

## Supporting Information

### Synthesis and Characterization of New Tripodal Lanthanide Complexes and Investigation of Their Optical and Magnetic Properties

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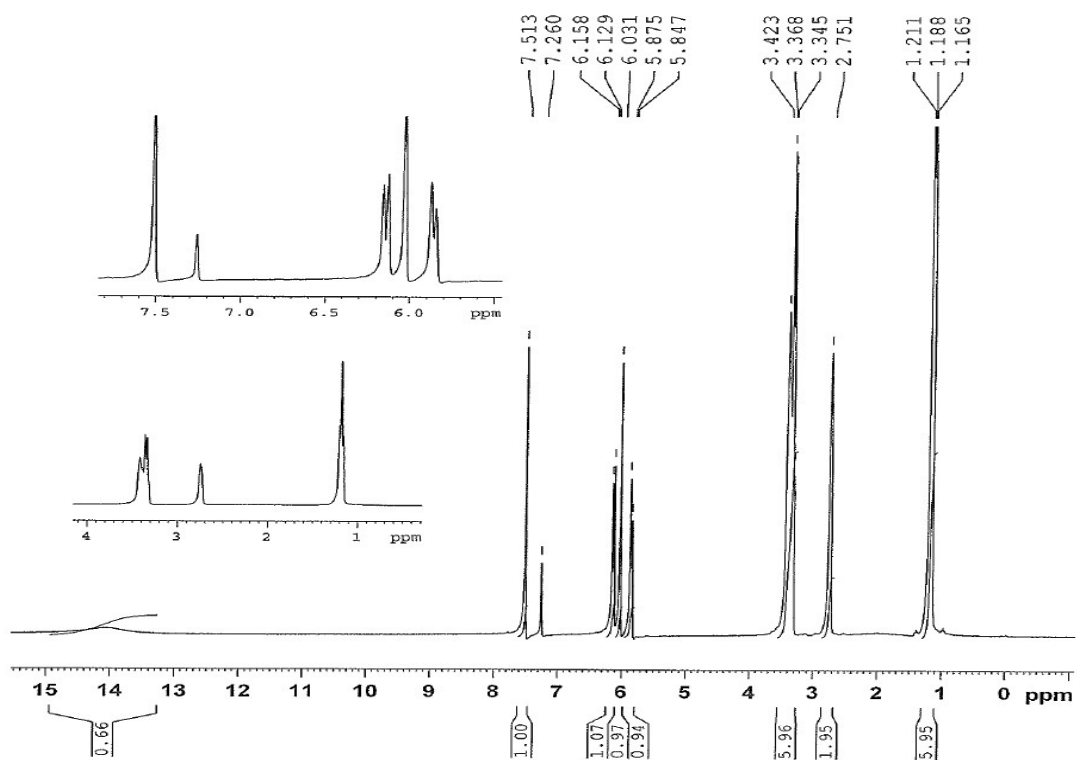


Figure S1  $^1\text{H}$ -NMR spectrum of  $\text{H}_3\text{L}$ .

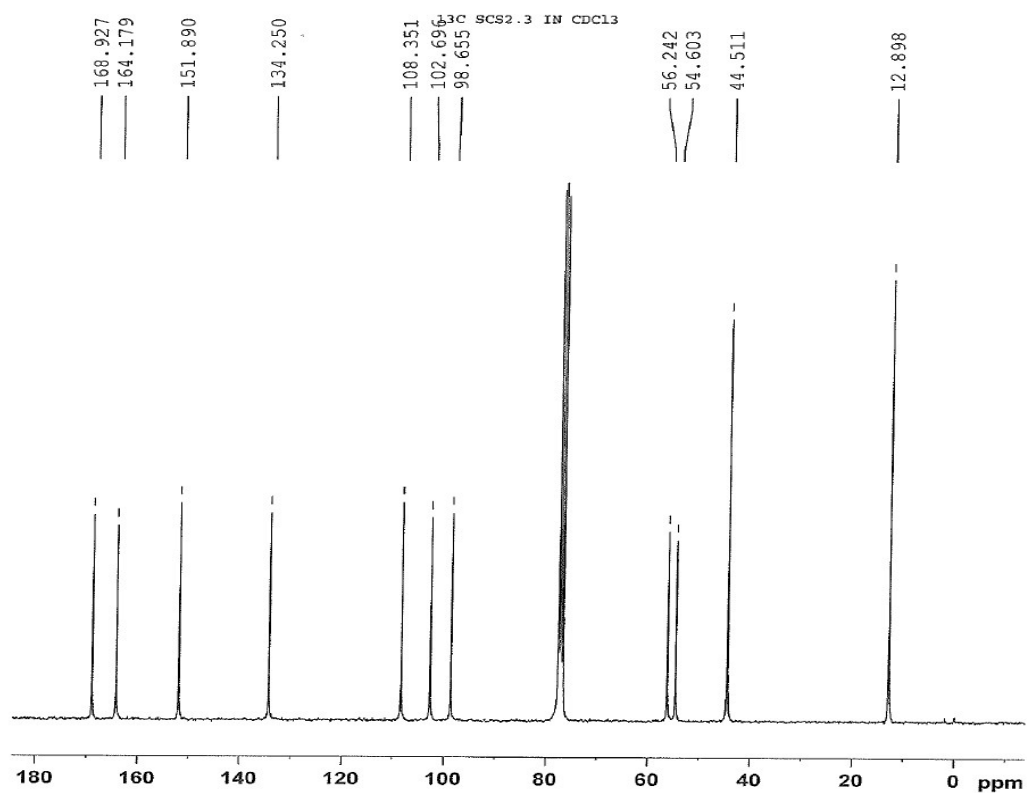
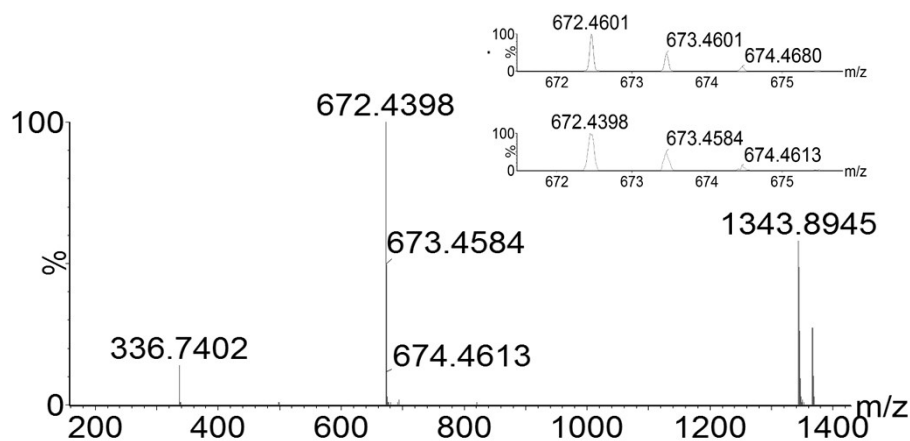
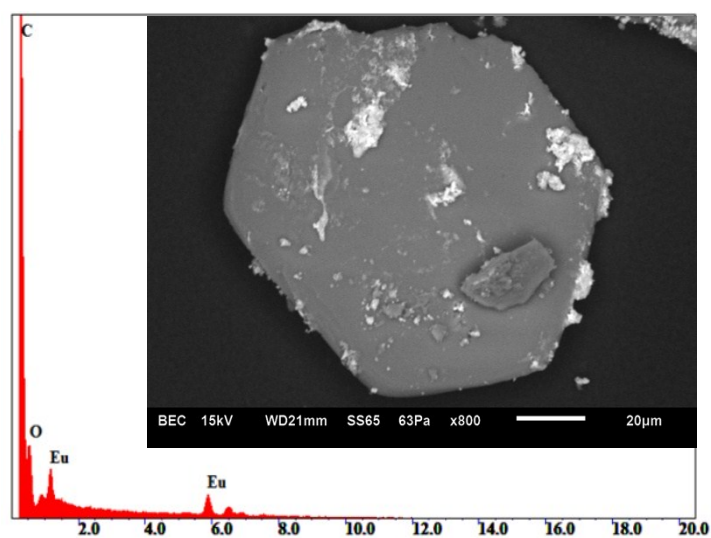


