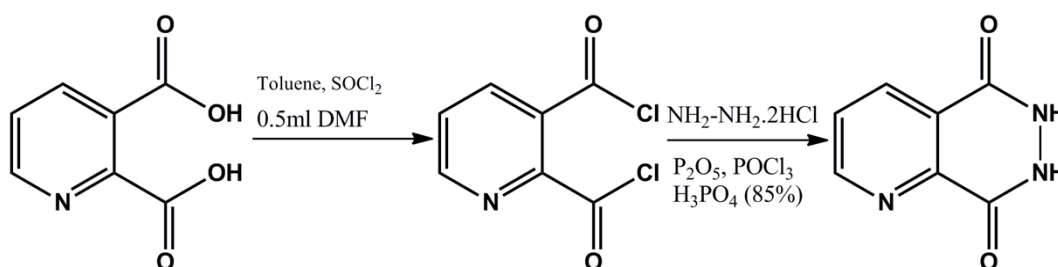


## Supporting Information

# 2-D lanthanide organic networks constructed from 6,7-dihydropyrido(2,3-d) pyridazine-5,8-dione: Synthesis, characterization and photoluminescence for sensing small molecules

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Scheme S1 Synthesis of H<sub>2</sub>PDH.

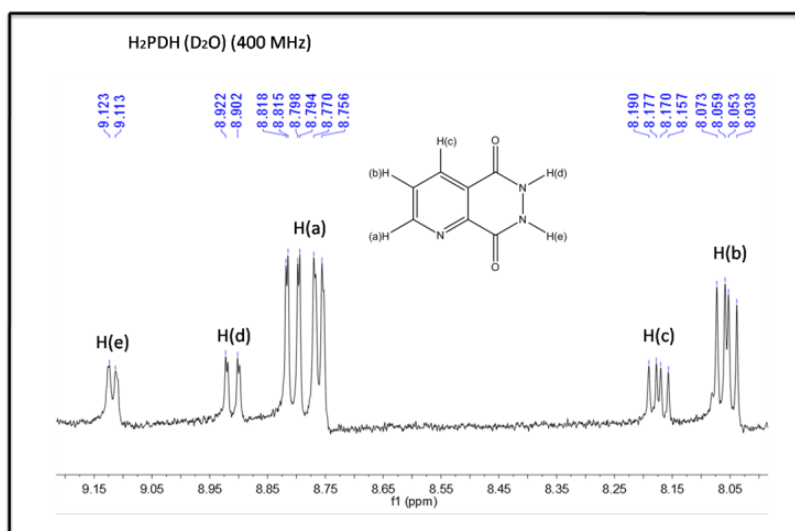
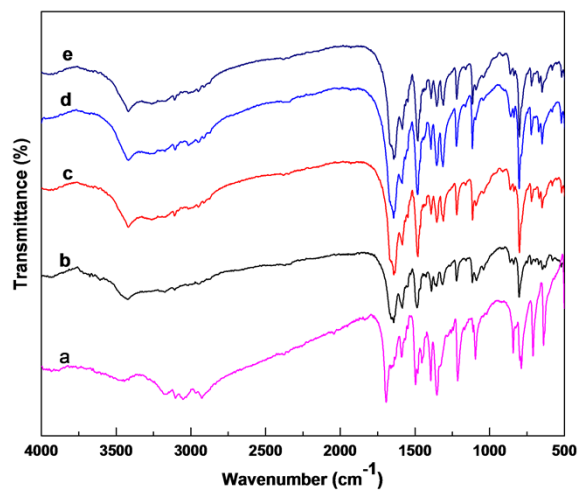
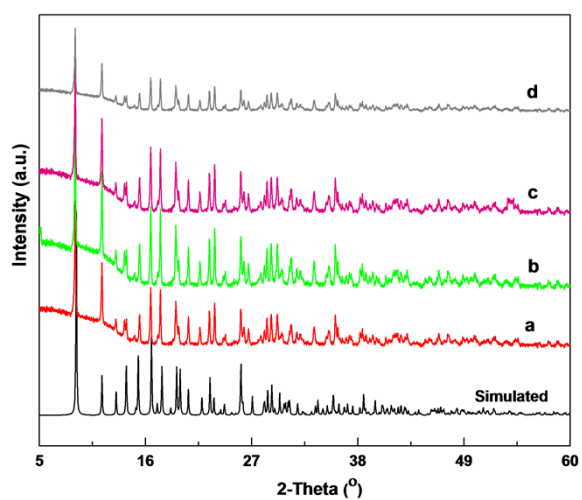


