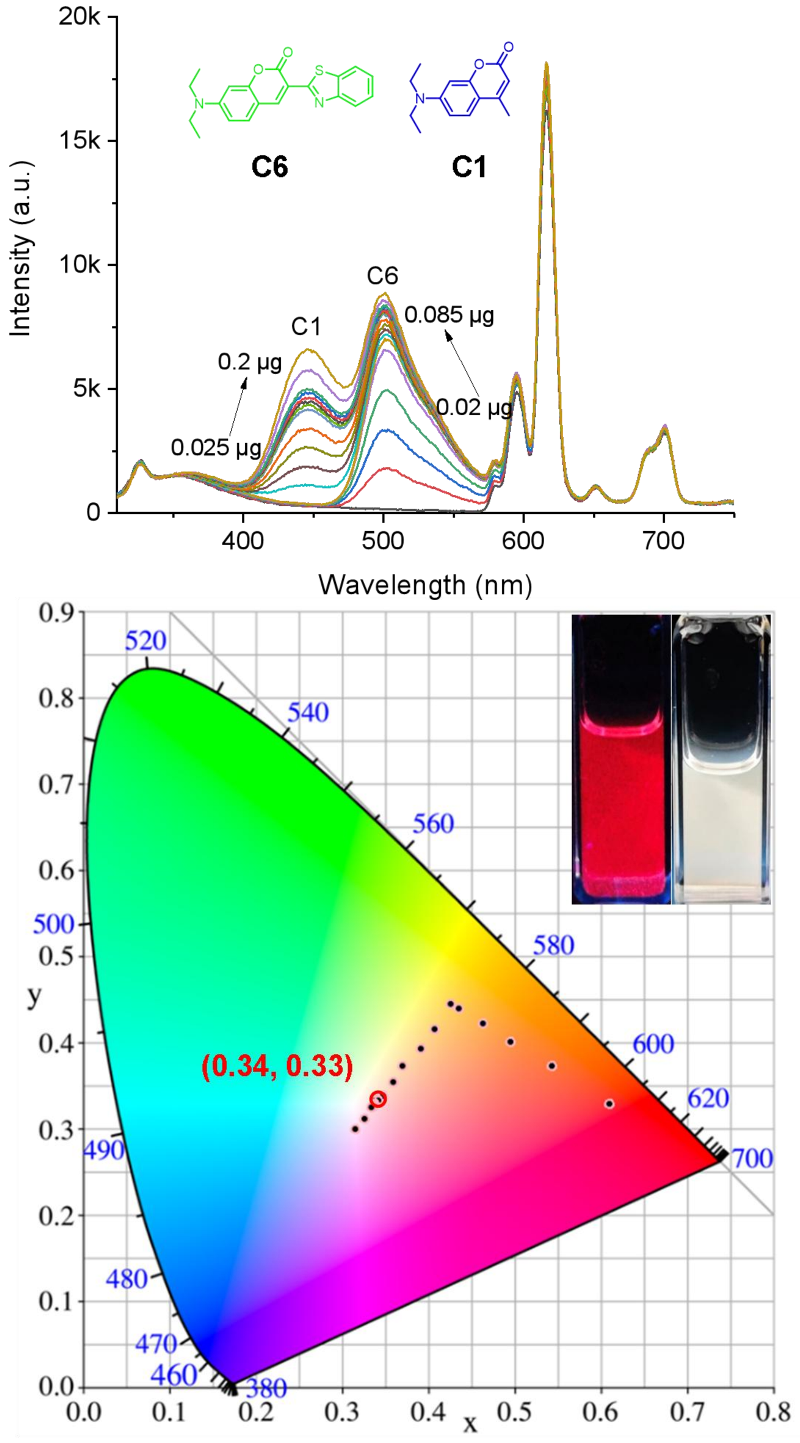


Figure S28. (a) White-light tuning of the unstable C1-based system in EtOH and its corresponding (b) CIE coordinates.

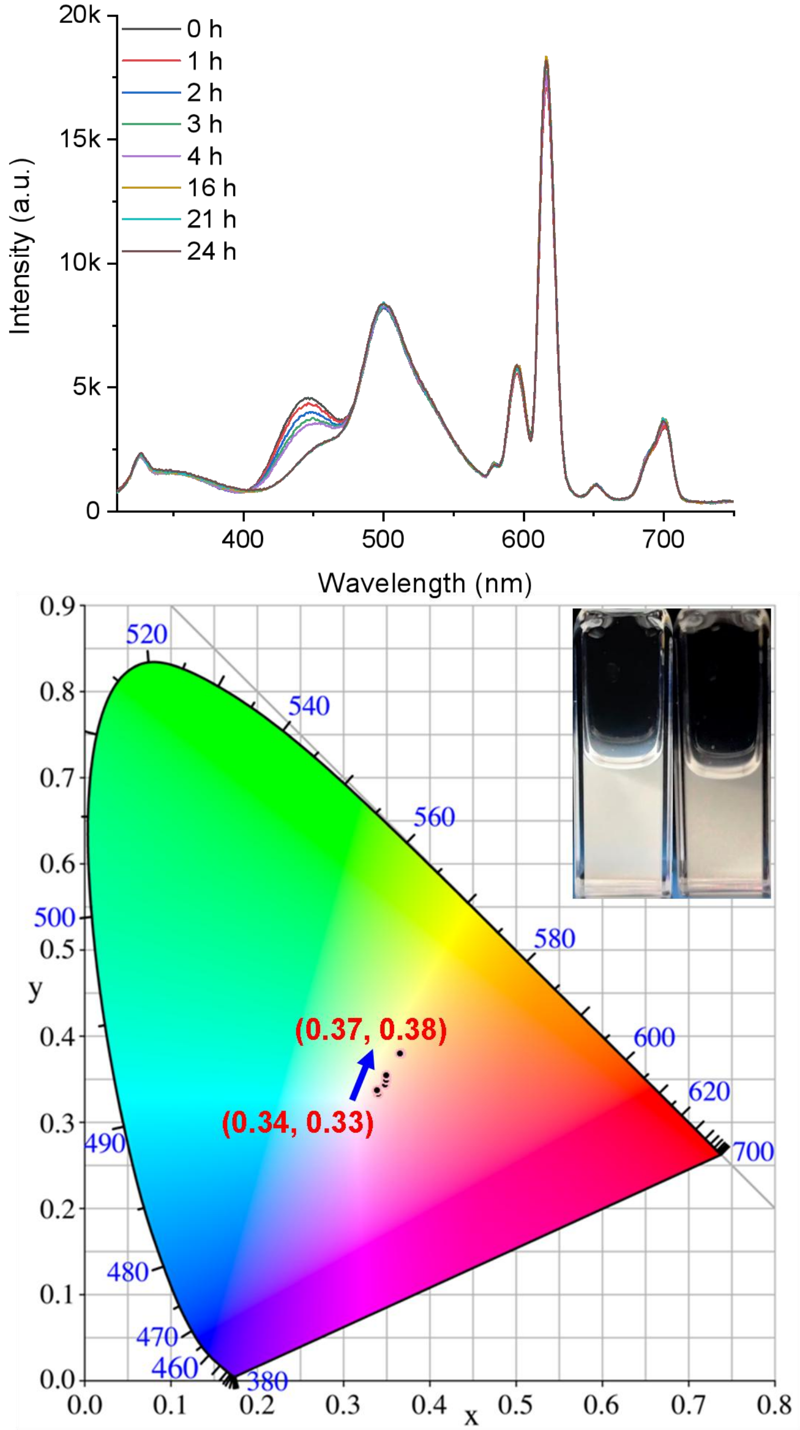


Figure S29. Photostability of **Eu-P6MOF-C6-C1** (**Eu-P6MOF**: 0.1 mg/mL suspension in EtOH, 2 mL; C6: 0.01 mg/mL , 8.5 μL added thereto; C1: 0.01 mg/mL, 14 μL added thereto) under 365 nm irradiation for 24 hours and its corresponding (b) CIE coordinates.

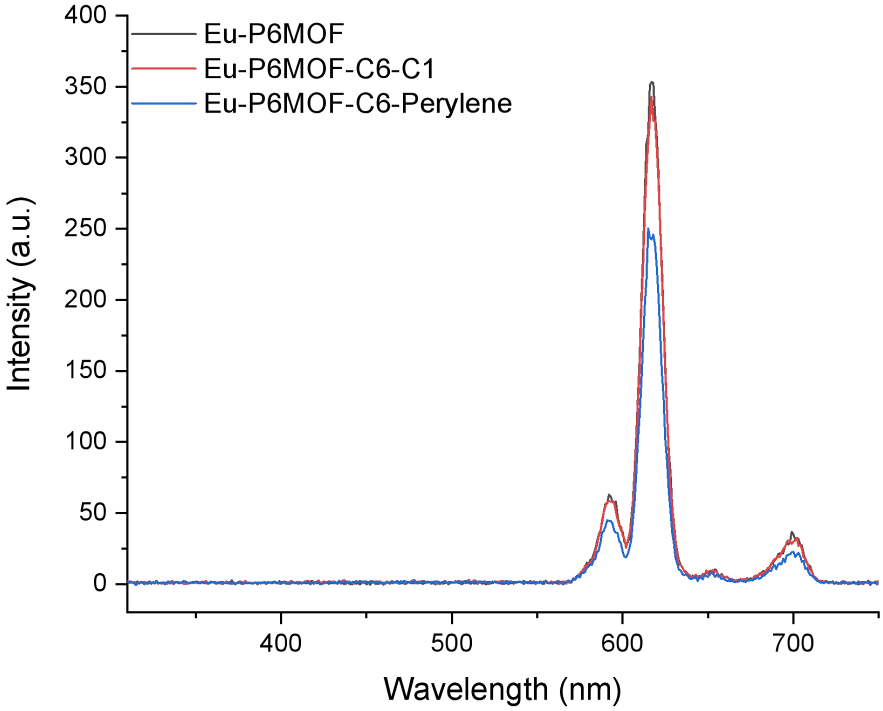


Figure S30. Phosphorescence Experiments for the suspension in DMF of **Eu-P6MOF** (1mg/10mL); **Eu-P6MOF-C6-C1**; **Eu-P6MOF-C6-Perylene**.

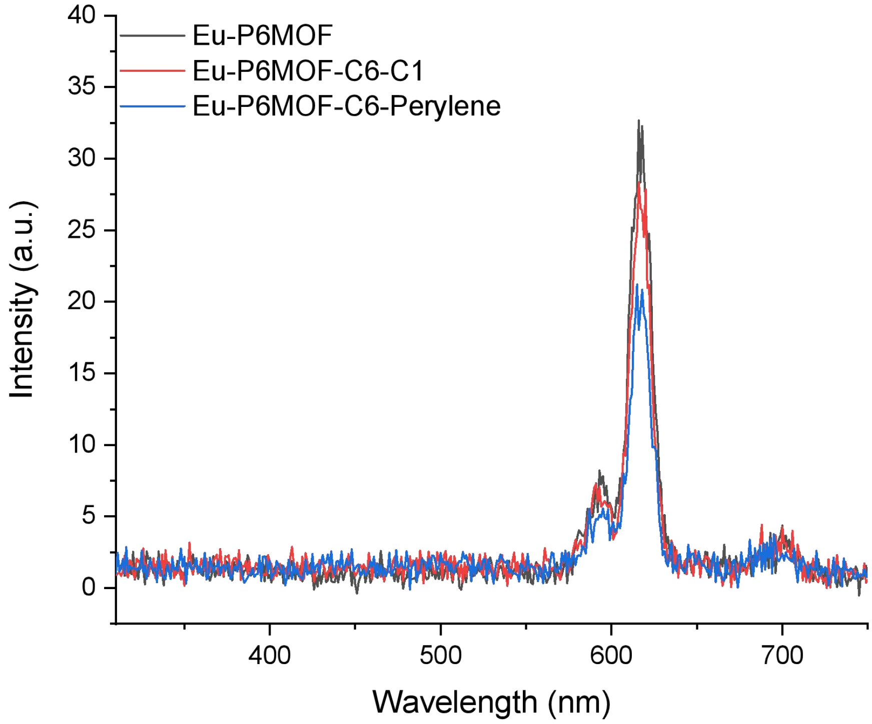


Figure S31. Phosphorescence Experiments for the suspension in EtOH of **Eu-P6MOF** (1mg/10mL); **Eu-P6MOF-C6-C1**; **Eu-P6MOF-C6-Perylene**.

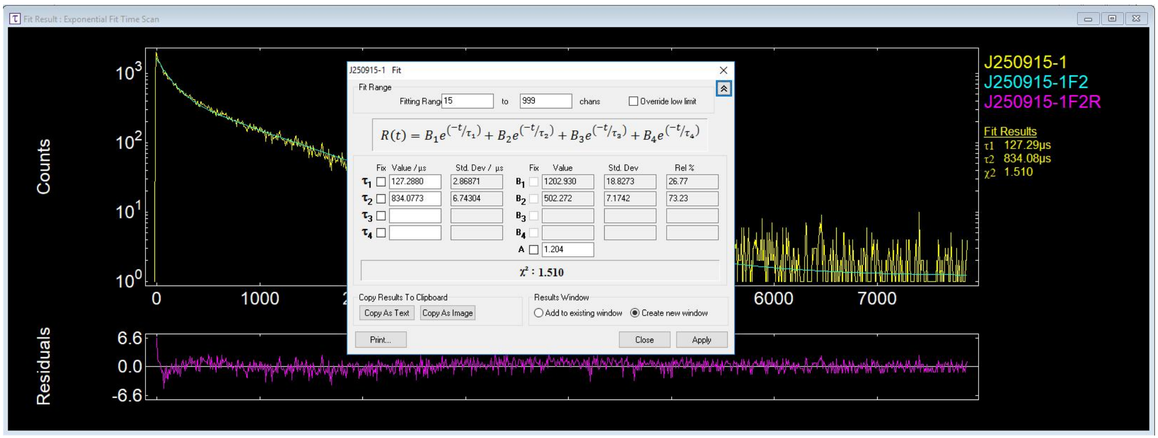


Figure S32. Fluorescence lifetime of **Eu-P6MOF** suspension (1 mg in 10 mL DMF) measured using a 375-nm Microsecond Flashlamp.

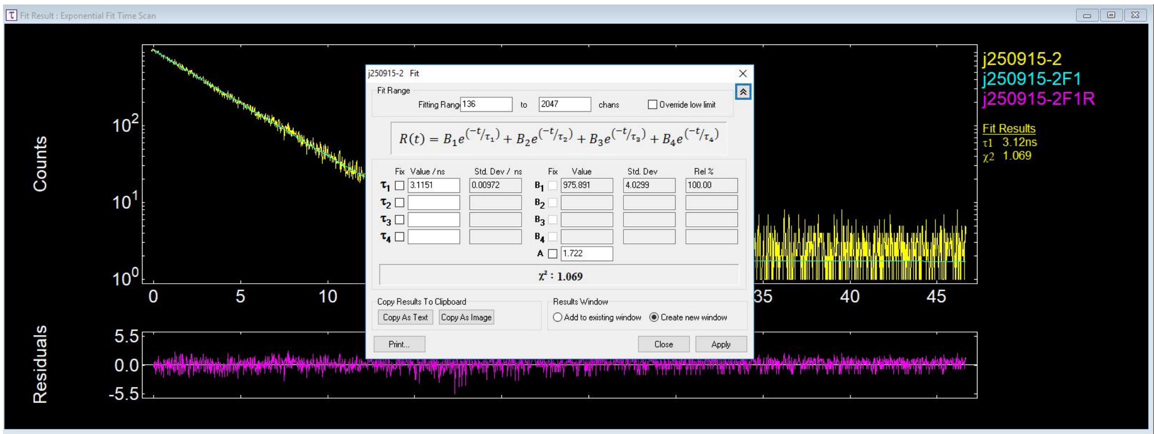


Figure S33. Fluorescence lifetime of Coumarin 1 (0.25 μg/mL, 5 μL of 0.1 mg/mL stock solution in 2 mL DMF) measured using a 375-nm Laser.