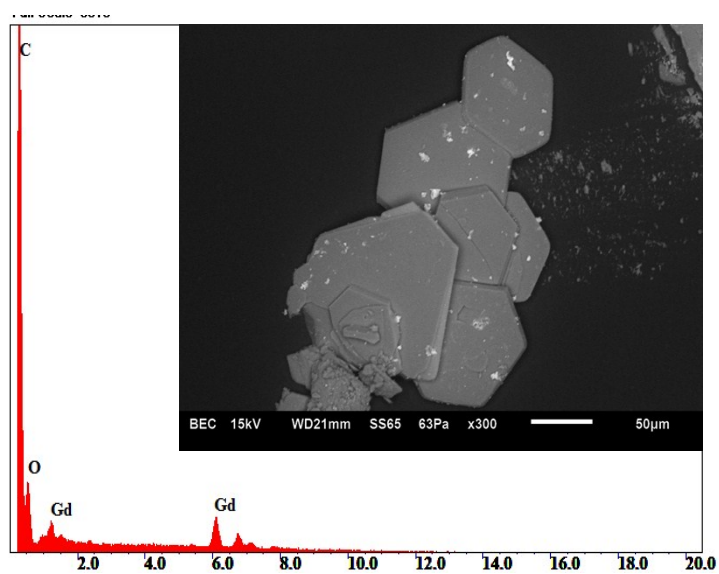
Figure S2:  $^{13}\text{C}$ -NMR spectrum of  $\text{H}_3\text{L}$ .



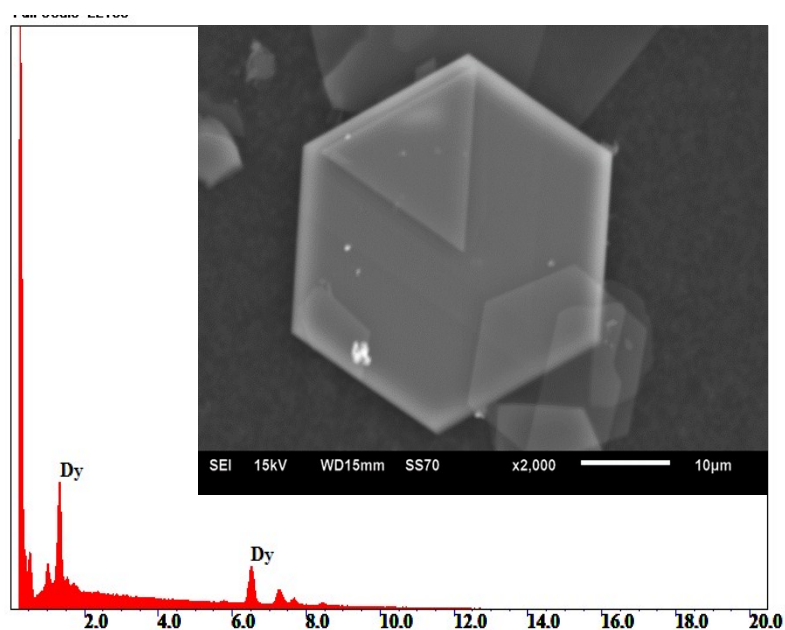
**Figure S3.** ESI-HRMS spectrum of  $[H_3L]$ . The inset shows the isotope pattern for  $[H_3L+H]^+$ , simulated (top) and experimental (bottom).



