

Electronic Supplementary Information for

**Nanosheets of two-dimensional photoluminescent Lanthanide
phosphonocarboxylate frameworks decorated with free
carboxylic groups for latent fingerprint imaging**

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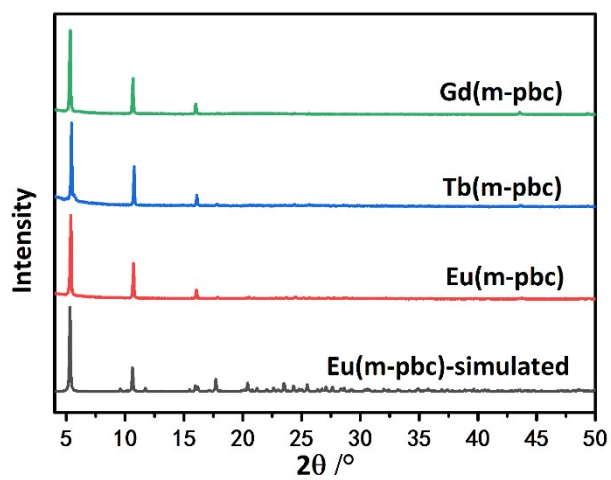


Figure S1. PXRD patterns of Gd(m-pbc), Tb(m-pbc), Eu(m-pbc) and simulated.

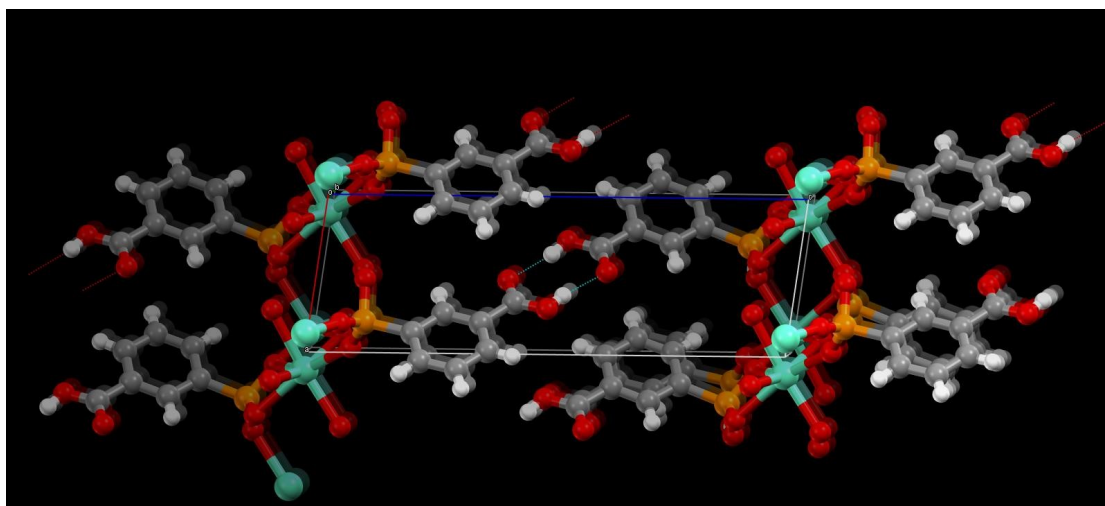


Figure S2. Structure of **Eu(m-bpc)** viewing along *b* axis, showing the hydrogen bonds between layers.

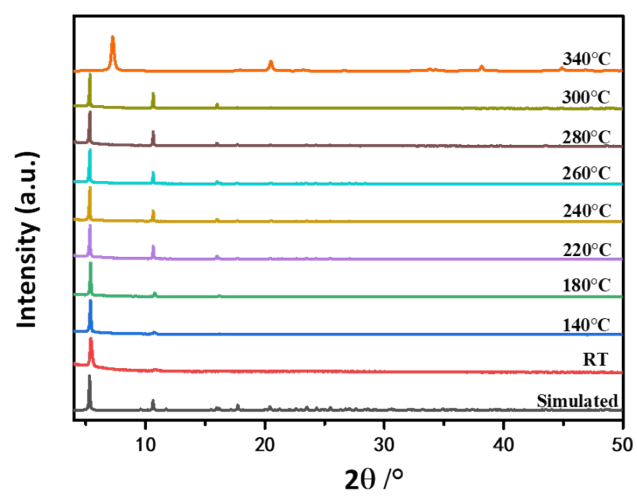


Figure S3. PXRD patterns of **Eu(m-pbc)** calcined at varied temperature.