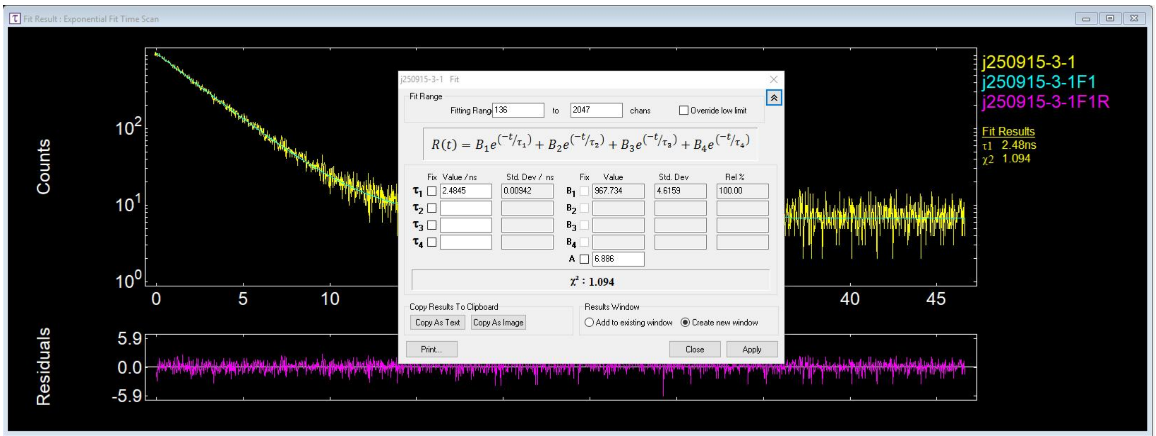


Figure S34. Fluorescence lifetime of Coumarin 6 (0.15 μg/mL, 3 μL of 0.1 mg/mL stock solution in 2 mL DMF) measured using a 450-nm Laser.

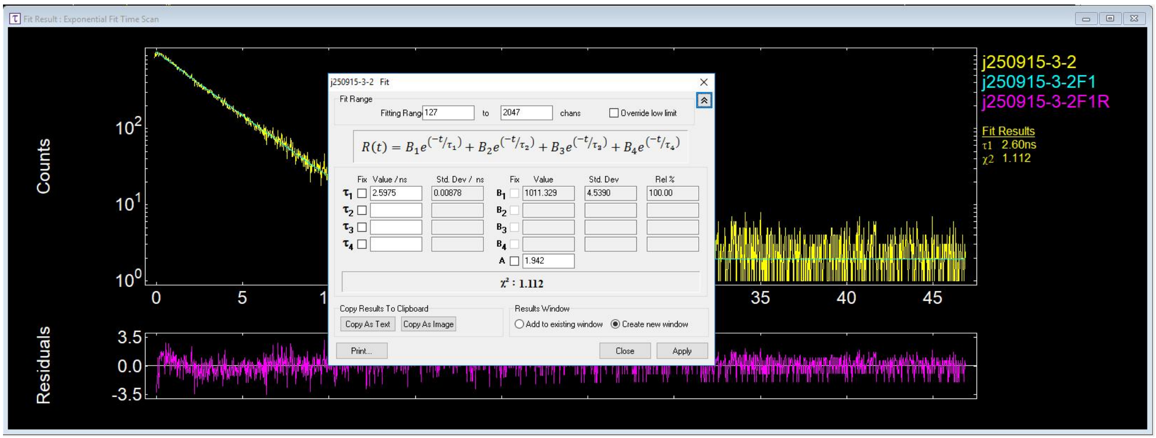


Figure S35. Fluorescence lifetime of Coumarin 6 (0.15 μg/mL, 3 μL of 0.1 mg/mL stock solution in 2 mL DMF) measured using a 375-nm Laser.

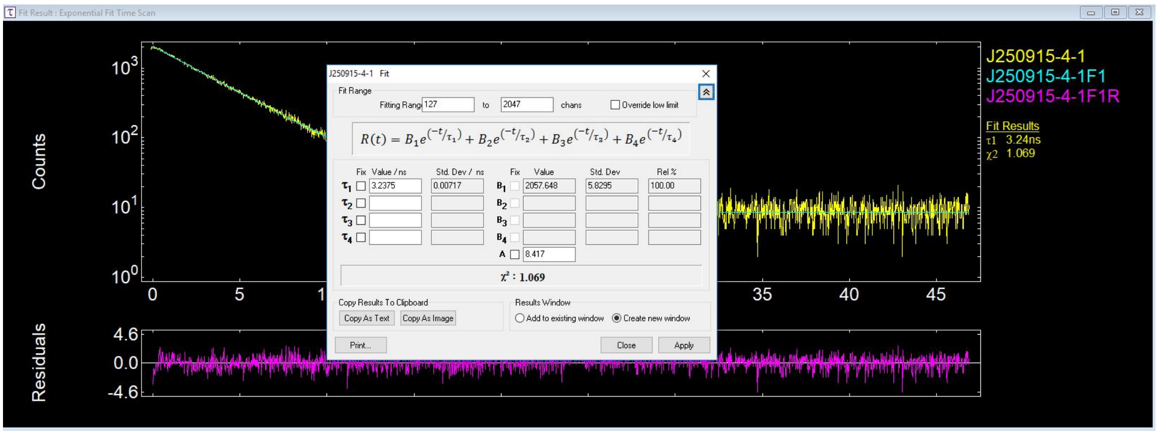


Figure S36. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in DMF measured using a 375-nm Laser.

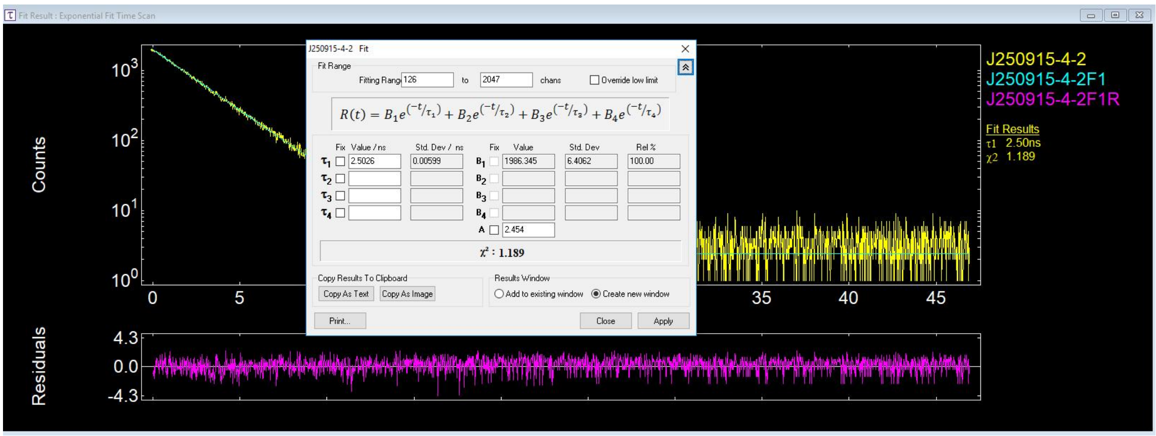


Figure S37. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in DMF measured using a 450-nm Laser.

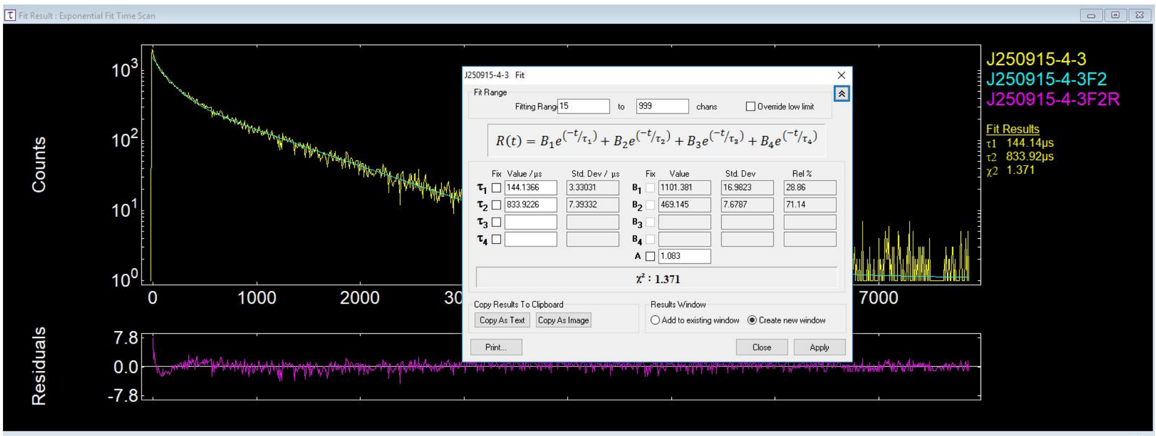


Figure S38. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in DMF measured using a 375-nm Microsecond Flashlamp.

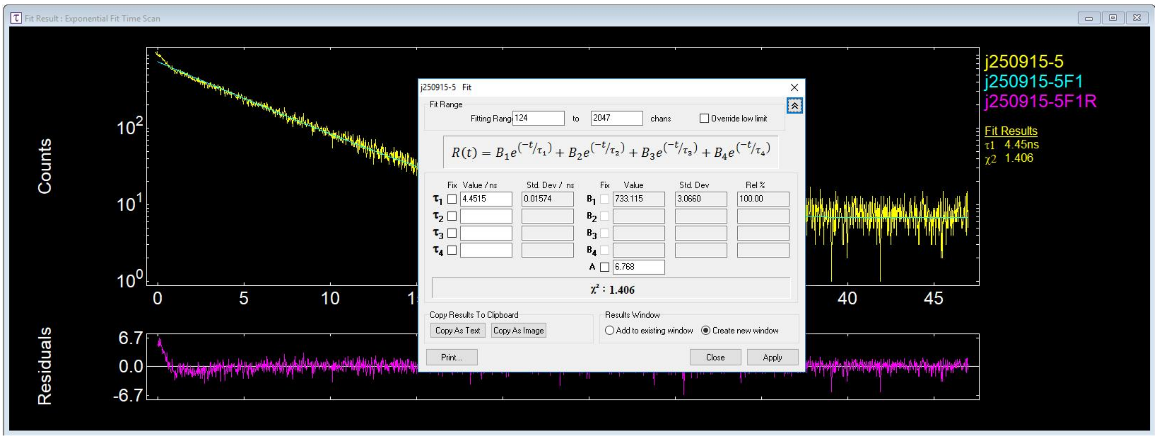


Figure S39. Fluorescence lifetime of Perylene (0.525 μg/mL, 10.5 μL of 0.1 mg/mL stock solution in 2 mL DMF) measured using a 450-nm Laser.

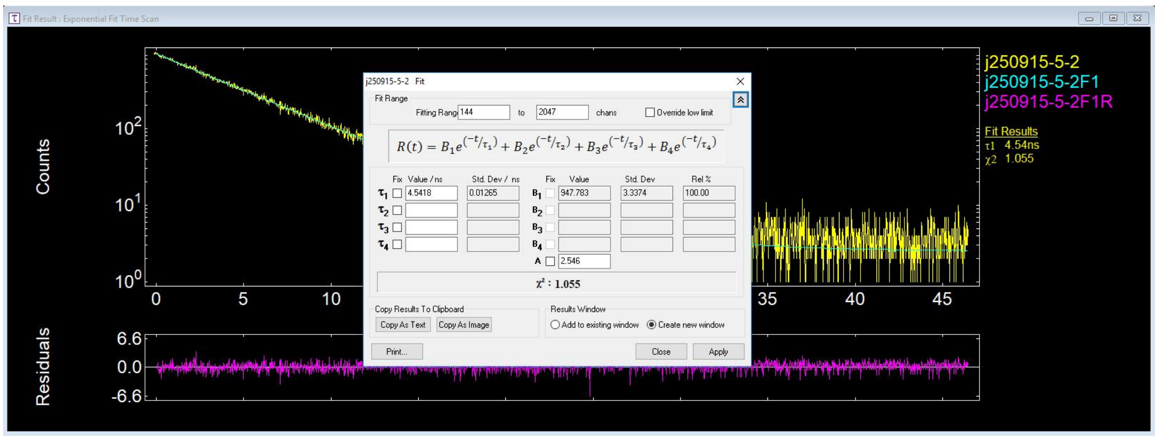


Figure S40. Fluorescence lifetime of Perylene (0.525 μg/mL, 10.5 μL of 0.1 mg/mL stock solution in 2 mL DMF) measured using a 375-nm Laser.

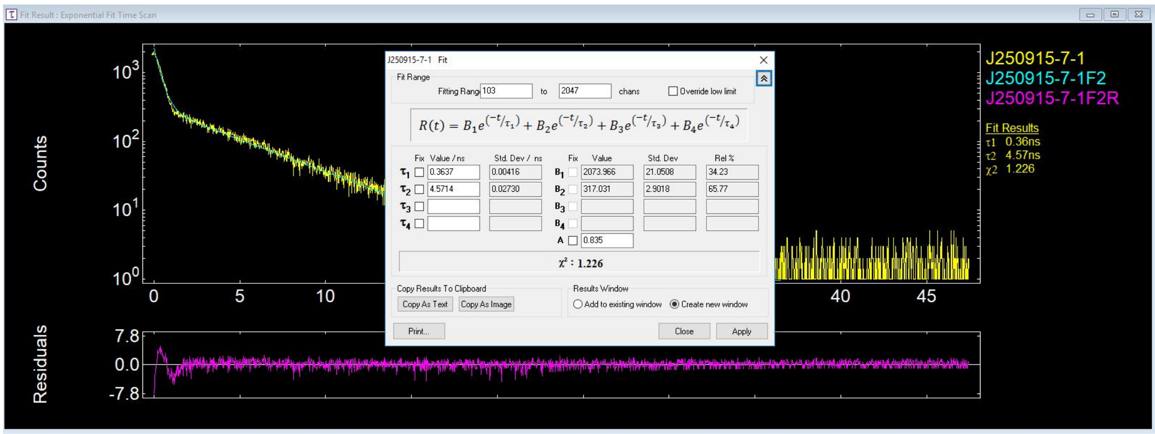


Figure S41. Fluorescence lifetime of **Eu-P6MOF/C6/Perylene** system in DMF measured using a 450-nm Laser.

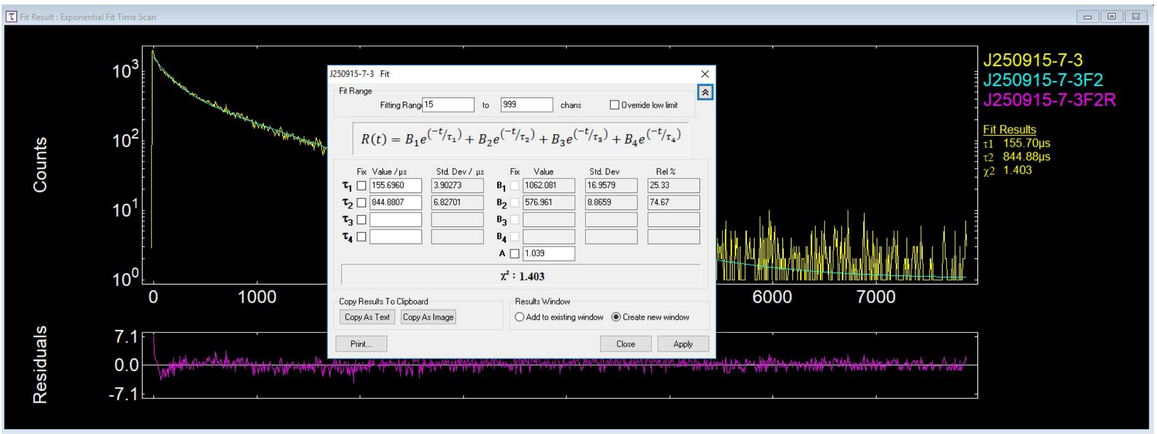


Figure S42. Fluorescence lifetime of **Eu-P6MOF/C6/Perylene** system in DMF measured using a 375-nm Microsecond Flashlamp.

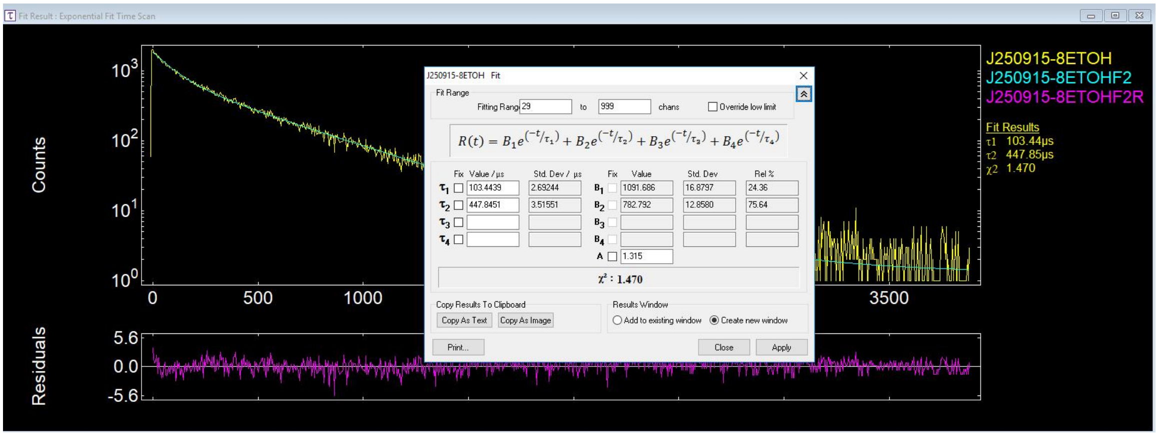


Figure S43. Fluorescence lifetime of **Eu-P6MOF** suspension (1 mg in 10 mL EtOH) measured using a 375-nm Microsecond Flashlamp.