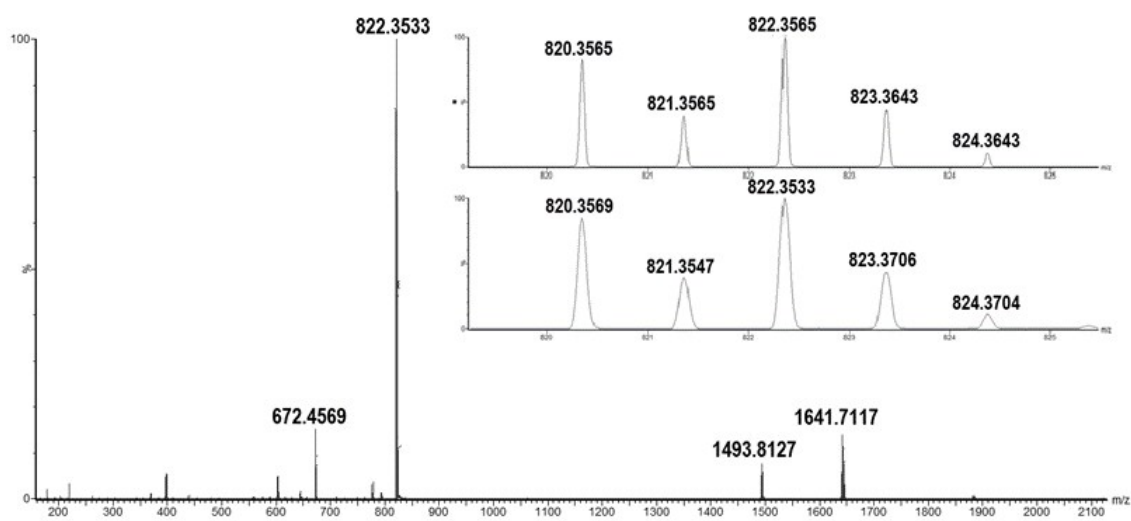
**Figure S4.** EDS spectrum of  $[EuL]$ . The inset shows the SEM image of the hexagonal plate crystals.



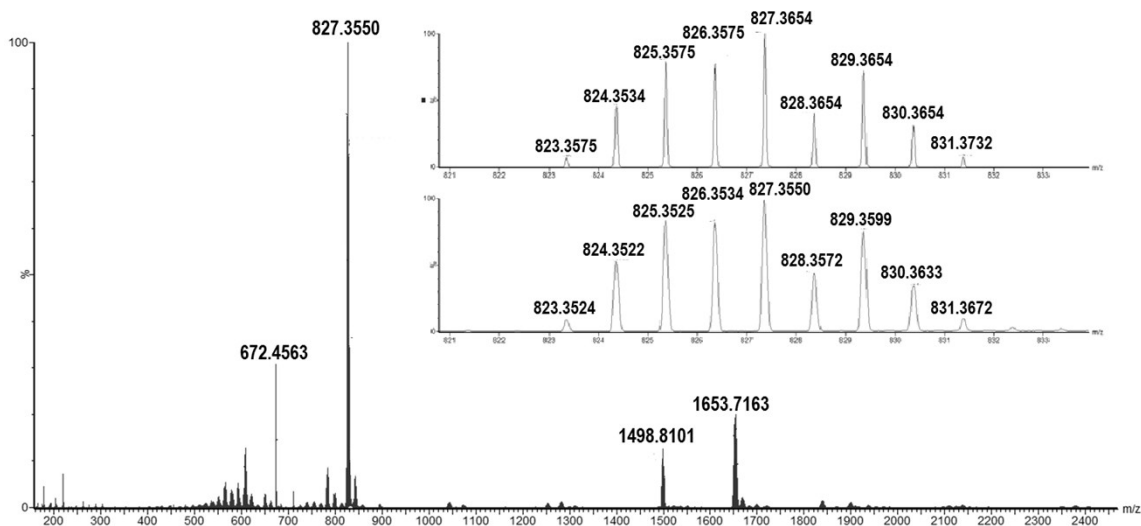
**Figure S5.** EDS spectrum of  $[GdL]$ . The inset shows the SEM image of the hexagonal plate crystals.



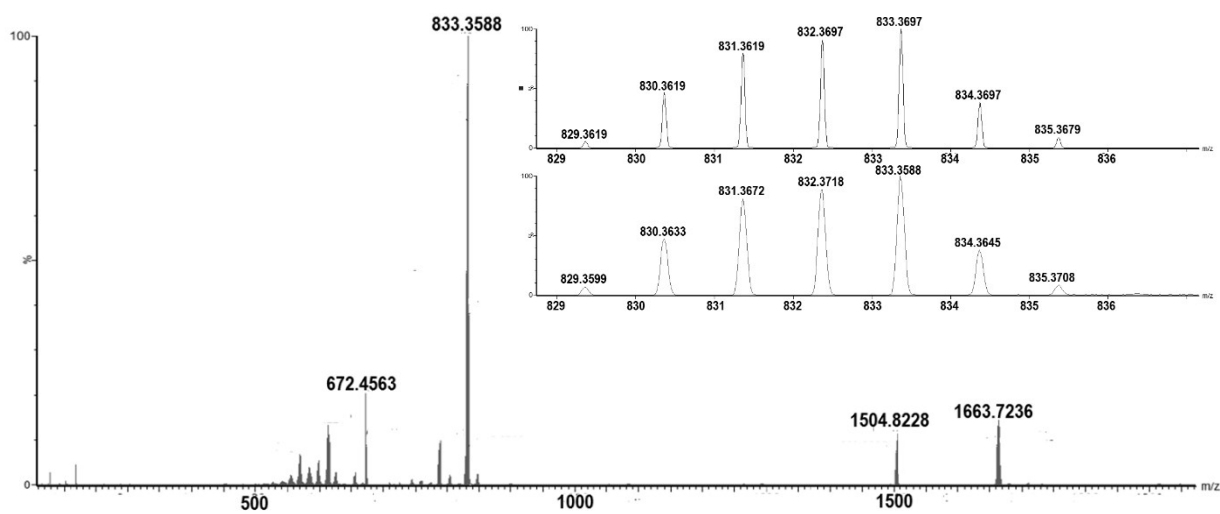
**Figure S6.** EDS spectrum of [DyL]. The inset shows the SEM image of the hexagonal plate crystals.