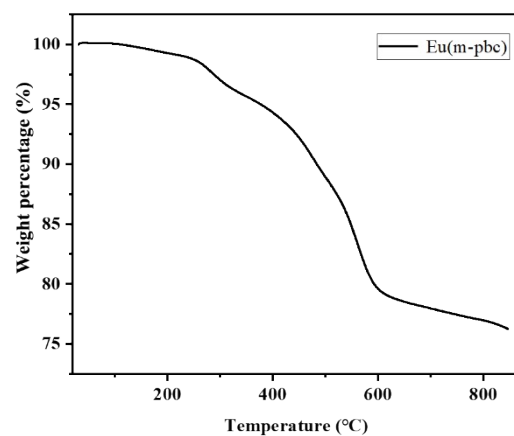


Figure S4. TGA curve of **Eu(m-pbc)**.

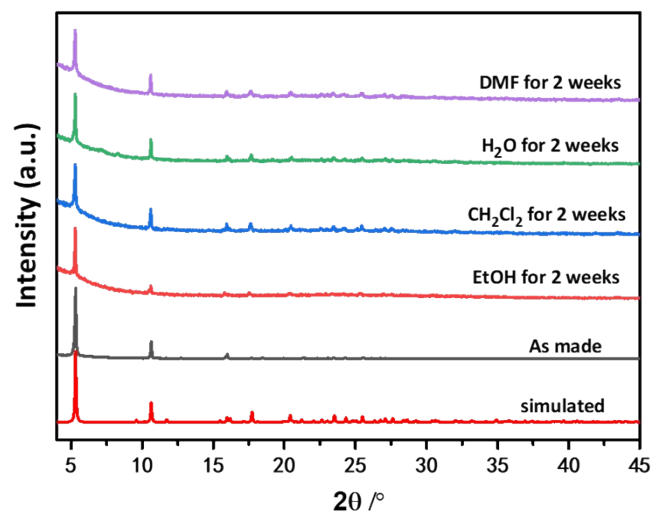


Figure S5. PXRD patterns of simulated, as-made and **Eu(m-pbc)** after immersing in different solvents for two weeks.

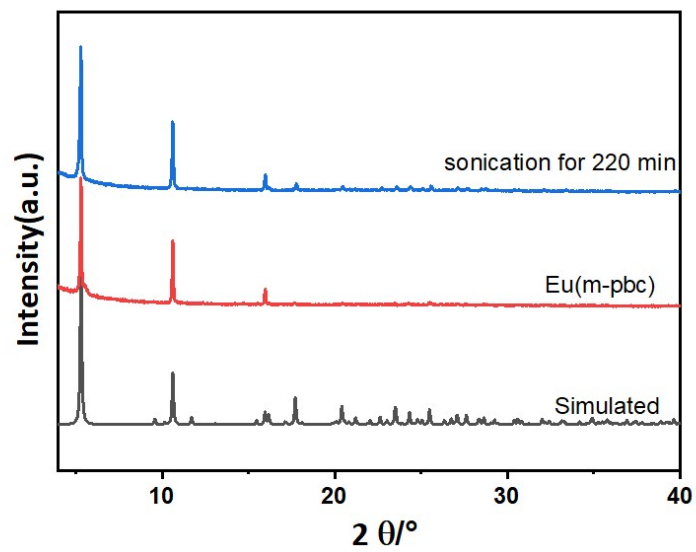


Figure S6. PXRD patterns of **Eu(m-pbc)**: simulated, as-made and after sonicating for 220 min.