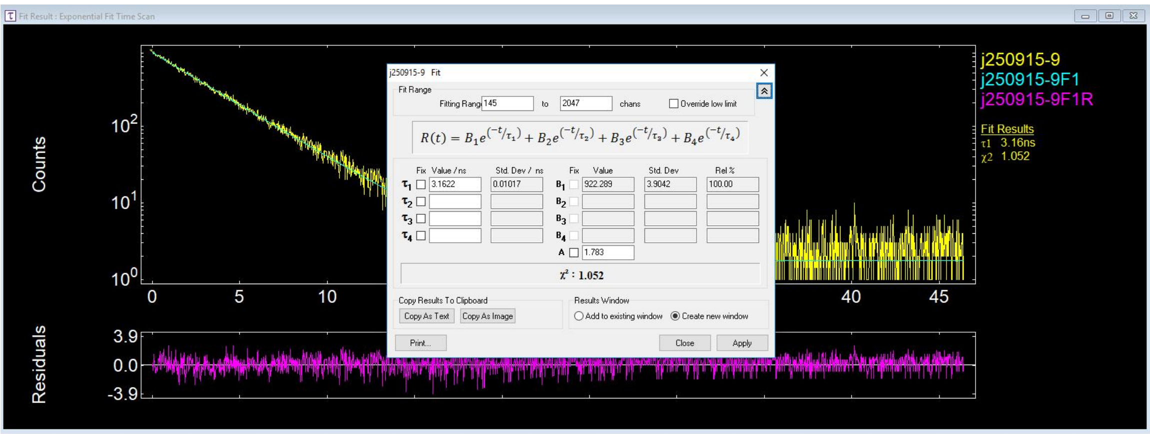


Figure S44. Fluorescence lifetime of Coumarin 1 (0.07 µg/mL, 14 µL of 0.01 mg/mL stock solution in 2 mL EtOH) measured using a 375-nm Laser.

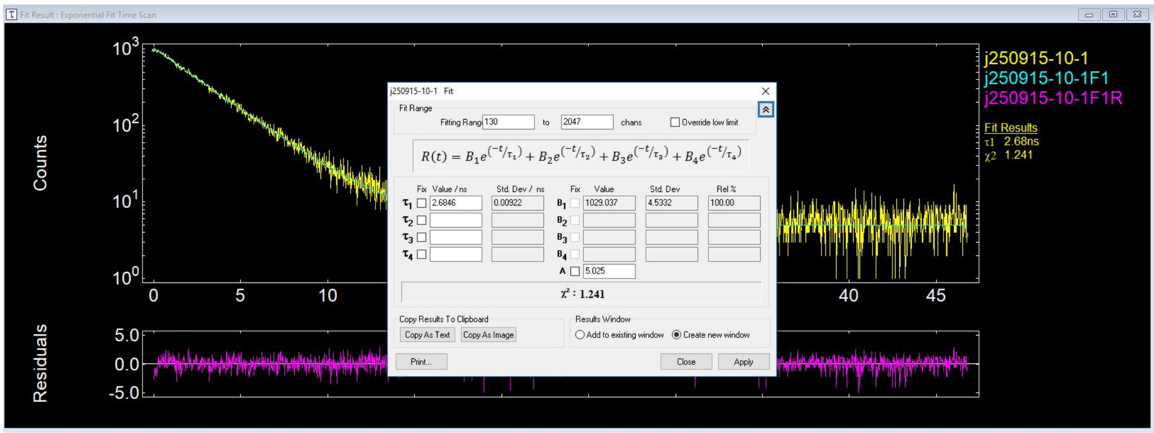


Figure S45. Fluorescence lifetime of Coumarin 6 (0.0425 µg/mL, 8.5 µL of 0.01 mg/mL stock solution in 2 mL EtOH) measured using a 450-nm Laser.

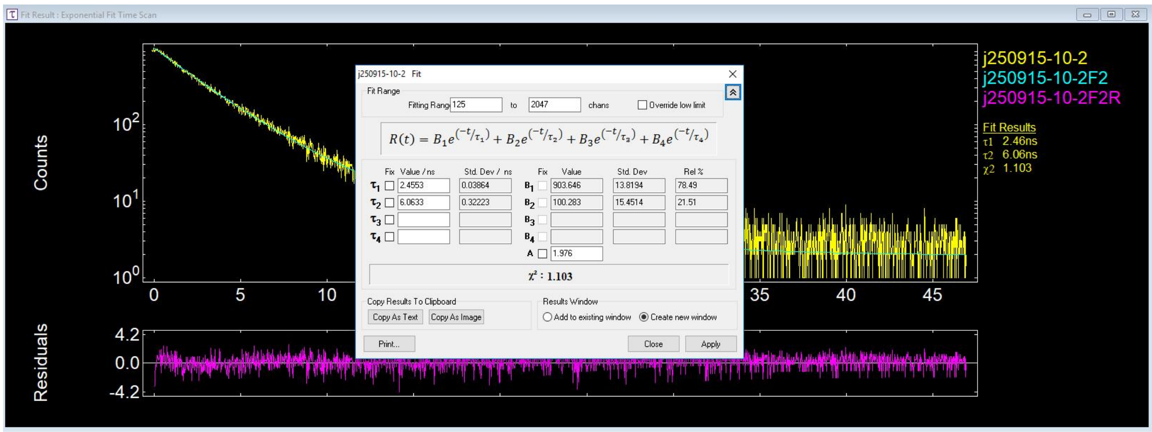


Figure S46. Fluorescence lifetime of Coumarin 6 (0.0425 µg/mL, 8.5 µL of 0.01 mg/mL stock solution in 2 mL EtOH) measured using a 375-nm Laser.

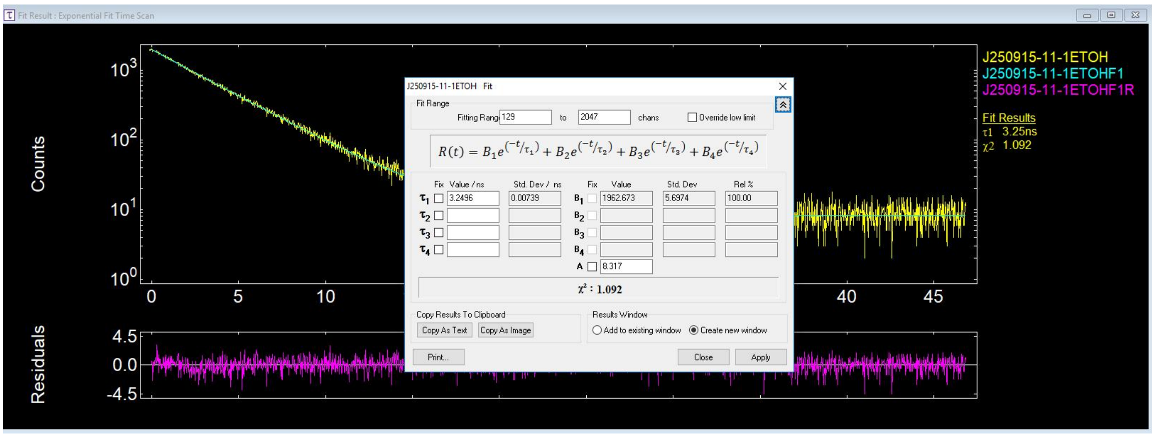


Figure S47. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in EtOH measured using a 375-nm Laser.

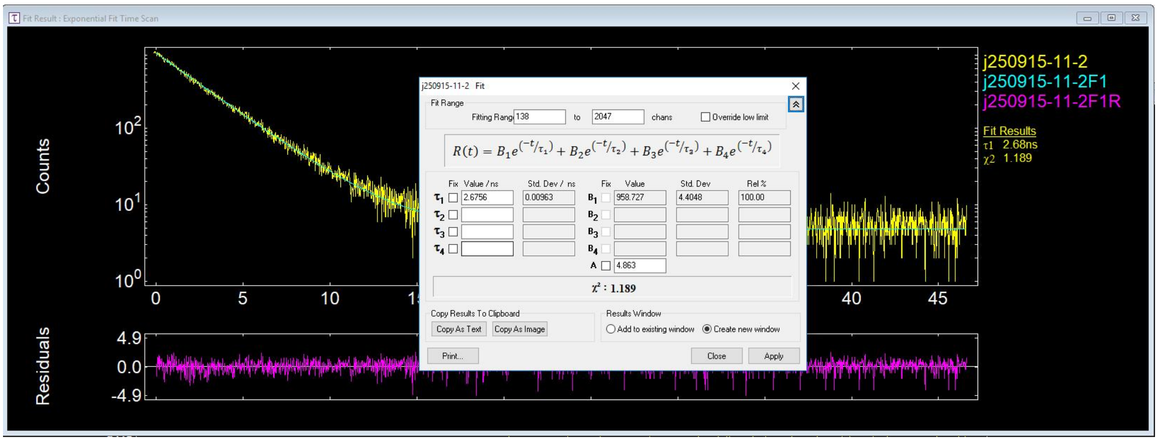


Figure S48. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in EtOH measured using a 450-nm Laser.

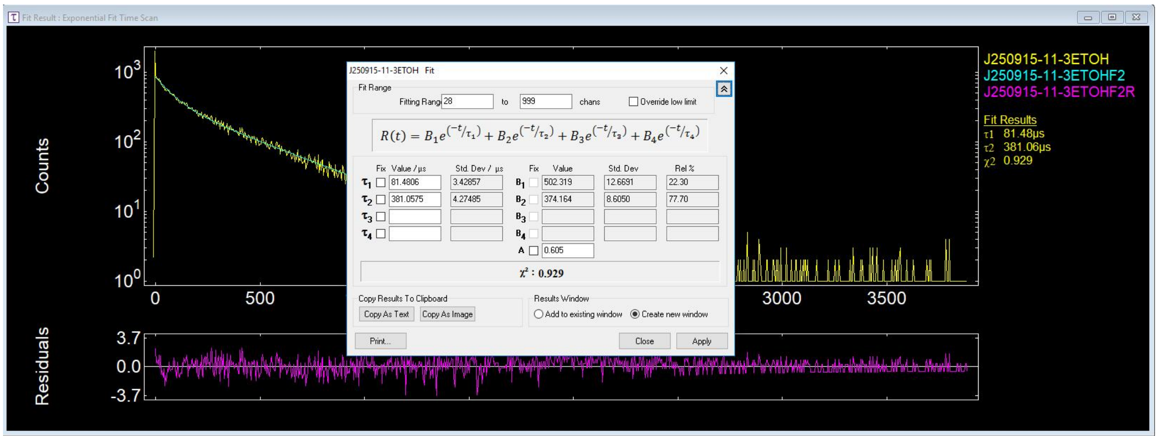


Figure S49. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in EtOH measured using a 375-nm Microsecond Flashlamp.

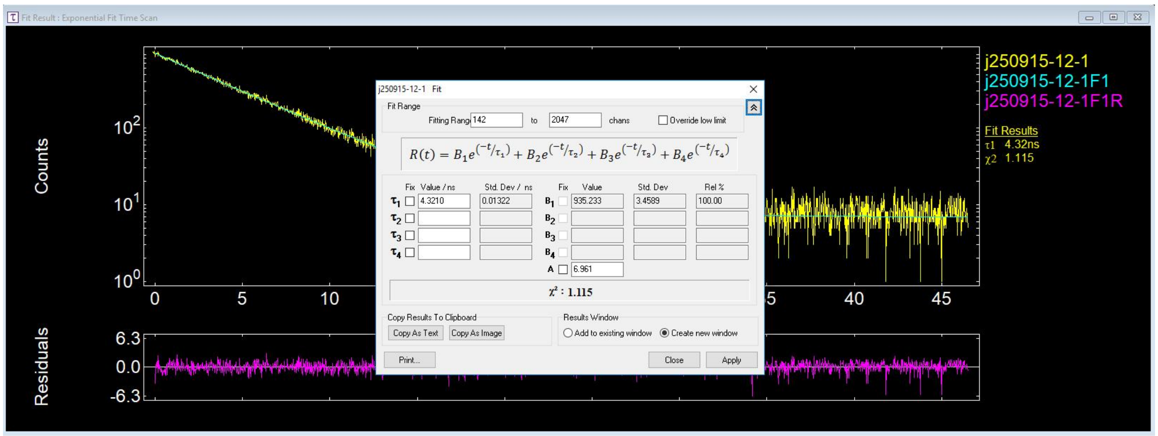


Figure S50. Fluorescence lifetime of Perylene (0.15 µg/mL, 30 µL of 0.01 mg/mL stock solution in 2 mL EtOH) measured using a 450-nm Laser.

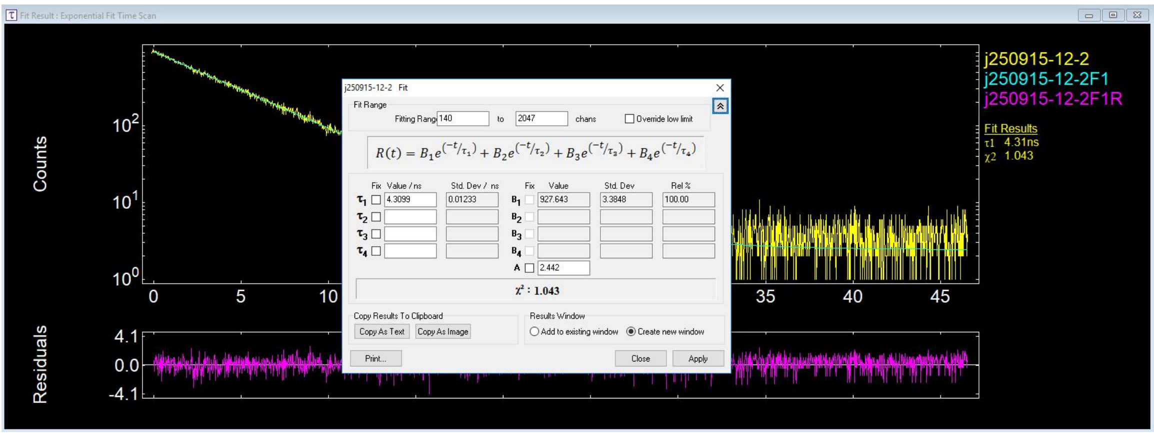


Figure S51. Fluorescence lifetime of Perylene (0.15 µg/mL, 30 µL of 0.01 mg/mL stock solution in 2 mL EtOH) measured using a 375-nm Laser.

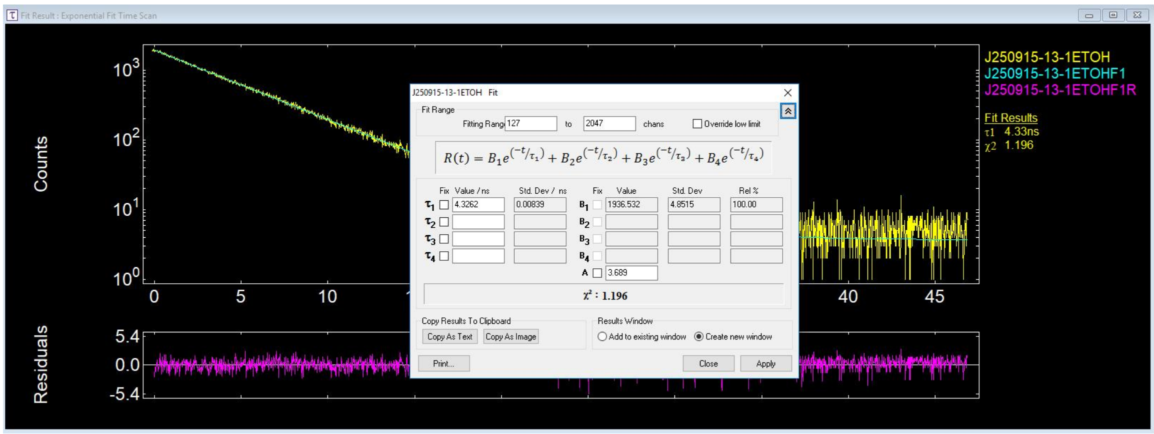


Figure S52. Fluorescence lifetime of **Eu-P6MOF/C6/Perylene** system in EtOH measured using a 450-nm Laser.