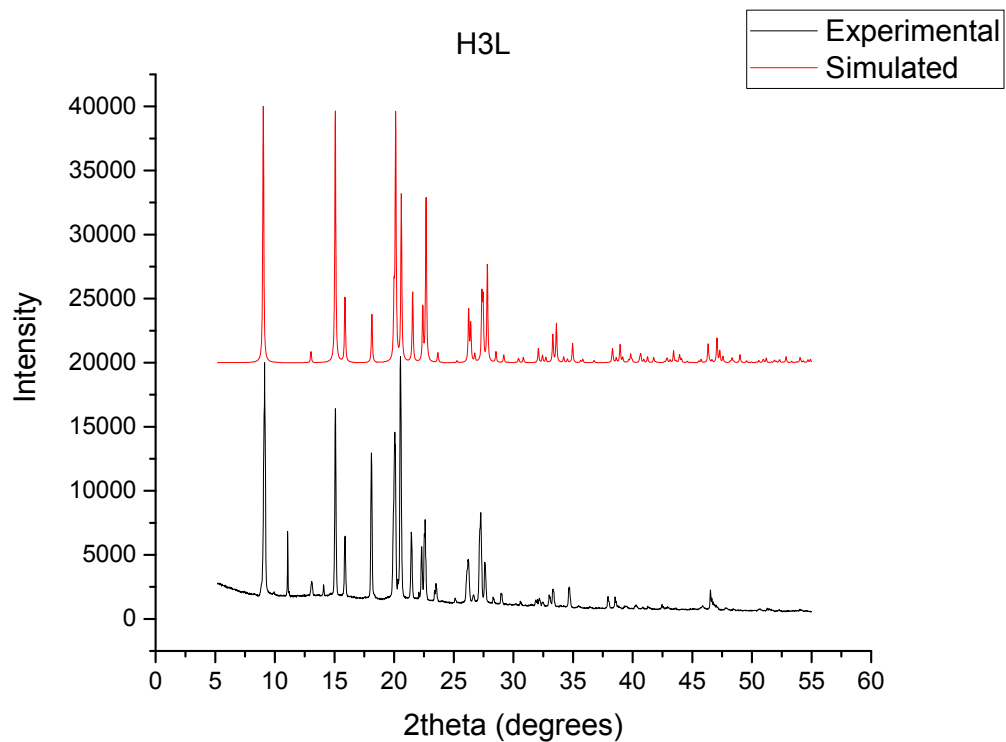
**Figure S7.** ESI-HRMS spectra of [EuL]. The inset shows the isotope pattern for [EuL+H]<sup>+</sup>, simulated (top) and experimental (bottom).



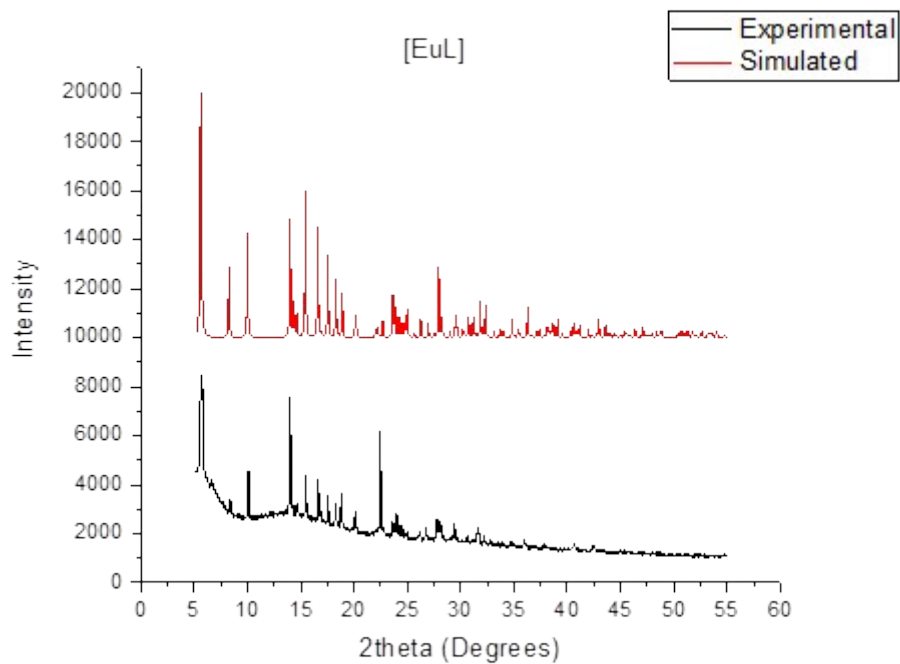
**Figure S8.** ESI-HRMS spectra of [GdL]. The inset shows the isotope pattern for [GdL+H]<sup>+</sup>, simulated (top) and experimental (bottom).



**Figure S9.** ESI-HRMS spectra of [DyL]. The inset shows the isotope pattern for [DyL+H]<sup>+</sup>, simulated (top) and experimental (bottom).