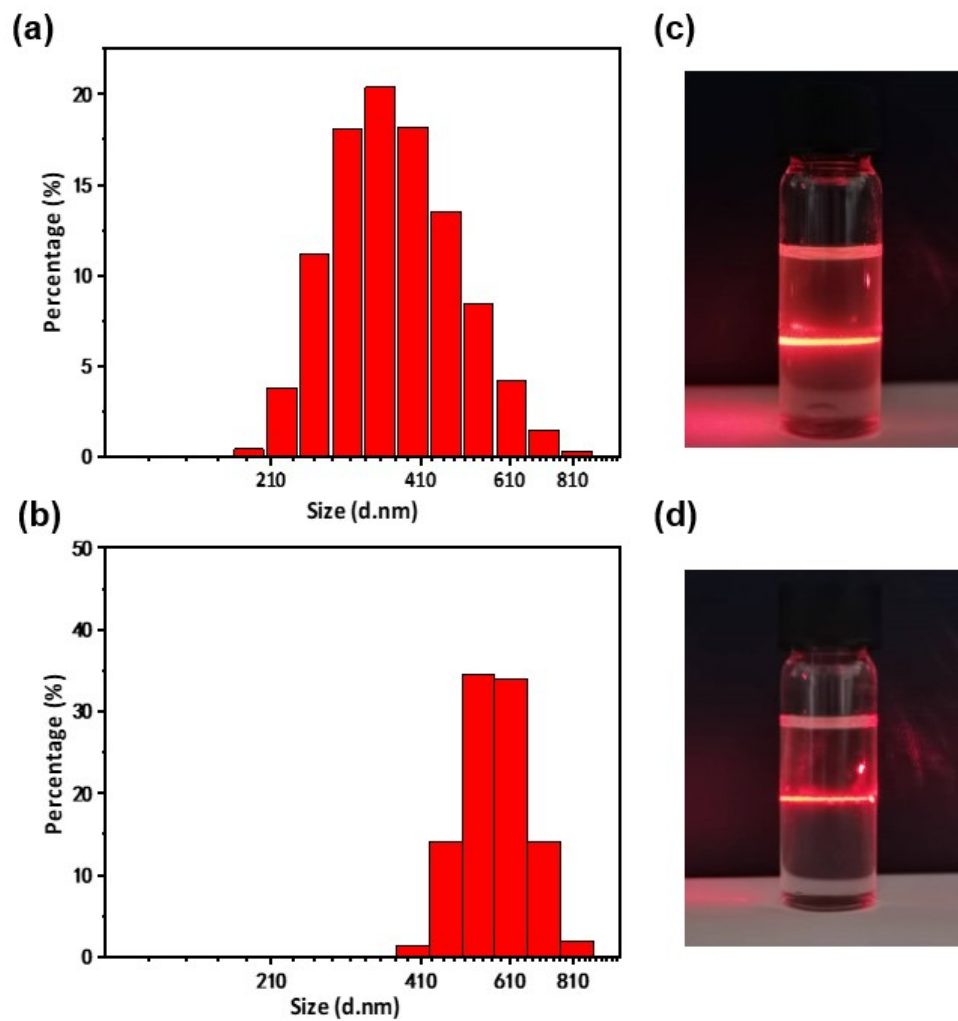


Figure S7. Hydrodynamic diameter distributions of suspensions of in EtOH, (a) **Eu(m-pbc)-NS** (b) **Tb(m-pbc)-NS**, (c) and (d) Tyndall effect for the suspension of in EtOH.

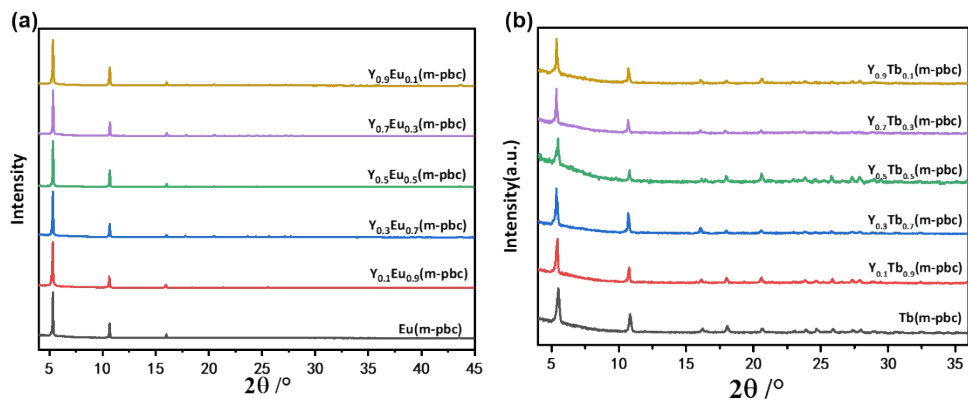


Figure S8. PXRD patterns of (a) $Y_xEu_{1-x}(m-pbc)$ and (b) $Y_xTb_{1-x}(m-pbc)$ ($x=10\%$, 30% , 50% , 70% , 90%).