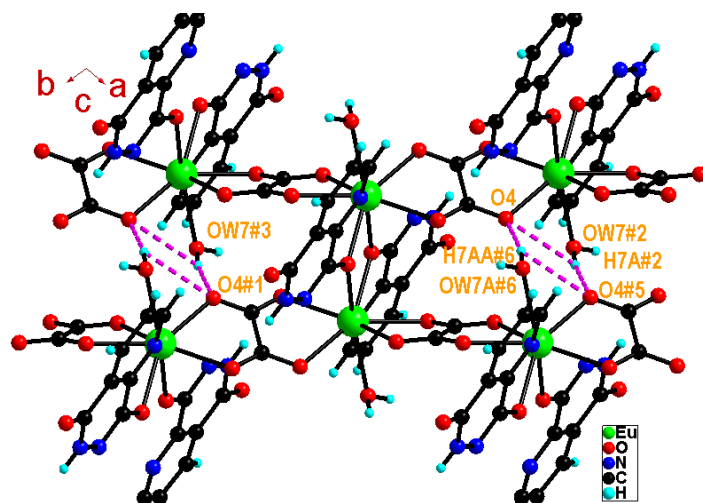
Figure S1. <sup>1</sup>H NMR spectrum of 6, 7-dihydropyrido(2, 3-*d*)pyridazine-5, 8-dione (H<sub>2</sub>PDH) ligand at 400MHz by using D<sub>2</sub>O as solvent.



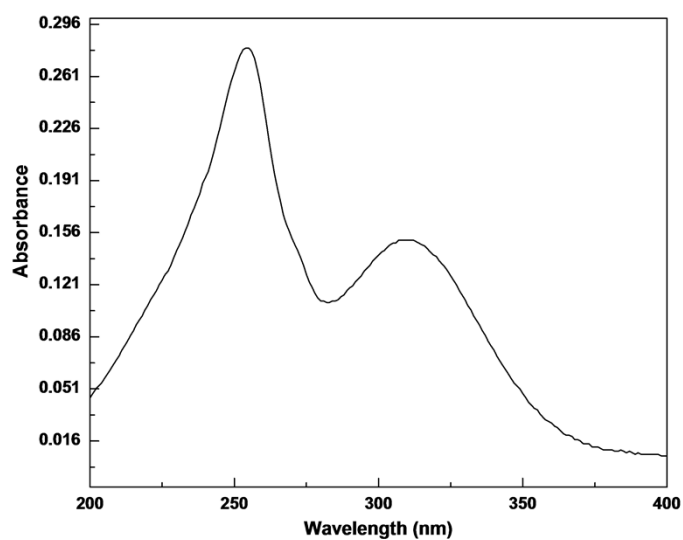
**Figure S2.** IR spectra of 6,7-dihydropyrido(2,3-d)pyridazine-5,8-dione (H<sub>2</sub>PDH) (a), [Eu(HPDH)(ox)(H<sub>2</sub>O)] **1** (b), [Tb(HPDH)(ox)(H<sub>2</sub>O)] **2** (c), [Sm(HPDH)(ox)(H<sub>2</sub>O)] **3** (d), [Gd(HPDH)(ox)(H<sub>2</sub>O)] **4** (e).



**Figure S3.** Experimental X-ray powder diffraction (XRD) patterns of complex **1**(a), complex **2**(b), complex **3**(c), complex **4**(d) and the simulated XRD pattern of complex **1**.



**Figure S4.** The inter and intra 2D layer hydrogen bonding in 3D network in complex 1 (the broken red lines). #1 =  $1-x, 2-y, 2-z$ , #2 =  $1-x, 1-y, 2-z$ , #3 =  $-x, 2-y, 2-z$ , #4 =  $1+x, -1+y, 2-z$ , #5 =  $2-x, 1-y, 2-z$ , #6 =  $1+x, y, z$ .