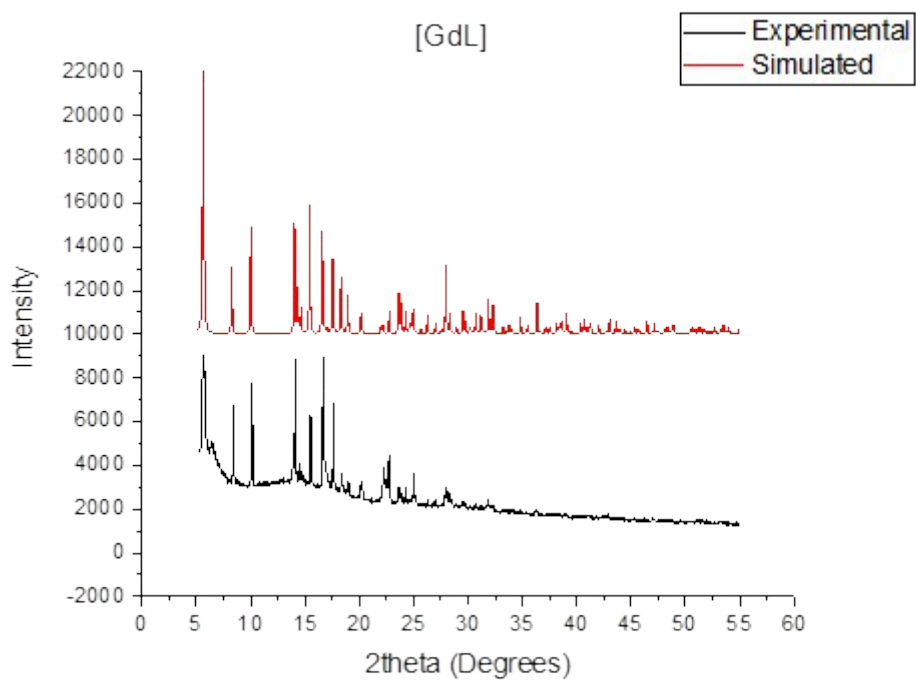


**Figure S10.** PXRD pattern for H<sub>3</sub>L.

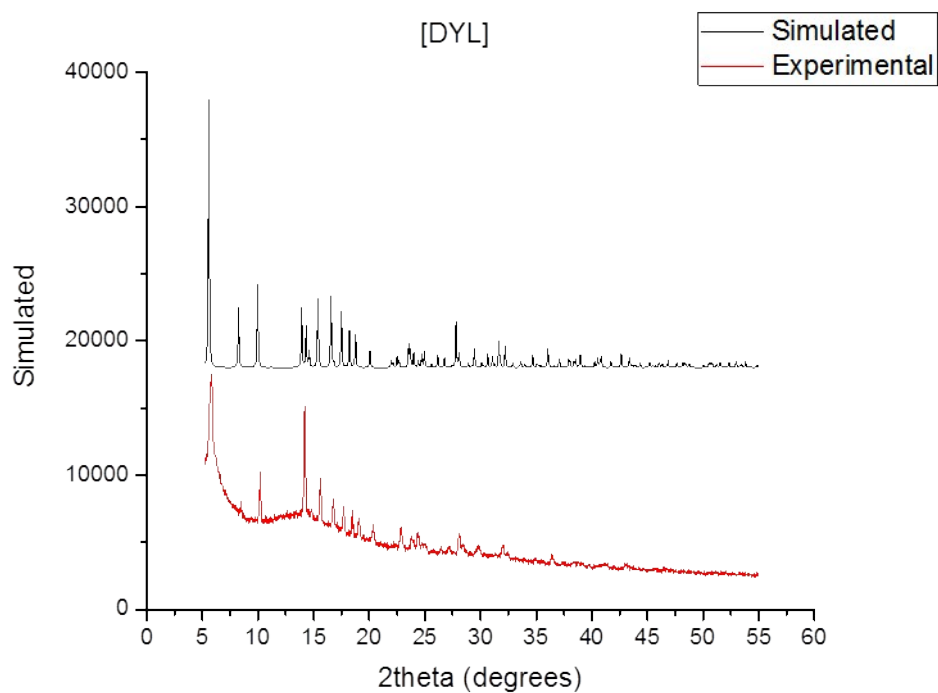


**Figure S11.** PXRD pattern for [EuL].

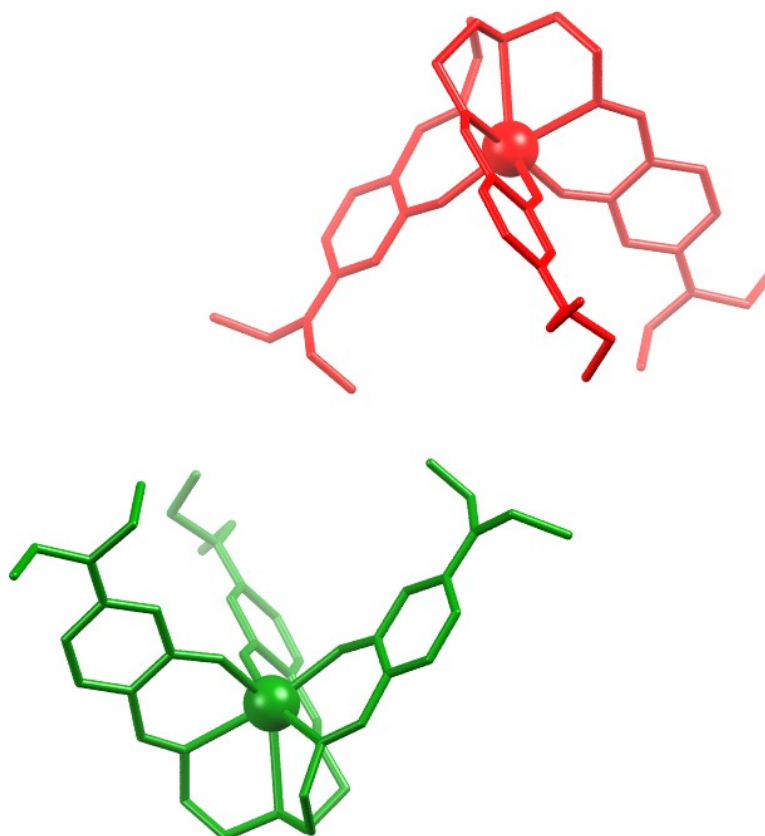




**Figure S12.** PXRd pattern for [GdL].



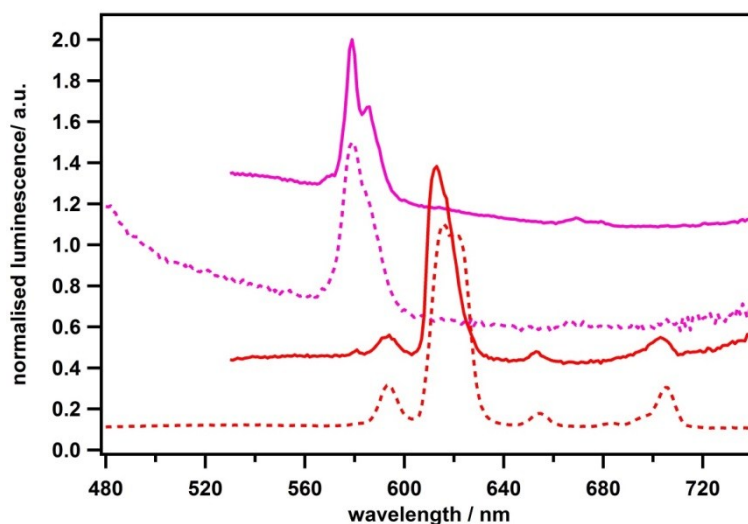
**Figure S13.** PXRd pattern for [DyL].