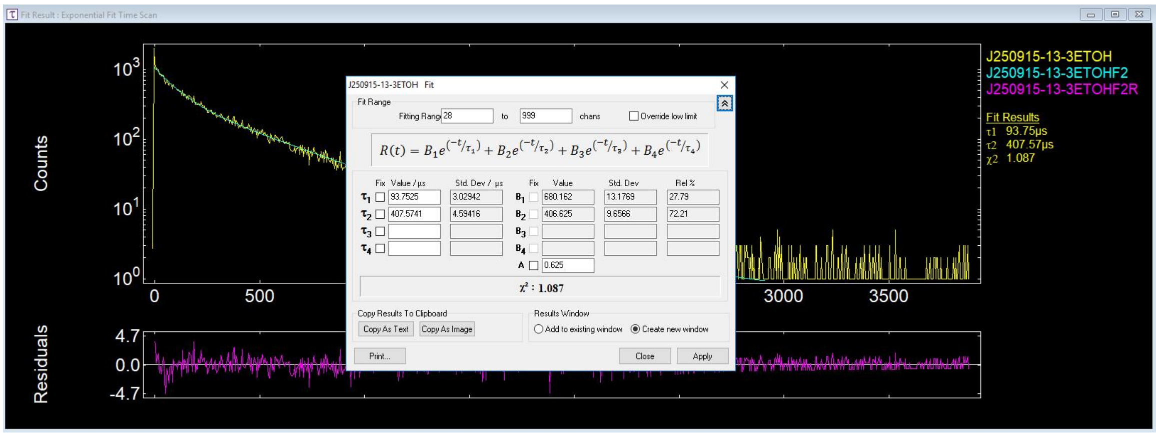


Figure S53. Fluorescence lifetime of **Eu-P6MOF/C6/Perylene** system in EtOH measured using a 375-nm Microsecond Flashlamp.

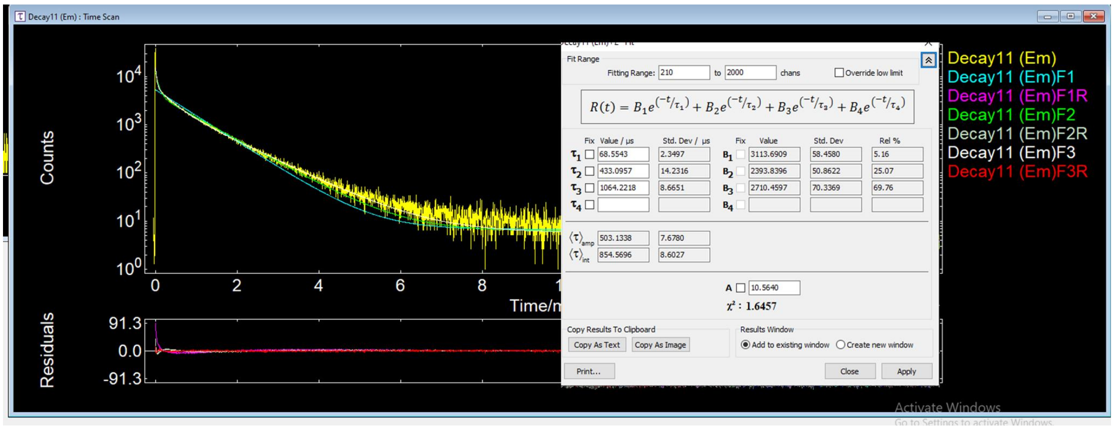


Figure S54. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in DMF at 323K.

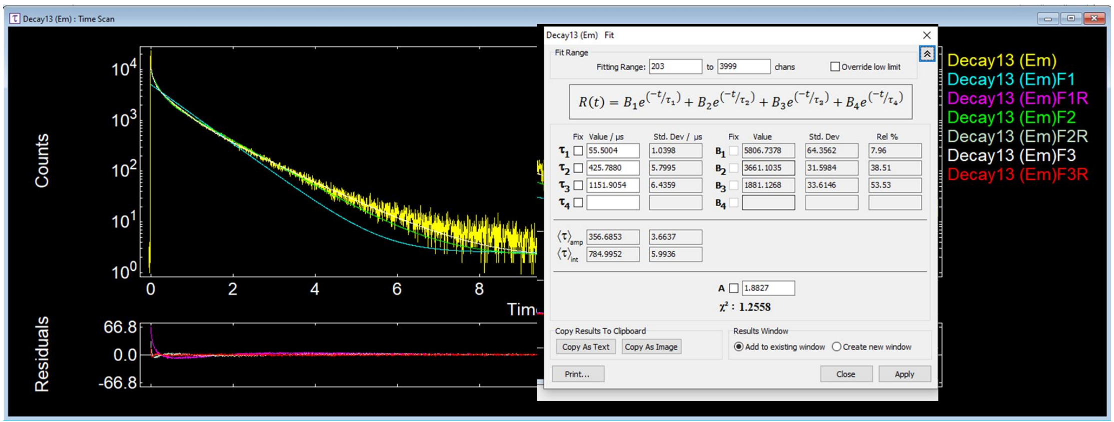


Figure S55. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in DMF at 348K.

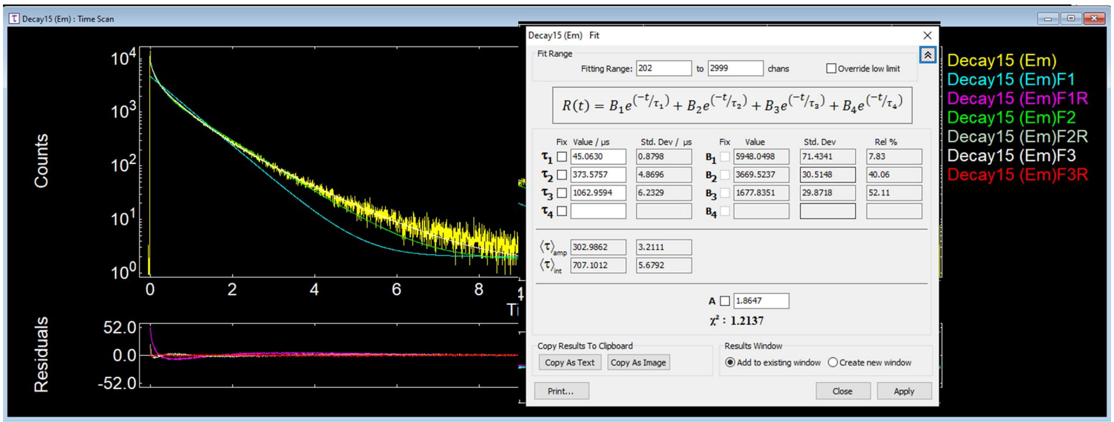


Figure S56. Fluorescence lifetime of **Eu-P6MOF/C6/C1** system in DMF at 373K.

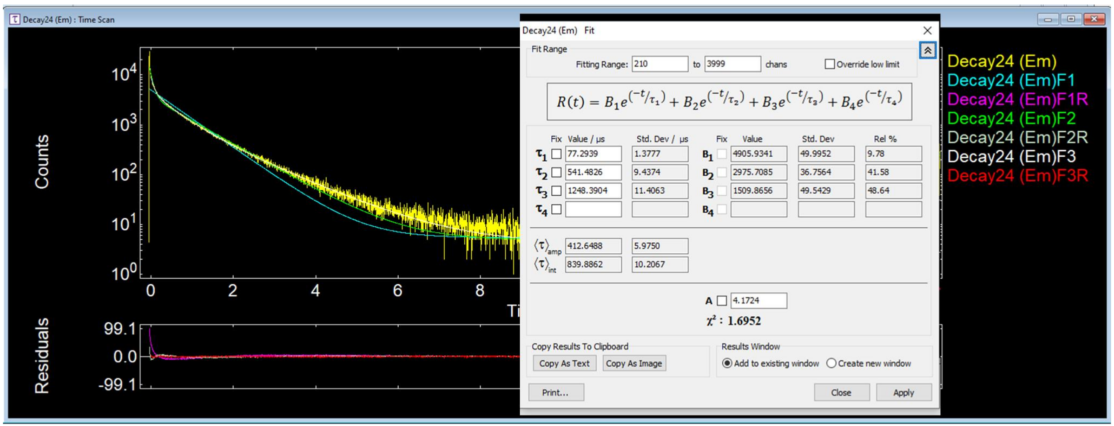


Figure S57. Fluorescence lifetime of **Eu-P6MOF/C6/Perylene** system in DMF at 323K.

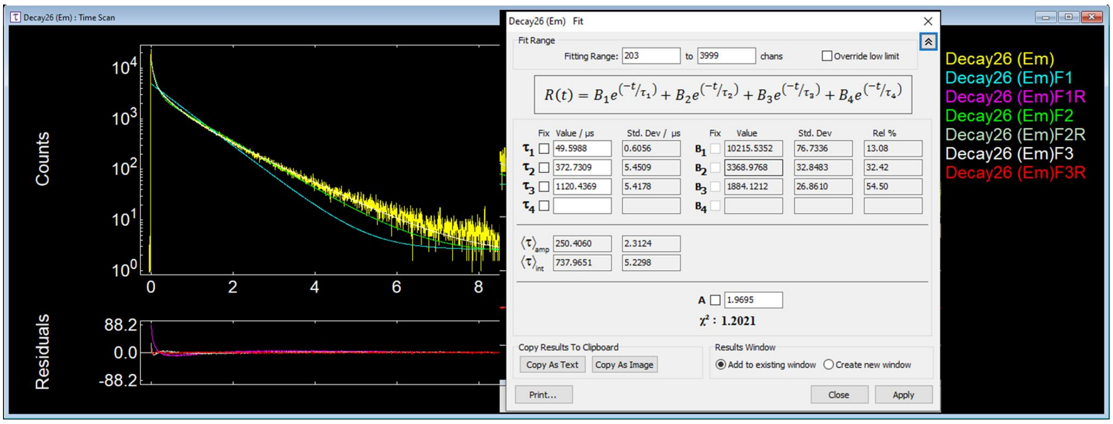


Figure S58. Fluorescence lifetime of **Eu-P6MOF/C6/Perylene** system in DMF at 348K.

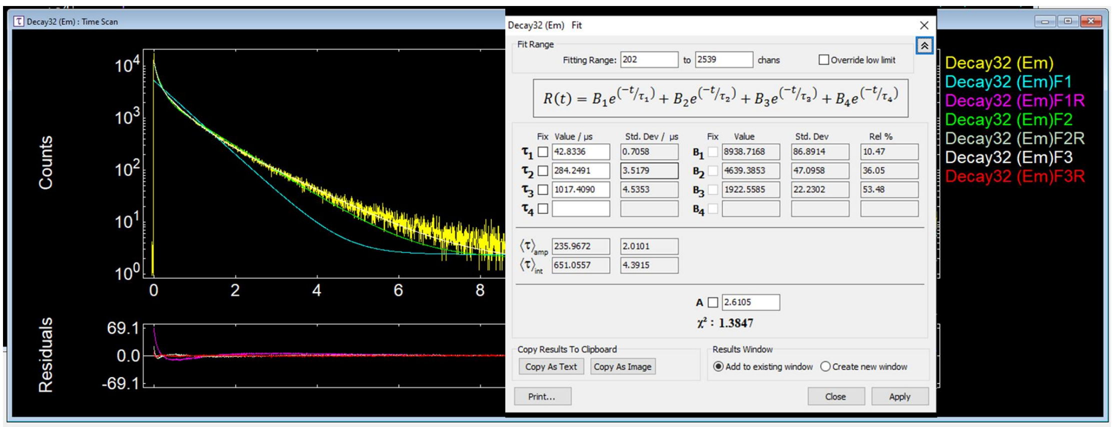


Figure S59. Fluorescence lifetime of **Eu-P6MOF/C6/Perylene** system in DMF at 373K.

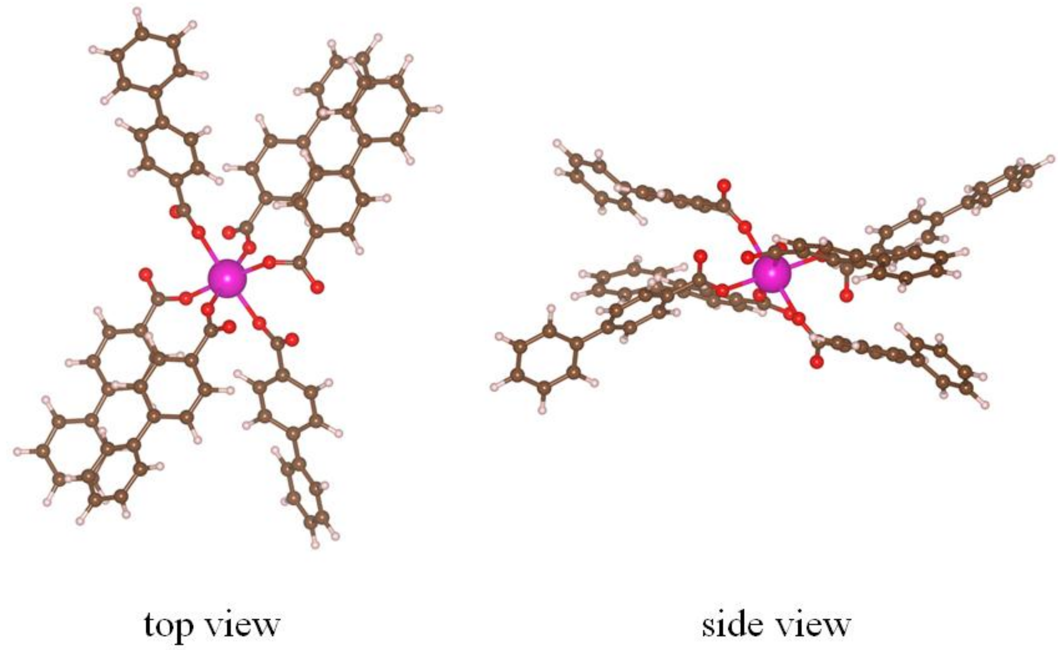


Figure S60. Optimized geometric structure of the **Eu-P6MOF** framework calculated using density functional theory (DFT) based on the VASP package. Top and side views are shown on the left and right, respectively. Color code: Eu (purple), O (red), C (brown), H (light pink).

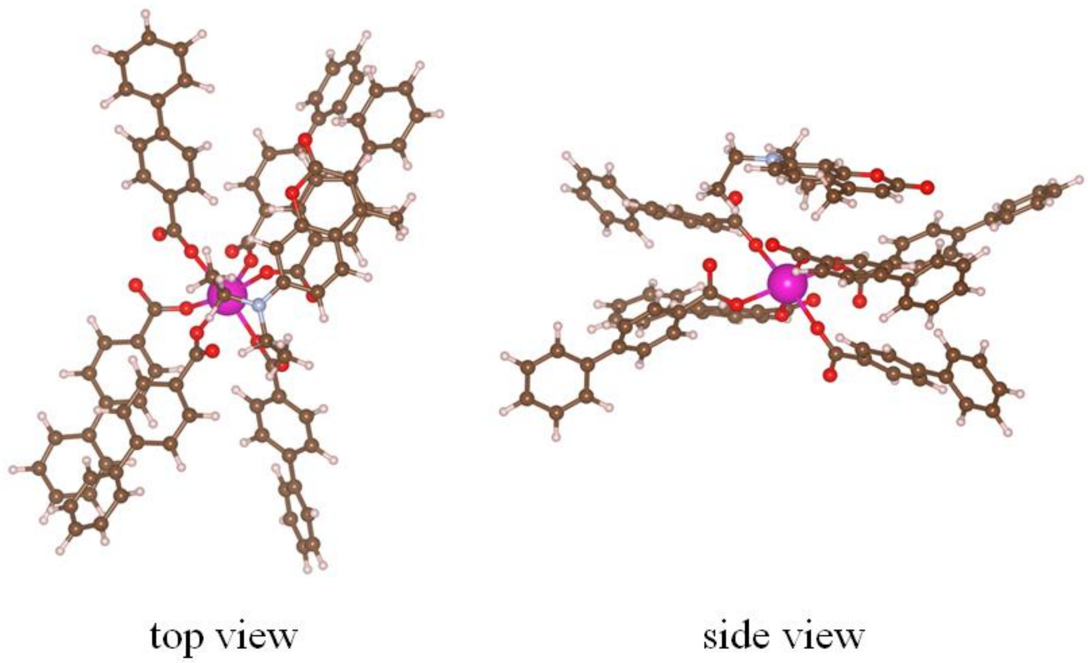


Figure S61. Optimized geometries of the interaction between **Eu-P6MOF** and Coumarin1 calculated using density functional theory (DFT) based on the VASP package, along with the corresponding binding energy (E_b = -2.07 eV). Top and side views are shown on the left and right, respectively. Color code: Eu (purple), O (red), C (brown), H (light pink), N (light blue).