**Figure S5.** The UV spectrum of free  $H_2PDH$  ligand in ethanol (concentration =  $1 \times 10^{-4}$  M).

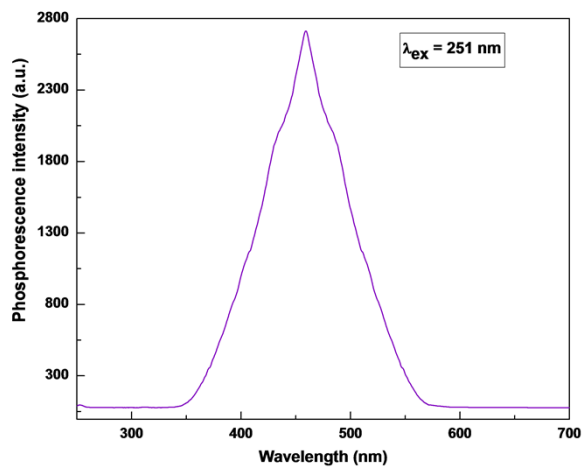


Figure S6. The Phosphorescence spectrum of  $[\text{Gd}(\text{HPDH})(\text{ox})(\text{H}_2\text{O})]$  **4** at 77 K at  $\lambda_{\text{exc}} = 251 \text{ nm}$ .