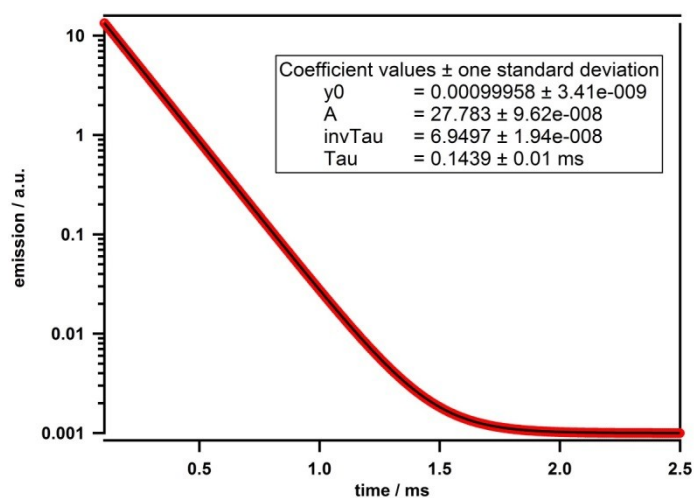
**Figure S14.** X-ray single-crystal structure of the two [DyL] isomers, with  $\Delta$  isomer in green and  $\Lambda$  in red.

**Table S1.** Continuous Shape Measure (CShM) analyses of geometries for compound [DyL] by SHAPE 2.1 Software

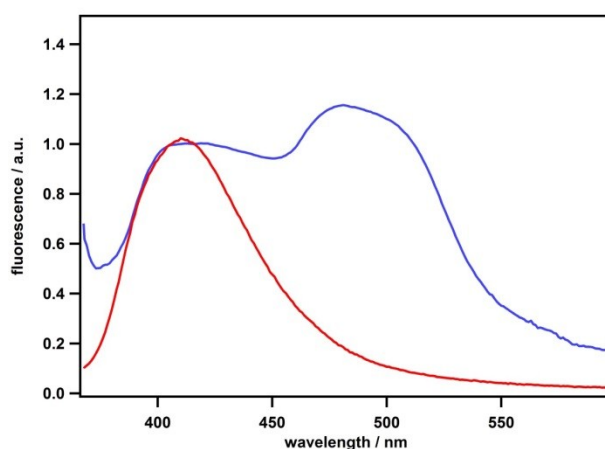
Geometries	CShM
Capped octahedron ( $C_{3v}$ )	1.14621
Capped trigonal prism ( $C_{2v}$ )	2.84385
Pentagonal bipyramid ( $D_{5h}$ )	8.79823
Johnson pentagonal bipyramid J13 ( $D_{5h}$ )	12.38500
Johnson elongated triangular pyramid J7 ( $C_{3v}$ )	14.39724
Hexagonal pyramid ( $C_{6v}$ )	21.50968
Heptagon ( $D_{7h}$ )	35.60487



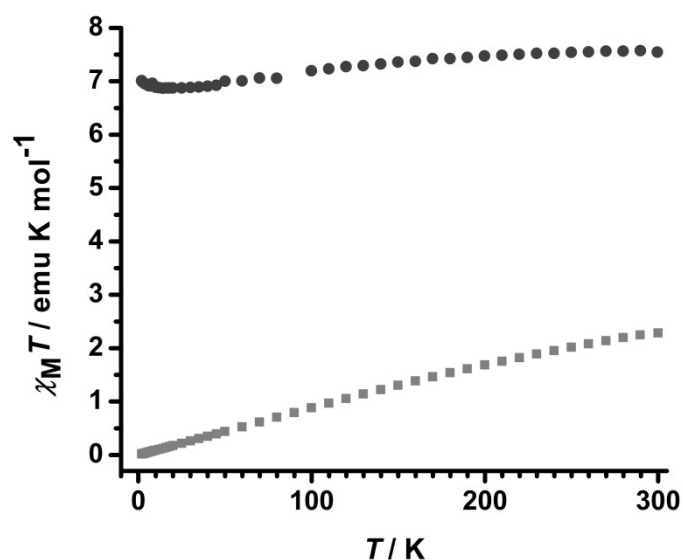
**Figure S15.** A comparison of the observed emission spectra in DCM solution ( $\lambda_{\text{ex}} = 350$  nm, dashed lines) and solid state ( $\lambda_{\text{ex}} = 380$  nm, solid lines) for [LnL] complexes with Ln = Eu (red) and Dy (pink). Spectra are offset for clarity.



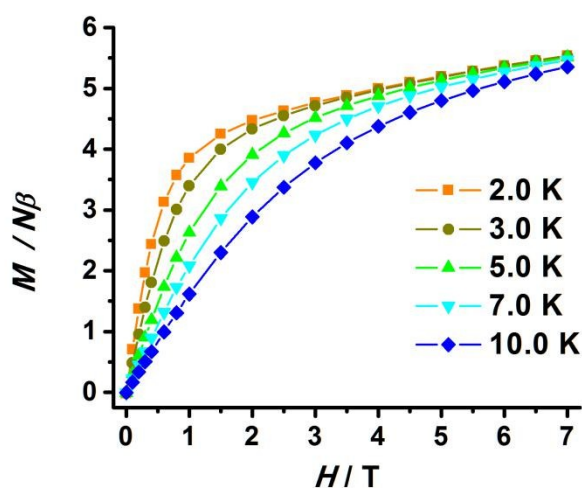
**Figure S16.** Emission decay ( $\lambda_{\text{ex}} = 350$  nm,  $\lambda_{\text{em}} = 616$  nm) of [EuL] in DCM fitted to a monoexponential with a lifetime of  $144.0 \pm 0.01$   $\mu\text{s}$ .



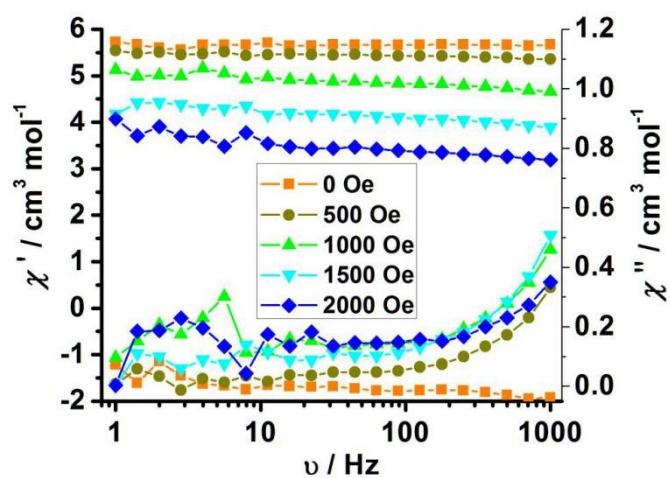
**Figure S17.** Normalized emission spectra ( $\lambda_{\text{ex}} = 350$  nm) of the [GdL] complex at 298 K (red) and 77 K (blue) in 2-methyltetrahydrofuran.