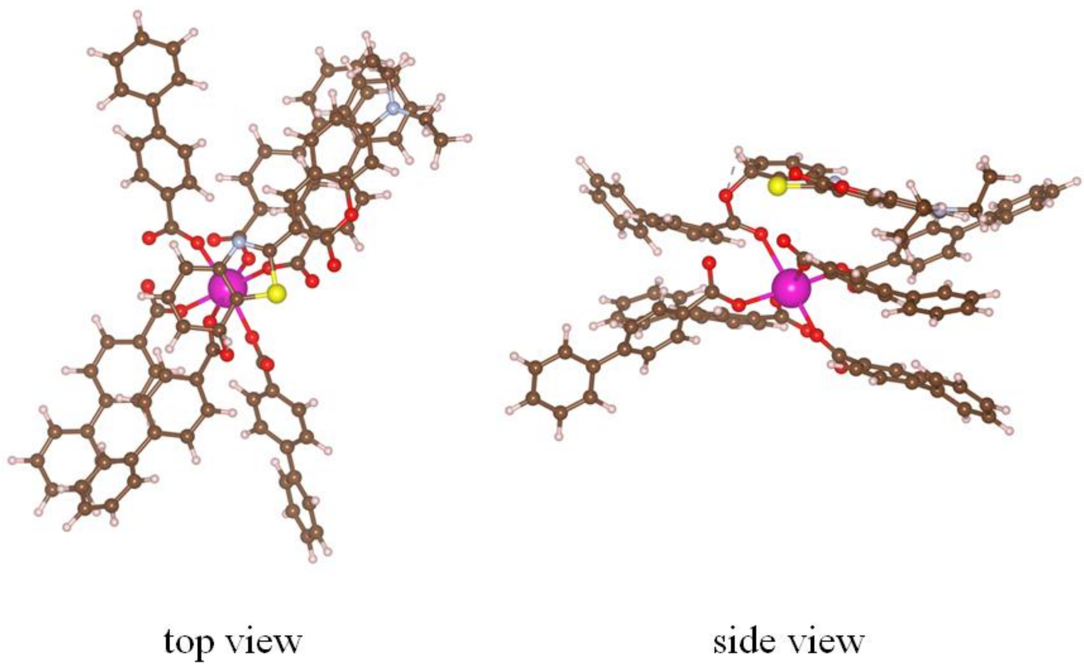


Figure S62. Optimized geometries of the interaction between **Eu-P6MOF** and Coumarin6 calculated using density functional theory (DFT) based on the VASP package, along with the corresponding binding energy (E_b = -1.54 eV). Top and side views are shown on the left and right, respectively. Color code: Eu (purple), O (red), C (brown), H (light pink), N (light blue), S (yellow).

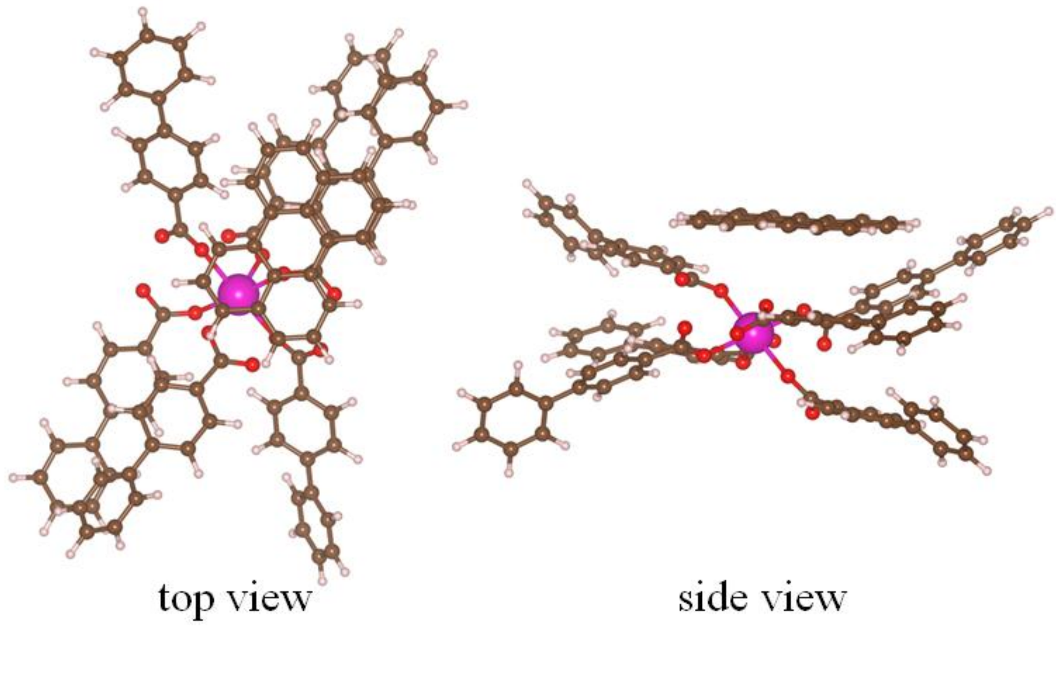


Figure S63. Optimized geometries of the interaction between **Eu-P6MOF** and Perylene calculated using density functional theory (DFT) based on the VASP package, along with the corresponding binding energy (E_b = -1.18 eV). Top and side views are shown on the left and right, respectively. Color code: Eu (purple), O (red), C (brown), H (light pink).

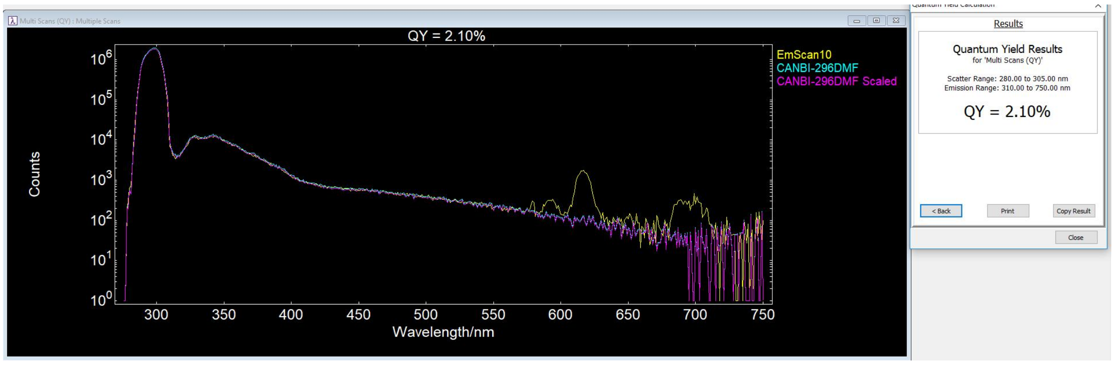


Figure S64. Quantum yield of **Eu-P6MOF** suspension (1 mg in 10 mL DMF) upon 296 nm excitation.

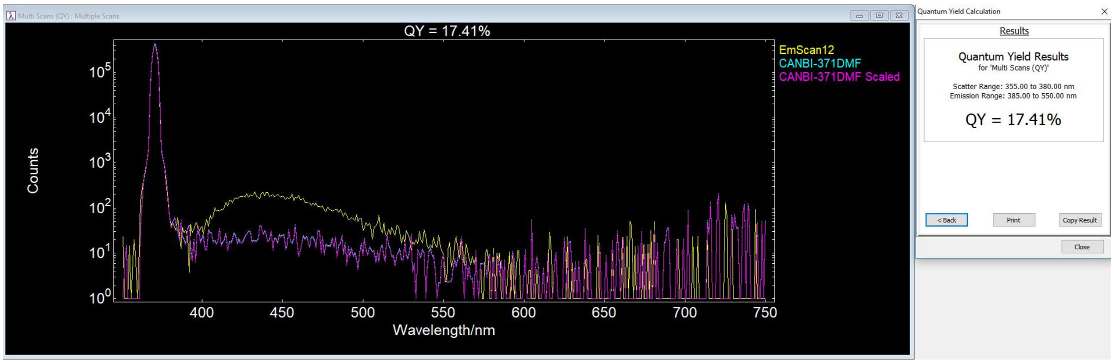


Figure S65. Quantum yield of Coumarin 1 (0.25 µg/mL, 5 µL of 0.1 mg/mL stock solution in 2 mL DMF) upon 371 nm excitation.

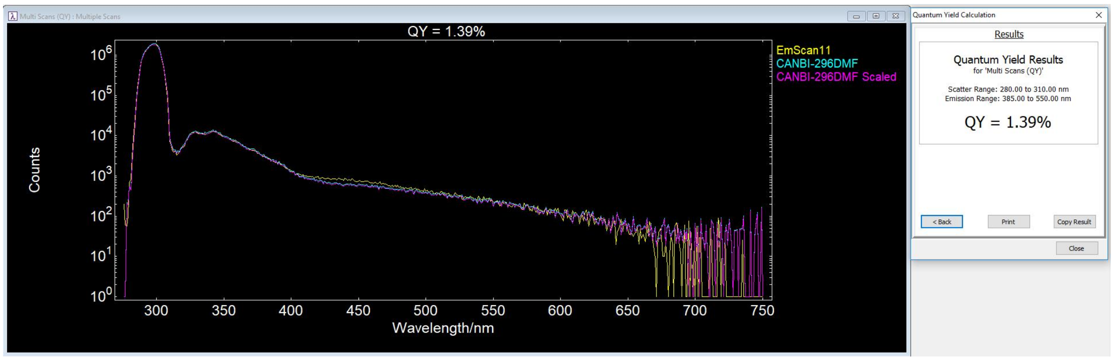


Figure S66. Quantum yield of Coumarin 1 (0.25 µg/mL, 5 µL of 0.1 mg/mL stock solution in 2 mL DMF) upon 296 nm excitation.

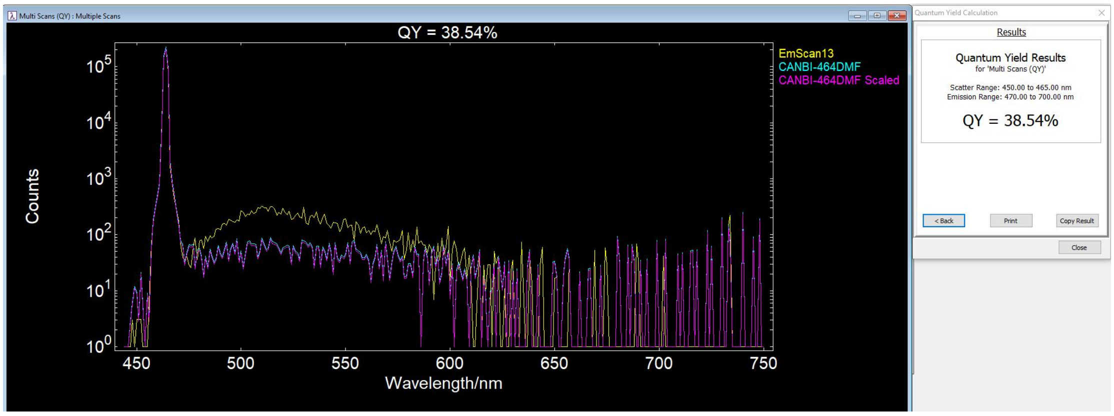


Figure S67. Quantum yield of Coumarin 6 (0.15 μg/mL, 3 μL of 0.1 mg/mL stock solution in 2 mL DMF) upon 464 nm excitation.

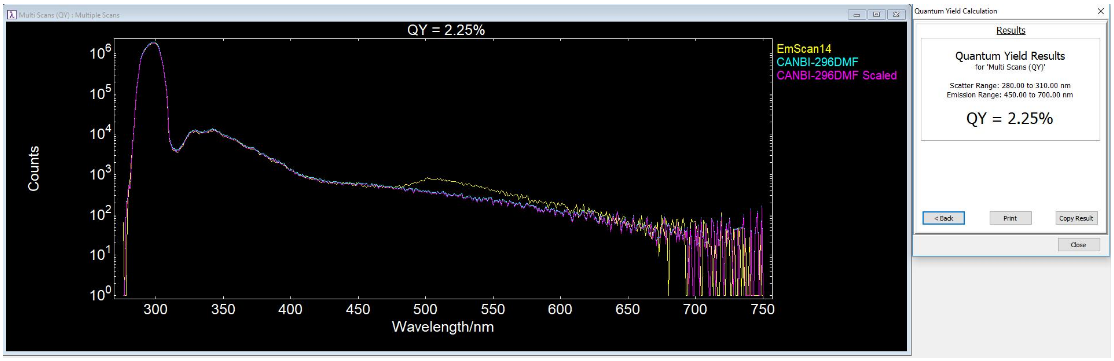


Figure S68. Quantum yield of Coumarin 6 (0.15 μg/mL, 3 μL of 0.1 mg/mL stock solution in 2 mL DMF) upon 296 nm excitation.

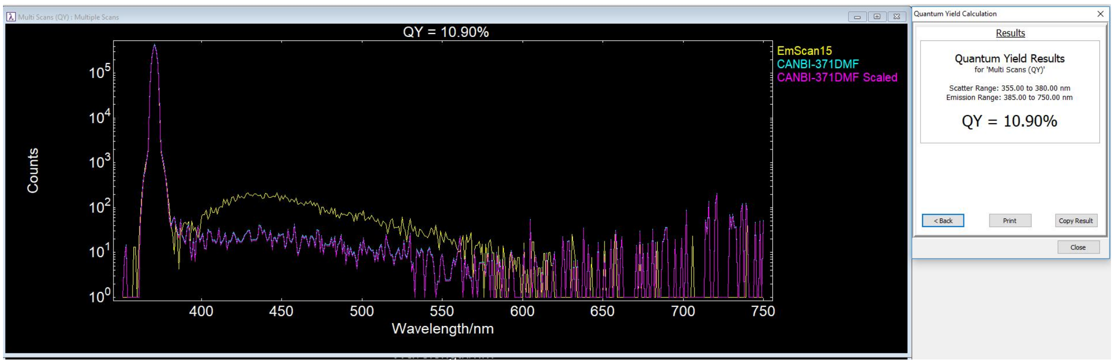


Figure S69. Quantum yield of **Eu-P6MOF/C6/C1** system in DMF upon 371 nm excitation.

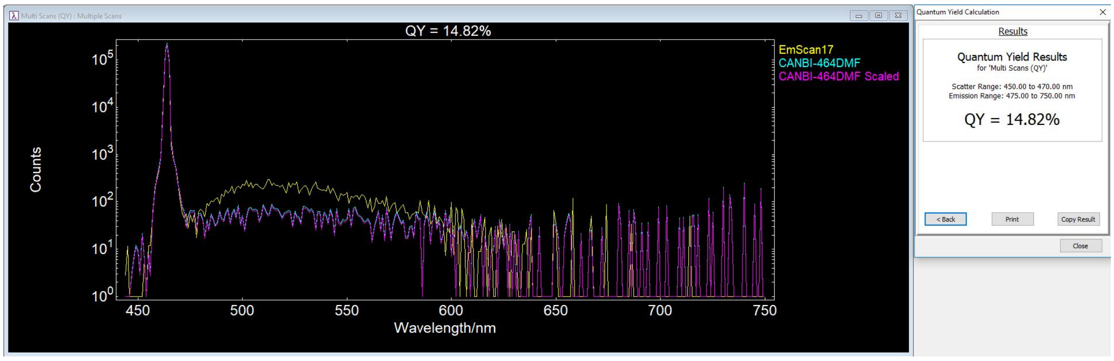


Figure S70. Quantum yield of **Eu-P6MOF/C6/C1** system in DMF upon 464 nm excitation.