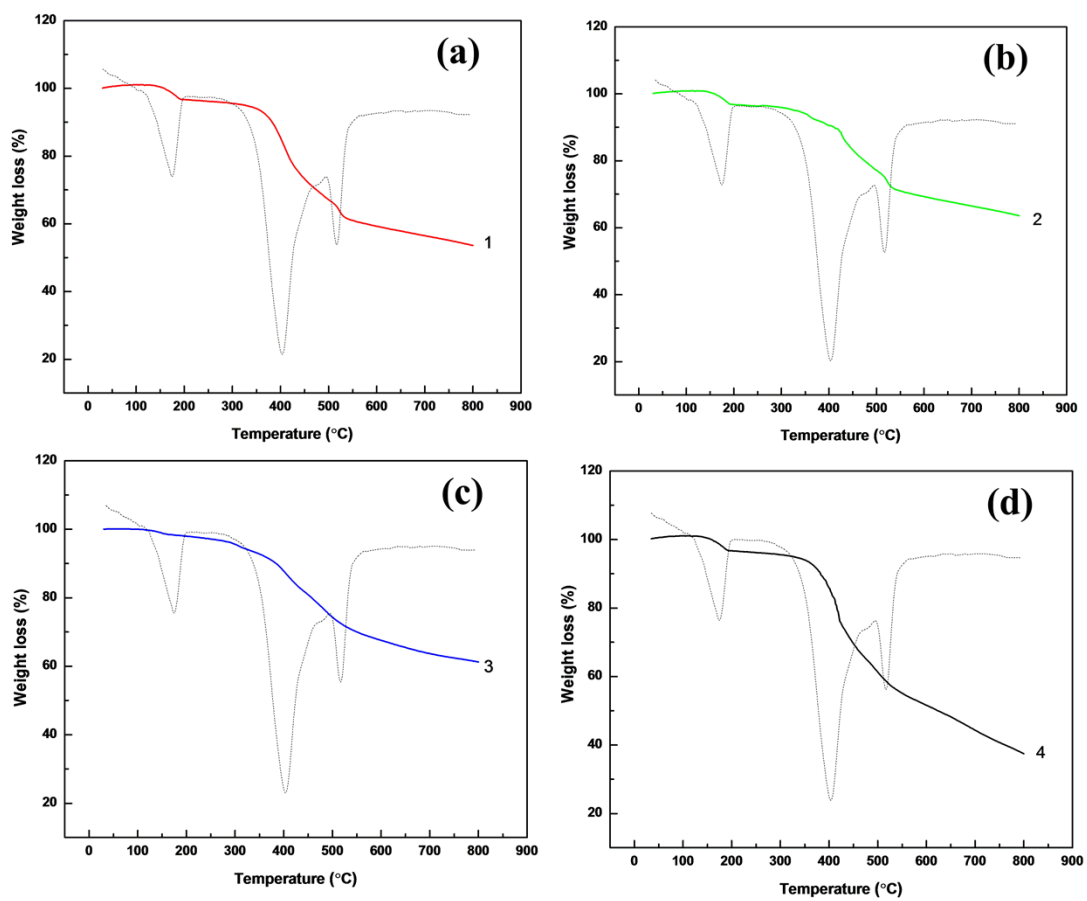
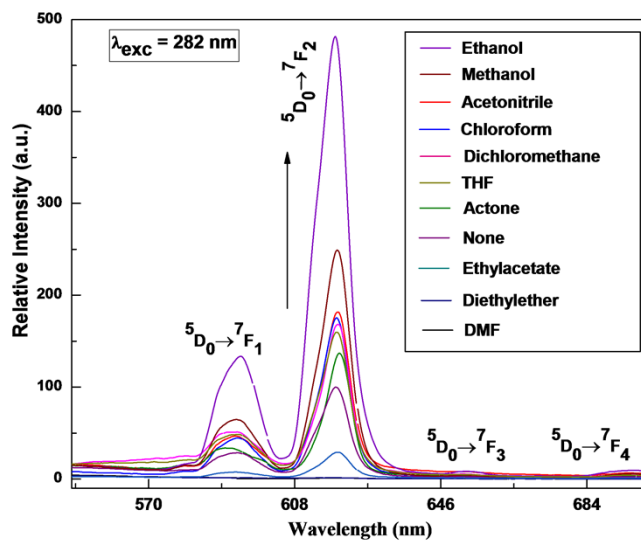
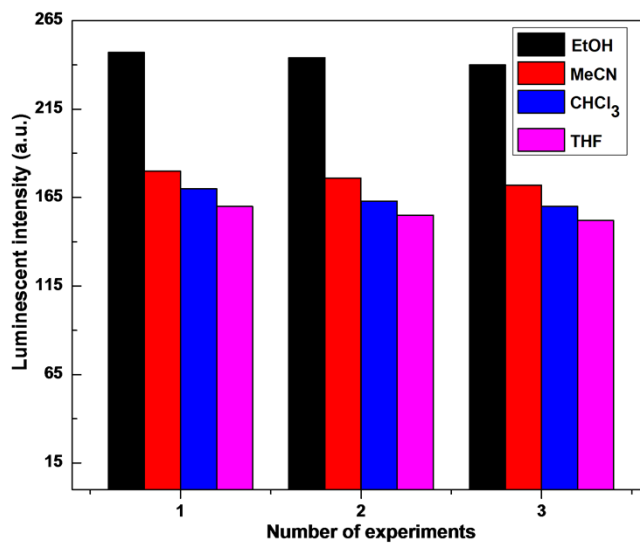


Figure S7. TG and DTA curves for complexes **1** (a), **2** (b), **3** (c), and **4** (d).



**Figure S8.** The PL spectra of complex **1**-solvent emulsions in different solvents at excitation wavelength of 282 nm.



**Figure S9.** Reproduce ability of the quenching ability of complex **1** dispersed in EtOH, MeCN, CHCl<sub>3</sub> and THF solutions.

**Table S1** Dielectric constant, Coordination ability and Reichard's solvent polarity parameters.

Solvent	K	a	$E_T^N$
EtOH	24.6	-0.1	0.654
MeOH	32.6	0	0.762
MeCN	37.5	-0.7	0.460
CHCl <sub>3</sub>	4.81	1.4	0.259
CH <sub>2</sub> Cl <sub>2</sub>	9.08	-0.6	3.1
THF	7.6	0.4	0.207
(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O	4.34	-0.9	0.117
None(H <sub>2</sub> O)	78.54	0.6	1.0
EtOAc	6.02	-0.8	0.228
(CH <sub>3</sub> ) <sub>2</sub> O	20.7	-0.5	0.355
DMF	36.7	0.8	0.386

Dielectric constant =  $K$ , Coordination ability =  $a$ , Dimroth–Reichardt =  $E_T^N$