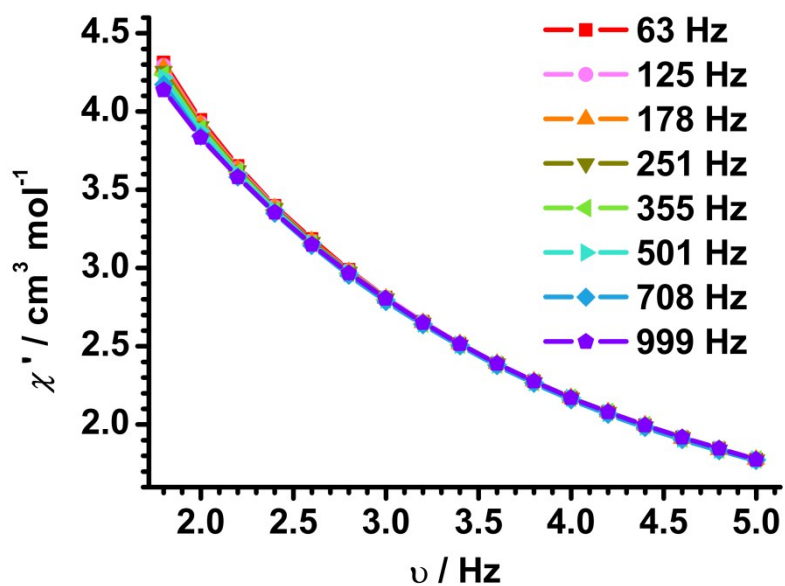
**Figure S18.** The temperature dependence of  $\chi_M T$  for complexes [GdL] (black) and [EuL] (Grey) measured at 1 kOe dc field.



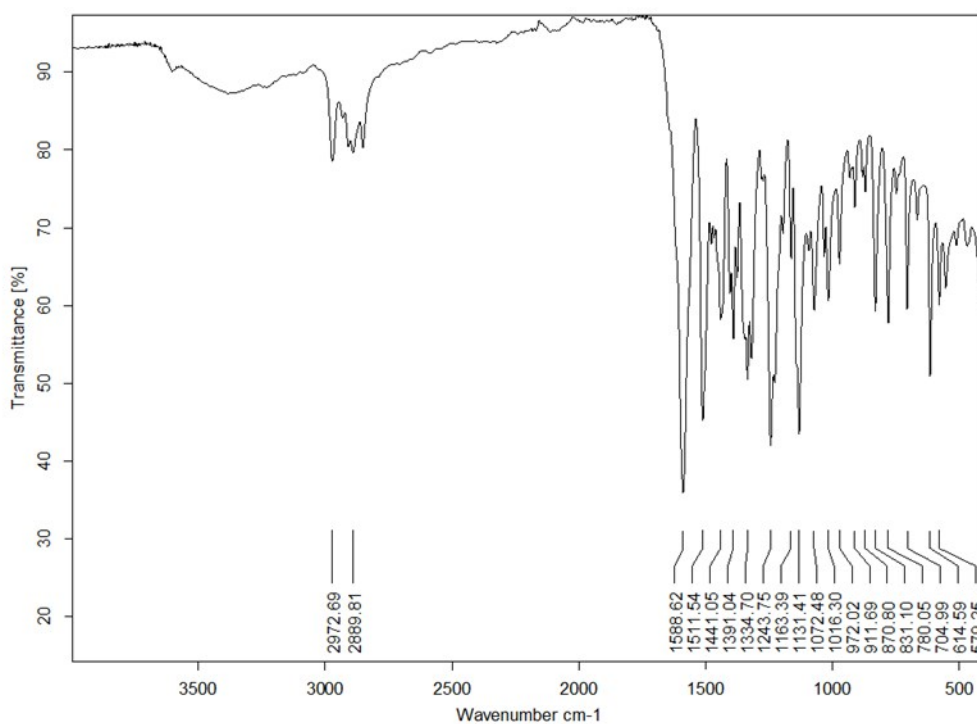
**Figure S19.** The M vs. H curves measured at different temperatures for complex [DyL].



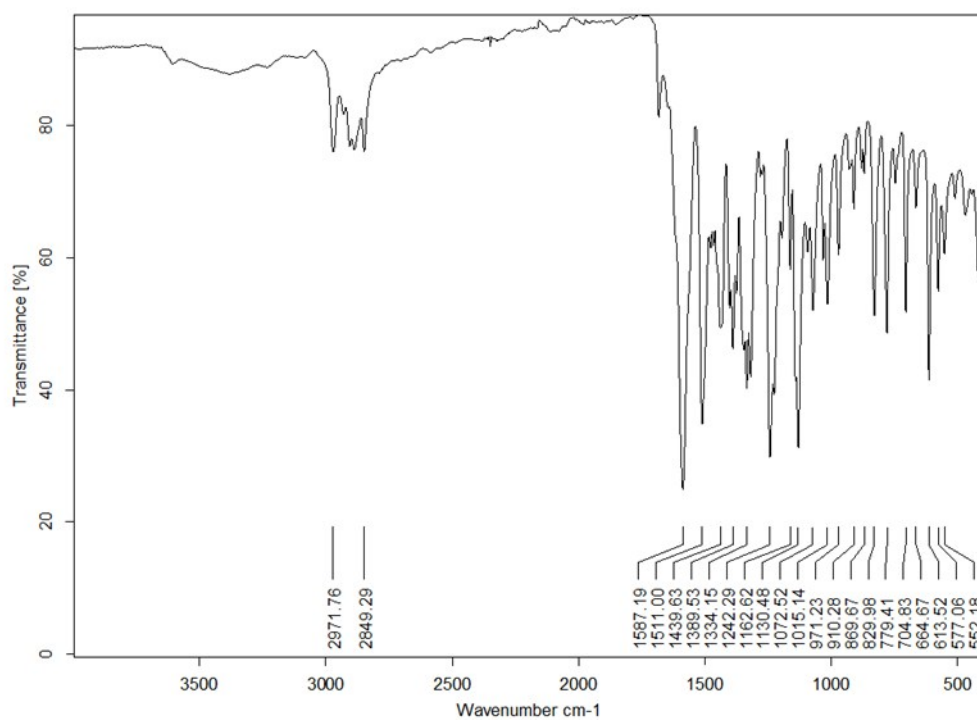
**Figure S20.** Frequency dependent in-phase ( $\chi'$ ) and out-of-phase ( $\chi''$ ) signals of [DyL] in indicated dc fields at 1.9 K