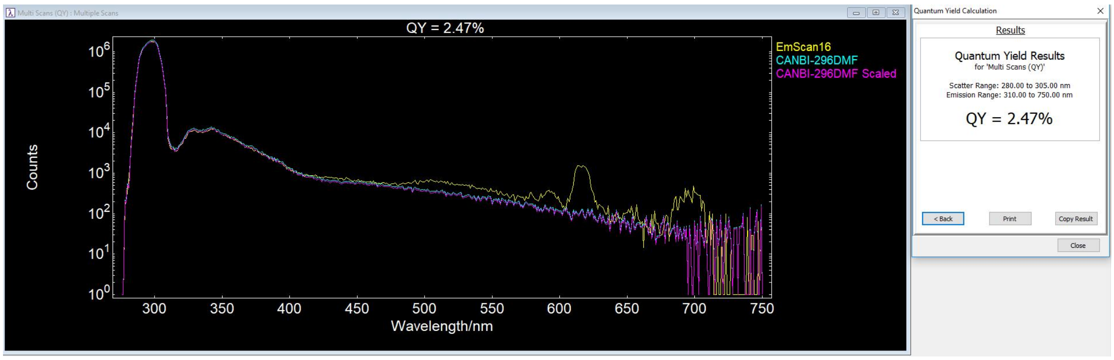


Figure S71. Quantum yield of **Eu-P6MOF/C6/C1** system in DMF upon 296 nm excitation.

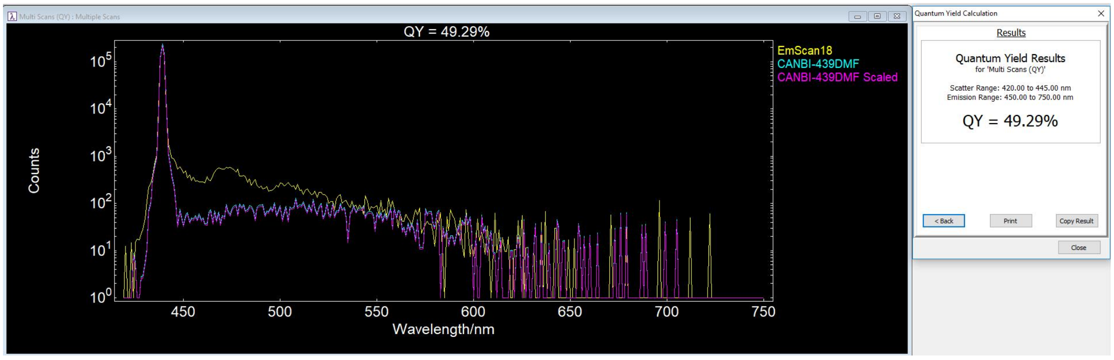


Figure S72. Quantum yield of Perylene (0.525 µg/mL, 10.5 µL of 0.1 mg/mL stock solution in 2 mL DMF) upon 439 nm excitation.

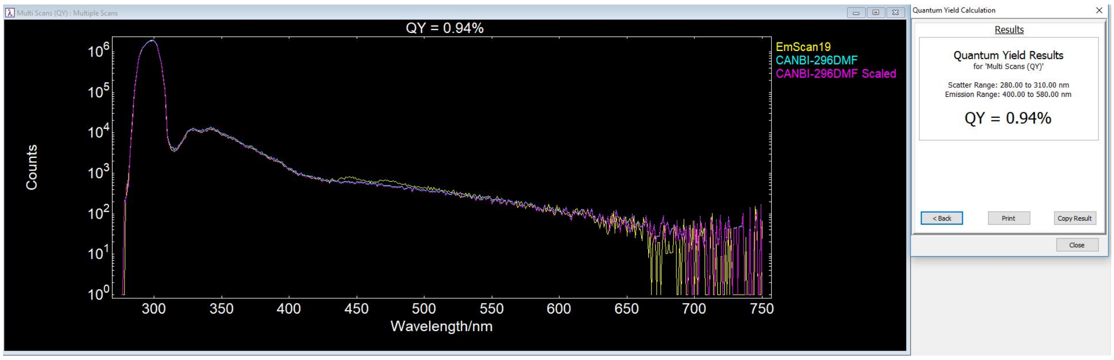


Figure S73. Quantum yield of Perylene (0.525 μg/mL, 10.5 μL of 0.1 mg/mL stock solution in 2 mL DMF) upon 296 nm excitation.

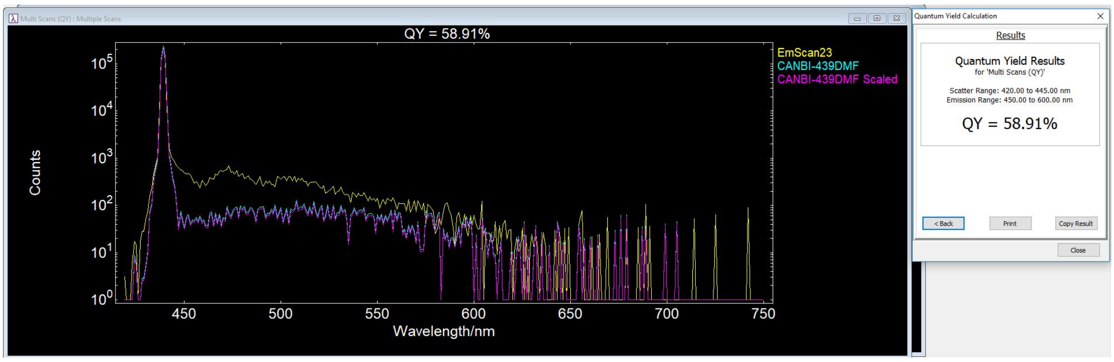


Figure S74. Quantum yield of **Eu-P6MOF/C6/Perylene** system in DMF upon 439 nm excitation.

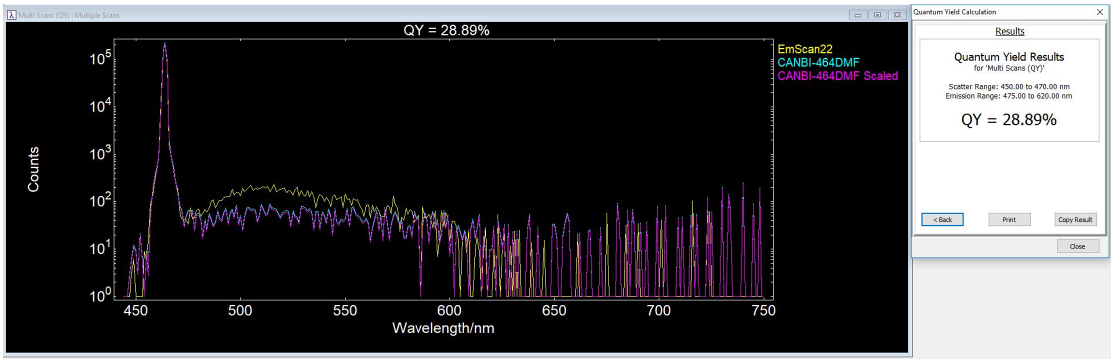


Figure S75. Quantum yield of **Eu-P6MOF/C6/Perylene** system in DMF upon 464 nm excitation.

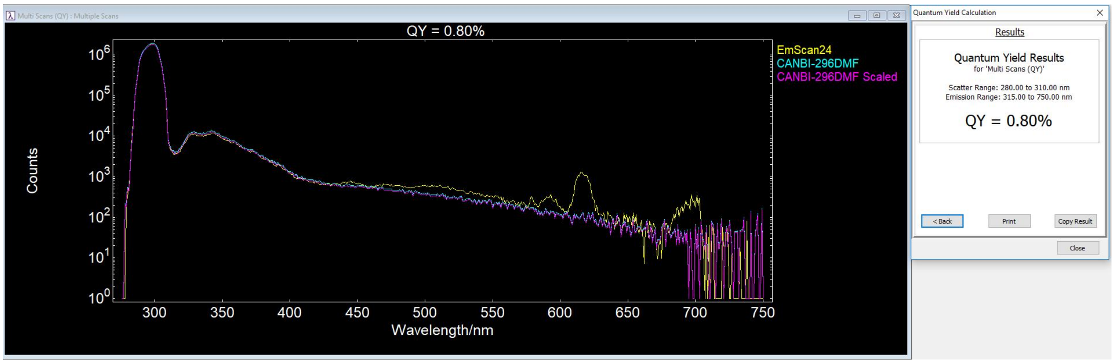


Figure S76. Quantum yield of **Eu-P6MOF/C6/Perylene** system in DMF upon 296 nm excitation.

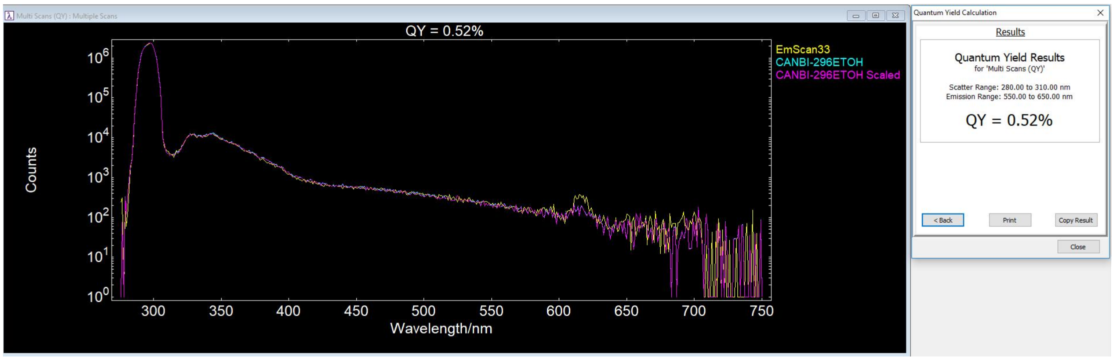


Figure S77. Quantum yield of **Eu-P6MOF** suspension (1 mg in 10 mL EtOH) upon 296 nm excitation.

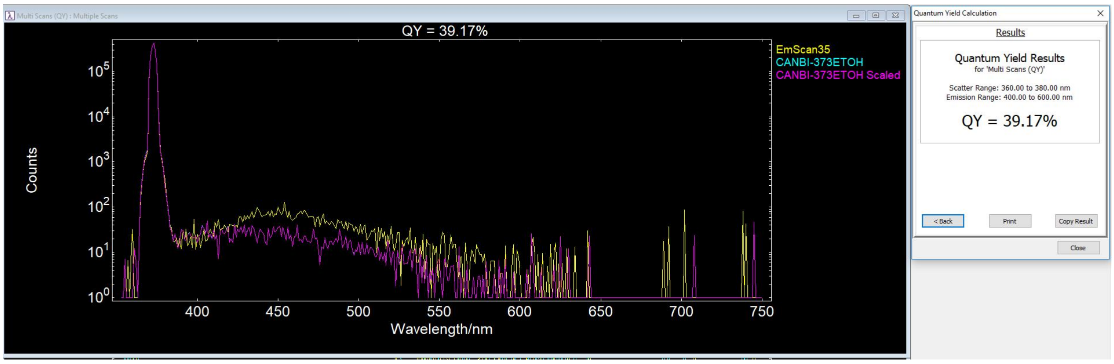


Figure S78. Quantum yield of Coumarin 1 (0.07 µg/mL, 14 µL of 0.01 mg/mL stock solution in 2 mL EtOH) upon 373 nm excitation.

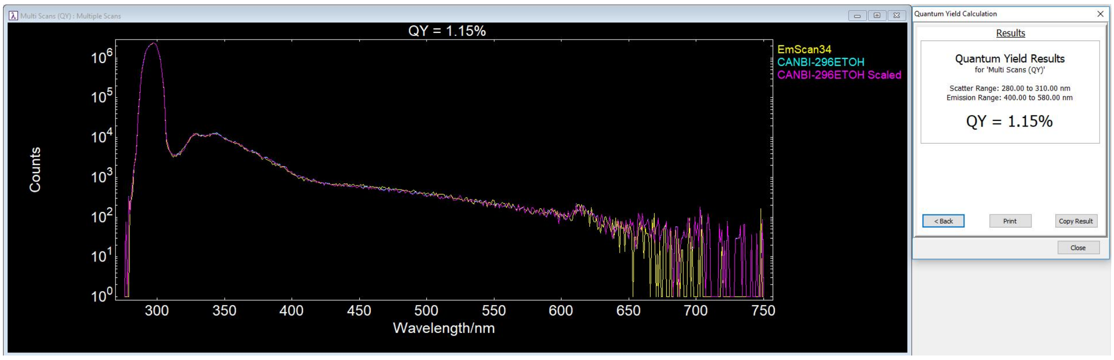


Figure S79. Quantum yield of Coumarin 1 (0.07 μg/mL, 14 μL of 0.01 mg/mL stock solution in 2 mL EtOH) upon 296 nm excitation.

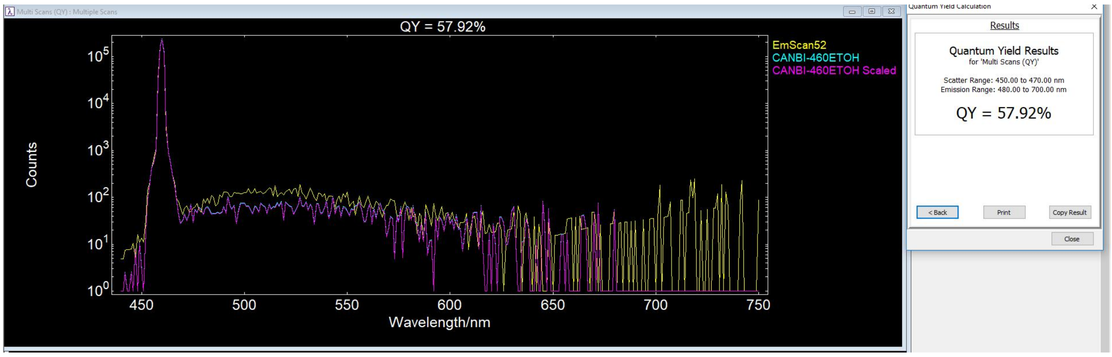


Figure S80. Quantum yield of Coumarin 6 (0.0425 μg/mL, 8.5 μL of 0.01 mg/mL stock solution in 2 mL EtOH) upon 460 nm excitation.

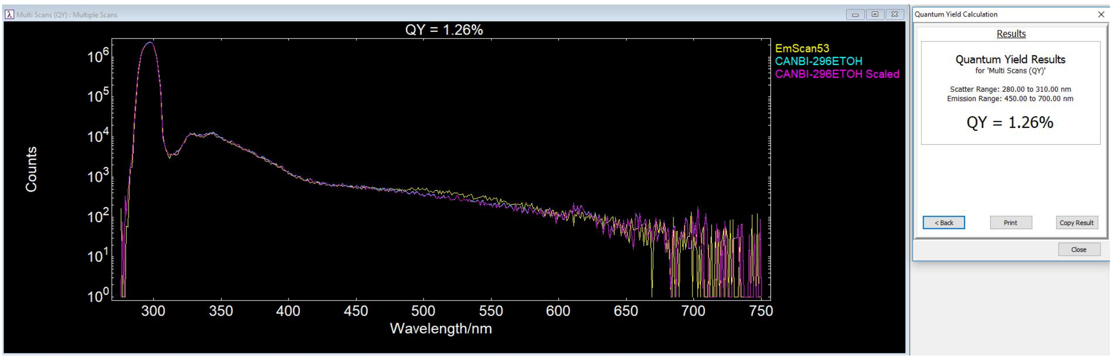


Figure S81. Quantum yield of Coumarin 6 (0.0425 μg/mL, 8.5 μL of 0.01 mg/mL stock solution in 2 mL EtOH) upon 296 nm excitation.

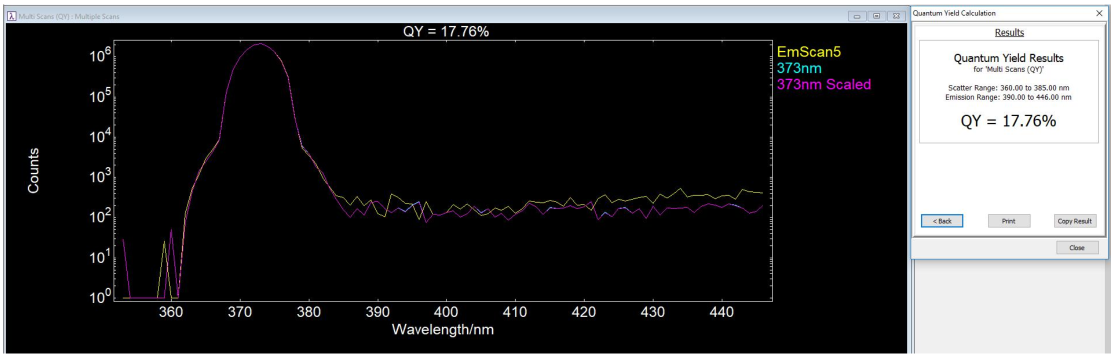


Figure S82. Quantum yield of **Eu-P6MOF/C6/C1** system in EtOH upon 373 nm excitation.