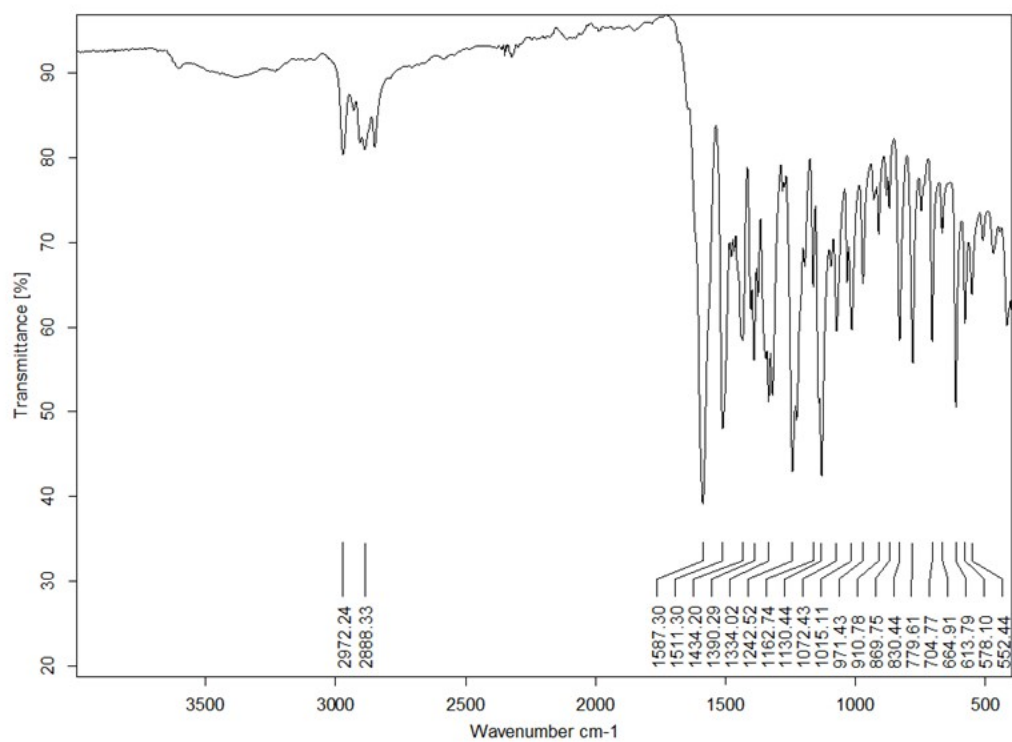
**Figure S21.** Variable-temperature in phase of ac susceptibility ( $\chi'$ ) for [DyL] below 1000 Hz ac frequency under 500 Oe static field.



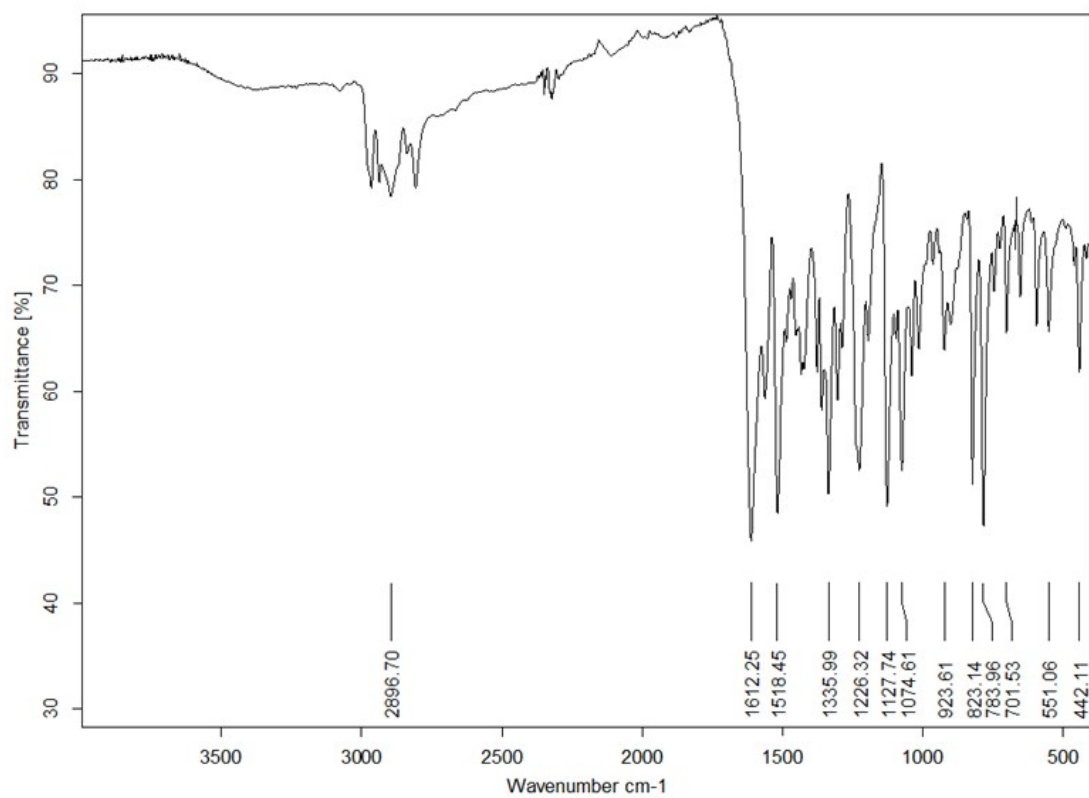
**Figure S22.** FT-IR spectrum of [H<sub>3</sub>L].



**Figure S23.** FT-IR spectrum of [EuL].



**Figure S24.** FT-IR spectrum of [GdL].



**Figure S25.** FT-IR spectrum of [DyL].