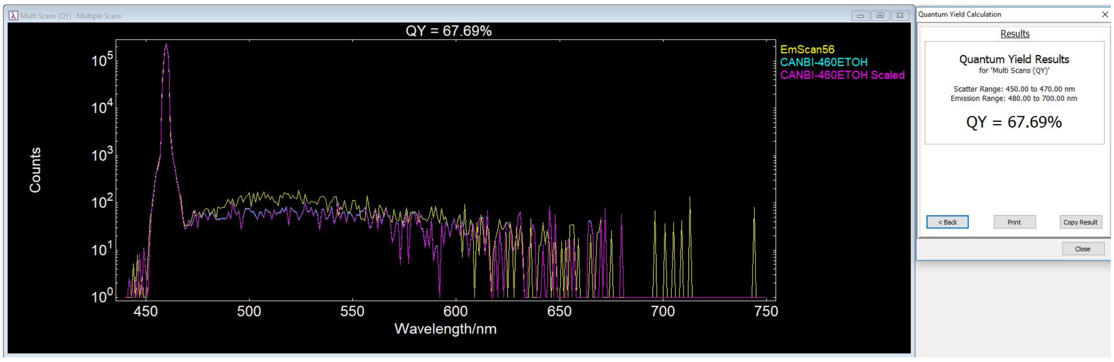


Figure S83. Quantum yield of **Eu-P6MOF/C6/C1** system in EtOH upon 460 nm excitation.

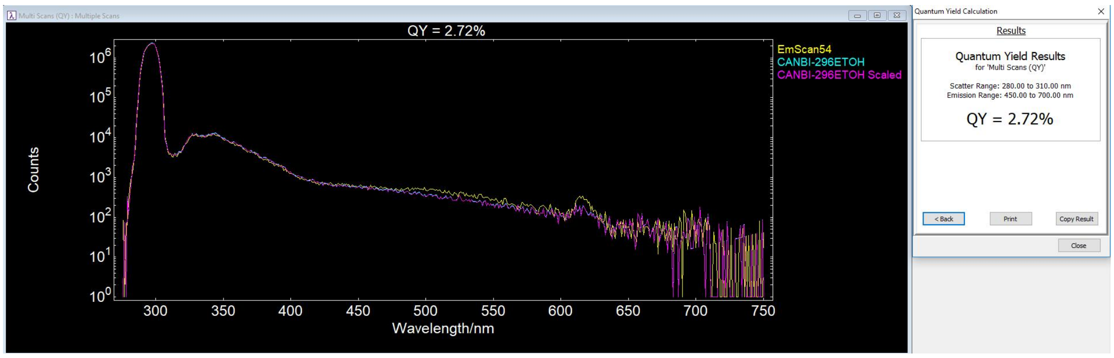


Figure S84. Quantum yield of **Eu-P6MOF/C6/C1** system in EtOH upon 296 nm excitation.

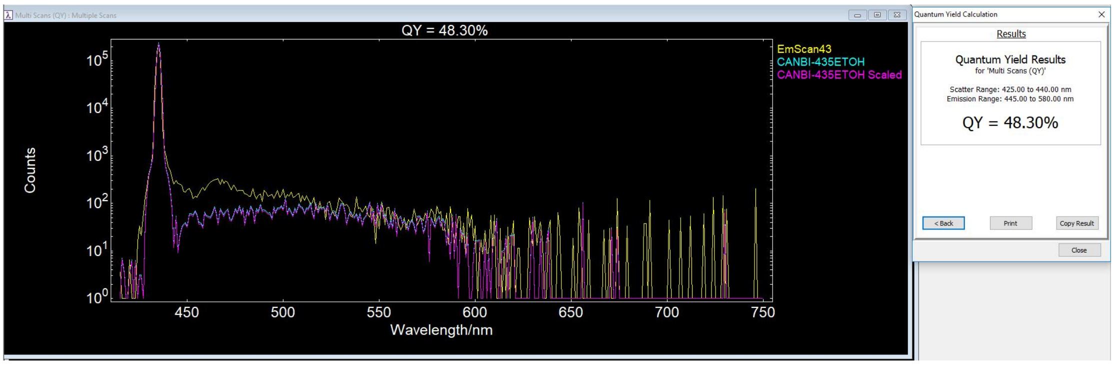


Figure S85. Quantum yield of Perylene (0.15 µg/mL, 30 µL of 0.01 mg/mL stock solution in 2 mL EtOH) upon 435 nm excitation.

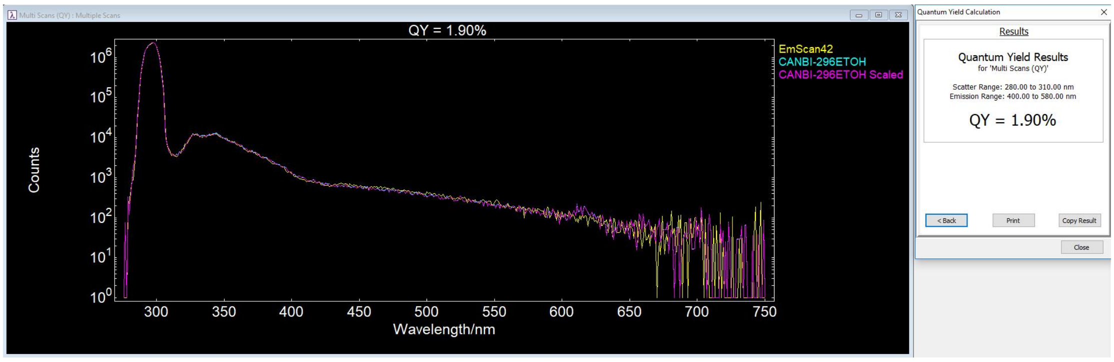


Figure S86. Quantum yield of Perylene (0.15 µg/mL, 30 µL of 0.01 mg/mL stock solution in 2 mL EtOH) upon 296 nm excitation.

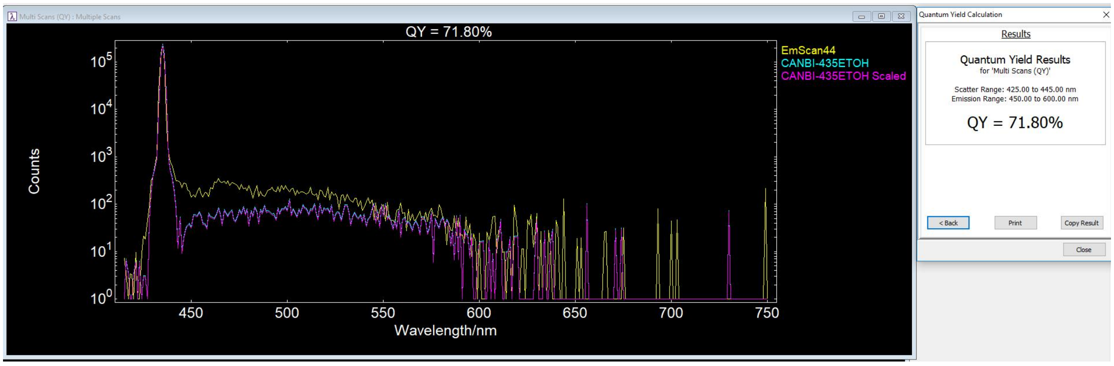


Figure S87. Quantum yield of **Eu-P6MOF/C6/Perylene** system in EtOH upon 435 nm excitation.

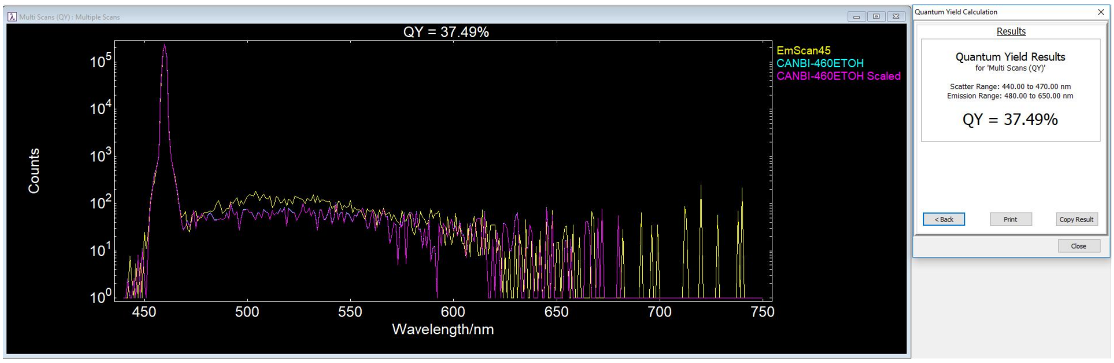


Figure S88. Quantum yield of **Eu-P6MOF/C6/Perylene** system in EtOH upon 460 nm excitation.

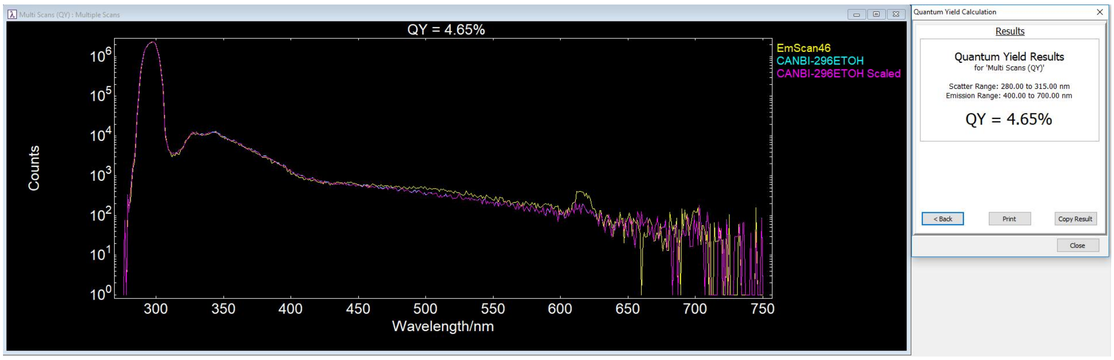


Figure S89. Quantum yield of **Eu-P6MOF/C6/Perylene** system in EtOH upon 296 nm excitation.

Table S1. Fluorescence Titration and Corresponding CIE Coordinates of the **Eu-P6MOF/C6/C1** system in DMF.

No.	CIE x	CIE y
Eu-P6MOF	0.635	0.3337
Eu-C6 1μL(0.1 μg)	0.532	0.4071
Eu-C6 2μL(0.2 μg)	0.471	0.4503
Eu-C6 3μL(0.3 μg)	0.4305	0.4788
Eu-C6(0.3 μg)-C1 1μL(0.1 μg)	0.4026	0.4386
Eu-C6(0.3 μg)-C1 2μL(0.2 μg)	0.3814	0.4045
Eu-C6(0.3 μg)-C1 3μL(0.3 μg)	0.3627	0.3784
Eu-C6(0.3 μg)-C1 4μL(0.4 μg)	0.347	0.3546
Eu-C6(0.3 μg)-C1 5μL(0.5 μg)	0.3337	0.3346
Eu-C6(0.3 μg)-C1 5.5μL(0.55 μg)	0.3276	0.3254
Eu-C6(0.3 μg)-C1 6μL(0.6 μg)	0.3209	0.3162
Eu-C6(0.3 μg)-C1 7μL(0.7 μg)	0.3098	0.2999
Eu-C6(0.3 μg)-C1 8μL(0.8 μg)	0.3009	0.285
Eu-C6(0.3 μg)-C1 9μL(0.9 μg)	0.2914	0.2724
Eu-C6(0.3 μg)-C1 10μL(1 μg)	0.2842	0.2609

Table S2. Photostability of the **Eu-P6MOF/C6/C1** system in DMF.

No.	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y
	Eu-P6MOF		C1		C6		**Eu-P6MOF-C6-C1**		**Eu-P6MOF-C1**		**Eu-P6MOF-C6**	
0 h	0.6341	0.3332	0.1636	0.0572	0.2302	0.6166	0.3337	0.3346	0.3815	0.185	0.4197	0.4767
1 h	0.6336	0.3335	0.1631	0.0576	0.2303	0.6148	0.332	0.3392	0.3905	0.1915	0.4232	0.4704
2 h	0.6333	0.3334	0.163	0.0586	0.2301	0.6143	0.3304	0.3412	0.3926	0.1936	0.4264	0.463
3 h	0.6335	0.3336	0.163	0.0596	0.2302	0.6142	0.3293	0.3432	0.3961	0.1966	0.4296	0.4597
4 h	0.6326	0.3338	0.1631	0.0606	0.2304	0.6143	0.3277	0.3449	0.3987	0.1987	0.4299	0.4582
5 h	0.6323	0.3337	0.1631	0.0616	0.2303	0.6149	0.3287	0.3463	0.4032	0.202	0.4318	0.4571
16 h	0.6319	0.3338	0.1646	0.0747	0.2313	0.6151	0.3193	0.3667	0.4174	0.2153	0.4283	0.4598
21 h	0.6307	0.3333	0.1658	0.082	0.2322	0.6163	0.3216	0.3755	0.4288	0.2241	0.4295	0.4595
24 h	0.6306	0.3334	0.1665	0.0857	0.2324	0.6166	0.3182	0.3795	0.4311	0.2267	0.429	0.459

Table S3. Fluorescence Titration and Corresponding CIE Coordinates of the **Eu-P6MOF/C6/Perylene** system in DMF.

No.	CIE x	CIE y
Eu-P6MOF	0.6382	0.332
Eu-C6 0.5μL(0.05 μg)	0.5771	0.3757
Eu-C6 1μL(0.1 μg)	0.5149	0.42
Eu-C6 1.5μL(0.15 μg)	0.4788	0.4451
Eu-C6 2μL(0.2 μg)	0.452	0.4636
Eu-C6 2.5μL(0.25 μg)	0.431	0.4785
Eu-C6(0.25 μg)-Perylene 2μL(0.2 μg)	0.4014	0.4388
Eu-C6(0.25 μg)-Perylene 4μL(0.4 μg)	0.3779	0.4061
Eu-C6(0.25 μg)-Perylene 6μL(0.6 μg)	0.3598	0.3796
Eu-C6(0.25 μg)-Perylene 8μL(0.8 μg)	0.3439	0.3573
Eu-C6(0.25 μg)-Perylene 10μL(1 μg)	0.3293	0.3383
Eu-C6(0.25 μg)-Perylene 10.5μL(1.05μg)	0.3283	0.3348
Eu-C6(0.25 μg)-Perylene 11μL(1.1 μg)	0.3249	0.3303
Eu-C6(0.25 μg)-Perylene 13μL(1.3 μg)	0.3148	0.3158
Eu-C6(0.25 μg)-Perylene 15μL(1.5 μg)	0.3039	0.3019

Table S4. Photostability of the **Eu-P6MOF/C6/ Perylene** System in DMF.

No.	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y
	Eu-P6MOF		Perylene		C6		**Eu-P6MOF-C6-Perylene**		**Eu-P6MOF-Perylene**		**Eu-P6MOF-C6**	
0 h	0.6357	0.3323	0.1548	0.0982	0.2354	0.6186	0.3246	0.338	0.3757	0.2046	0.4257	0.4785
1 h	0.6339	0.3312	0.155	0.098	0.2366	0.6172	0.3297	0.3375	0.3746	0.2042	0.4257	0.4773
2 h	0.6316	0.3305	0.1551	0.0982	0.2367	0.6179	0.332	0.3374	0.3727	0.2033	0.4233	0.4778
3 h	0.6321	0.3311	0.1551	0.0983	0.2364	0.6175	0.334	0.3371	0.3757	0.2051	0.4251	0.4764
4 h	0.6306	0.3305	0.1552	0.0984	0.2366	0.6173	0.3381	0.337	0.3748	0.2048	0.4247	0.4762
5 h	0.6316	0.3311	0.1552	0.0985	0.2366	0.6176	0.3358	0.3371	0.3757	0.2055	0.4275	0.4742
6 h	0.6298	0.3305	0.1553	0.0988	0.2366	0.618	0.3416	0.3368	0.3744	0.2052	0.4273	0.4738
16 h	0.626	0.3294	0.156	0.1001	0.237	0.6184	0.3312	0.3345	0.3687	0.2035	0.4243	0.4737
21 h	0.623	0.3279	0.1561	0.1007	0.2371	0.6188	0.3301	0.3332	0.3704	0.2049	0.4211	0.474
24 h	0.6208	0.3272	0.1563	0.1008	0.2369	0.6189	0.3253	0.3322	0.3648	0.2022	0.4187	0.4737

Table S5. CIE coordinates of the **Eu-P6MOF-C6-Perylene** in DMF during storage.

No.	CIE x	CIE y
0 d	0.3246	0.338
80 d	0.3205	0.3219
168 d	0.3129	0.3129
184 d	0.3101	0.3103
197 d	0.3058	0.3095

Table S6. Fluorescence Titration and Corresponding CIE Coordinates of the **Eu-P6MOF/C6/DPA** system in DMF.

No.	CIE x	CIE y
Eu-P6MOF	0.6417	0.3308
Eu-C6 0.5μL(0.05 μg)	0.5579	0.3887
Eu-C6 1μL(0.1 μg)	0.5063	0.4254
Eu-C6 1.5μL(0.15 μg)	0.4593	0.4577
Eu-C6 2μL(0.2 μg)	0.4239	0.4827
Eu-C6(0.2 μg)-DPA 2μL(0.2 μg)	0.408	0.4545
Eu-C6(0.2 μg)-DPA 4μL(0.4 μg)	0.4014	0.4279
Eu-C6(0.2 μg)-DPA 6μL(0.6 μg)	0.3827	0.41
Eu-C6(0.2 μg)-DPA 8μL(0.8 μg)	0.3686	0.3909
Eu-C6(0.2 μg)-DPA 10μL(1.0 μg)	0.3574	0.3739
Eu-C6(0.2 μg)-DPA 12μL(1.2 μg)	0.3447	0.3588
Eu-C6(0.2 μg)-DPA 14μL(1.4 μg)	0.3341	0.3435
Eu-C6(0.2 μg)-DPA 16μL(1.6 μg)	0.3322	0.3306
Eu-C6(0.2 μg)-DPA 18μL(1.8 μg)	0.323	0.3184
Eu-C6(0.2 μg)-DPA 20μL(2.0 μg)	0.3199	0.3078

Table S7. Photostability of the **Eu-P6MOF/C6/ DPA** System in DMF.

No.	CIE x	CIE y	CIE x	CIE y
	Eu-P6MOF-C6-DPA		DPA	
0 h	0.3322	0.3306	0.1719	0.0625
1 h	0.3282	0.3312	0.1713	0.0619
2 h	0.3324	0.3308	0.1712	0.0619
3 h	0.3307	0.3306	0.1714	0.0619
4 h	0.3358	0.3295	0.1713	0.0619
5 h	0.3385	0.3303	0.1715	0.0622
16 h	0.3388	0.3311	0.1719	0.0633
21 h	0.3329	0.3301	0.172	0.0633
24 h	0.3317	0.3301	0.1721	0.0633

Table S8. Fluorescence Titration and Corresponding CIE Coordinates of the **Eu-P6MOF/C6/Perylene** system in EtOH.

No.	CIE x	CIE y
Eu-P6MOF	0.6086	0.3285
Eu-C6 2 μL(0.02 μg)	0.5375	0.3686
Eu-C6 4 μL(0.04 μg)	0.4896	0.3973
Eu-C6 6 μL(0.06 μg)	0.4588	0.4178
Eu-C6 8 μL(0.08 μg)	0.4334	0.4352
Eu-C6 8.5 μL(0.085 μg)	0.4227	0.4397
Eu-C6(0.085 μg)-Perylene 5 μL(0.05 μg)	0.3956	0.4124
Eu-C6(0.085 μg)-Perylene 10 μL(0.1 μg)	0.3855	0.3872
Eu-C6(0.085 μg)-Perylene 15 μL(0.15 μg)	0.3719	0.3683
Eu-C6(0.085 μg)-Perylene 20 μL(0.2 μg)	0.357	0.353
Eu-C6(0.085 μg)-Perylene 25 μL(0.25 μg)	0.3489	0.3393
Eu-C6(0.085 μg)-Perylene 27.5 μL(0.27.5 μg)	0.3413	0.3327
Eu-C6(0.085 μg)-Perylene 30 μL(0.3 μg)	0.3393	0.3272
Eu-C6(0.085 μg)-Perylene 35 μL(0.35 μg)	0.3243	0.3147
Eu-C6(0.085 μg)-Perylene 40 μL(0.4 μg)	0.318	0.3041
Eu-C6(0.085 μg)-Perylene 45 μL(0.45 μg)	0.3099	0.2944
Eu-C6(0.085 μg)-Perylene 50 μL(0.5 μg)	0.3002	0.2853

Table S9. Fluorescence Titration and Corresponding CIE Coordinates of the **Eu-P6MOF/C6/C1** system in EtOH.

No.	CIE x	CIE y
Eu-P6MOF	0.6092	0.3298
Eu-C6 2 μL(0.02 μg)	0.542	0.3728
Eu-C6 4 μL(0.04 μg)	0.4946	0.4012
Eu-C6 6 μL(0.06 μg)	0.4622	0.4227
Eu-C6 8 μL(0.08 μg)	0.4347	0.4399
Eu-C6 8.5 μL(0.085 μg)	0.4254	0.4449
Eu-C6(0.085 μg)-C1 2.5 μL(0.025 μg)	0.4071	0.4164
Eu-C6(0.085 μg)-C1 5 μL(0.05 μg)	0.39	0.3929
Eu-C6(0.085 μg)-C1 7.5 μL(0.075 μg)	0.3691	0.3728
Eu-C6(0.085 μg)-C1 10 μL(0.1 μg)	0.3582	0.3547
Eu-C6(0.085 μg)-C1 12.5 μL(0.125 μg)	0.3464	0.3384
Eu-C6(0.085 μg)-C1 13 μL(0.13 μg)	0.3392	0.3353
Eu-C6(0.085 μg)-C1 13.5 μL(0.135 μg)	0.3408	0.3327
Eu-C6(0.085 μg)-C1 14 μL(0.14 μg)	0.3375	0.3299
Eu-C6(0.085 μg)-C1 14.5 μL(0.145 μg)	0.3363	0.3273
Eu-C6(0.085 μg)-C1 15 μL(0.15 μg)	0.3339	0.3249
Eu-C6(0.085 μg)-C1 17.5 μL(0.175 μg)	0.3252	0.3122
Eu-C6(0.085 μg)-C1 20 μL(0.2 μg)	0.3151	0.3003

Table S10. Photostability of the **Eu-P6MOF/C1/C6/Perylene** System in EtOH.

No.	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y
	Eu-P6MOF		C1		C6		Perylene		**Eu-P6MOF-C6-C1**		**Eu-P6MOF-C6-Perylene**	
0 h	0.6178	0.3313	0.1659	0.088	0.2209	0.5629	0.1689	0.0879	0.3403	0.3327	0.3404	0.3342
1 h	0.6183	0.3299	0.1662	0.0924	0.2201	0.5636	0.1687	0.0877	0.3391	0.3367	0.3436	0.3336
2 h	0.6147	0.3297	0.1666	0.0986	0.2195	0.5641	0.1684	0.0872	0.348	0.3434	0.3429	0.3339
3 h	0.611	0.3285	0.1673	0.1049	0.2191	0.5648	0.1683	0.0871	0.3497	0.3491	0.3375	0.3332
4 h	0.6107	0.3294	0.1675	0.1089	0.219	0.5644	0.1685	0.0872	0.3498	0.3541	0.3384	0.3337
16 h	0.6011	0.3271	0.172	0.1462	0.2184	0.5653	0.1687	0.0884	0.3668	0.3796	0.3414	0.3349
21 h	0.5972	0.3253	0.1748	0.1655	0.2177	0.5658	0.1695	0.0897	0.3658	0.3794	0.3463	0.3355
24 h	0.595	0.3246	0.1756	0.1714	0.2175	0.5664	0.17	0.0906	0.3655	0.3794	0.3428	0.3358

Table S11. CIE coordinates of the **Eu-P6MOF-C6-Perylene** in EtOH during storage.

No.	CIE x	CIE y
0 d	0.3404	0.3342
49 d	0.3248	0.3301
137 d	0.3284	0.3235
153 d	0.328	0.3244
166 d	0.3238	0.3252

Table S12. Fluorescence properties of **Eu-P6MOF** and three dyes: Lifetimes at corresponding excitation wavelengths.

solv	Sample	λex	τ
		1	
DMF	**Eu-P6MOF**	375nm*	644.86980439 μs
	C1	375nm	3.1151 ns
	C6	450nm	2.4845 ns
		375nm	2.5975 ns
	Eu-P6MOF-C6- C1	375nm	3.2375 ns
		450nm	2.5026 ns
		375nm*	634.8503604 μs
		2	
DMF	Perylene	450nm	4.4515 ns
		375nm	4.5418 ns
	Eu-P6MOF-C6-Perylene	450nm	3.13110429 ns
		375nm*	670.31021549 μs
		3	
EtOH	**Eu-P6MOF**	375nm*	363.94896768 μs
	C1	375nm	3.1622 ns
	C6	450nm	2.6846 ns
		375nm	3.2313808 ns
	Eu-P6MOF-C6-C1	375nm	3.2496 ns
		450nm	2.6756 ns
		375nm*	314.2518513 μs
		4	
EtOH	Perylene	450nm	4.321 ns
		375nm	4.3099 ns
	Eu-P6MOF-C6-Perylene	450nm	4.3262 ns
		375nm*	320.36307736 μs

(375nm*: testing with a 375nm microsecond lamp.)

Table S13. Temperature-dependent fluorescence lifetimes of **Eu-P6MOF-C6-C1** and **Eu-P6MOF-C6-Perylene** in DMF.

solv	Sample	Temp.(K)	τ (μs)
DMF	**Eu-P6MOF-C6-C1**	323	854.5156
		348	785.0038
		373	707.091
	Eu-P6MOF-C6-Perylene	323	839.9249
		348	737.965
		373	651.0668

Table S14. Fluorescence properties of **Eu-P6MOF** and three dyes: Quantum yields at corresponding excitation wavelengths.

solv	Sample	λex	Φ
	1		
DMF	**Eu-P6MOF**	296nm	2.10%
	C1	296nm	1.39%
		371nm	17.41%
	C6	296nm	2.25%
		464nm	38.54%
	Eu-P6MOF-C6-C1	296nm	2.47%
		371nm	10.90%
		464nm	14.82%
	2		
DMF	Perylene	296nm	0.94%
		439nm	49.29%
	Eu-P6MOF-C6-Perylene	296nm	0.80%
		439nm	58.91%
		464nm	28.89%
	3		
EtOH	**Eu-P6MOF**	296nm	0.52%
	C1	296nm	1.15%
		373nm	39.17%
	C6	296nm	1.26%
		460nm	57.92%
	Eu-P6MOF-C6-C1	296nm	2.72%
		373nm	17.76%
		460nm	67.69%
	4		
EtOH	Perylene	296nm	1.90%
		435nm	48.30%
	Eu-P6MOF-C6-Perylene	296nm	4.65%
		435nm	71.80%
		460nm	37.49%

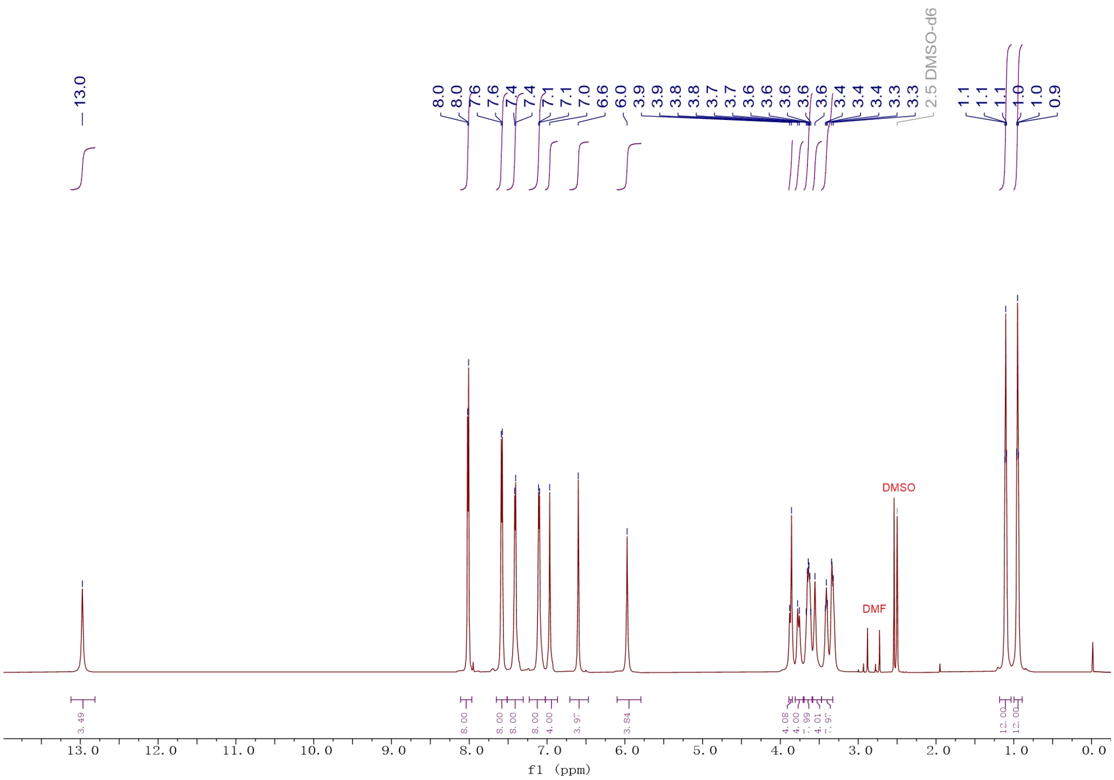


Figure S90. [1]H NMR spectrum (600 MHz) of H_8P6A in DMSO-d_6.

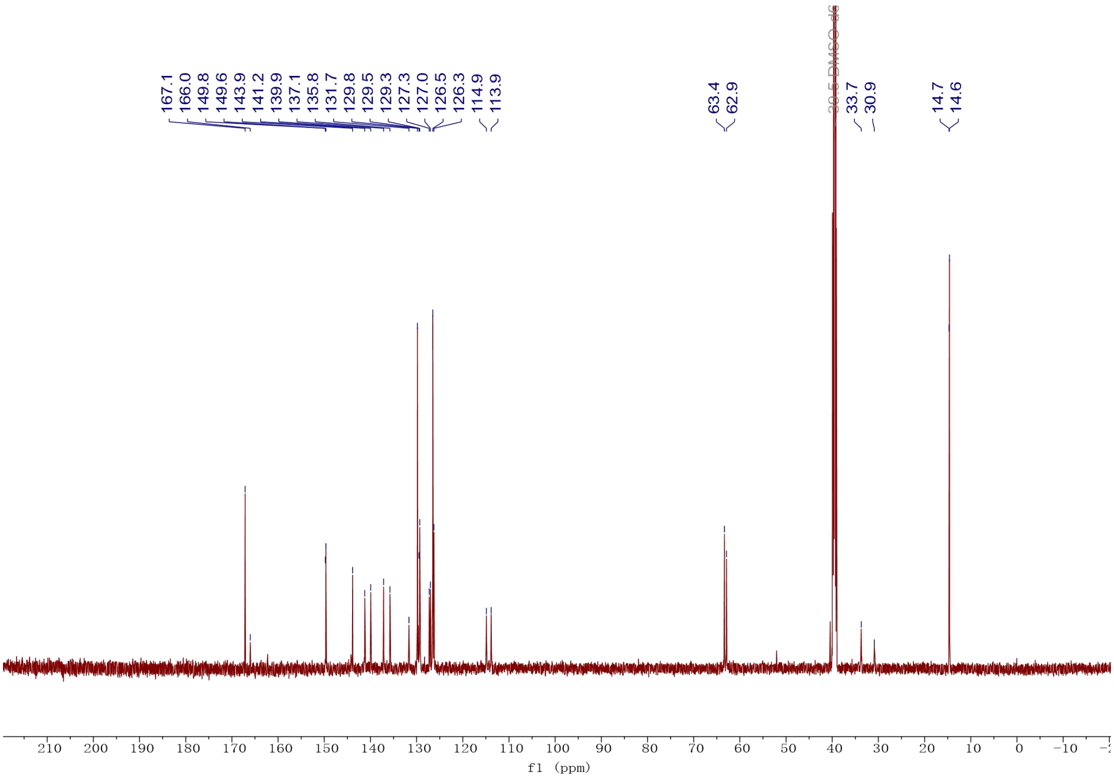


Figure S91. ^{13}C NMR spectrum (600 MHz) of H_8P6A in DMSO-d_6.

Reference

1. H. Zeng, P. Liu, H. Xing and F. Huang, *Angew. Chem. Int. Ed.,* 2022, **61**, e202115823.