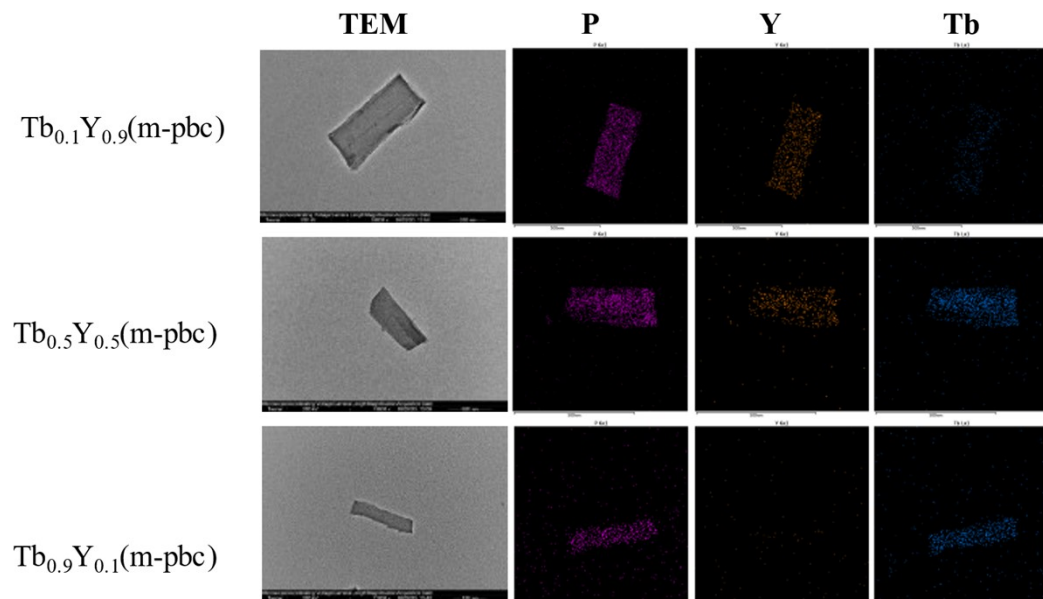


Figure S9. The TEM images and elemental mapping of $Tb_xY_{1-x}(m-pbc)$ ($x= 10\%$, 50% , 90%).

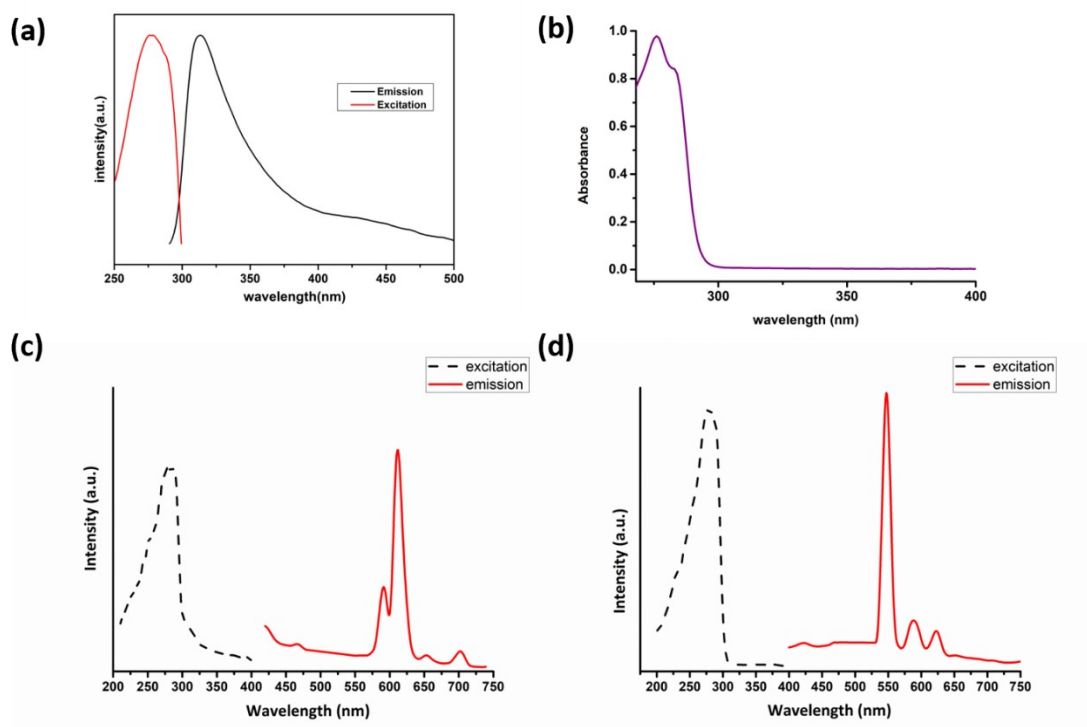


Figure S10. (a) Excitation and emission spectra of m-H₃pbc, (b) UV-vis absorption spectrum of m-H₃pbc, (c) (d) Excitation and emission spectra of Eu(m-bpc) and Tb(m-bpc) in solid state at room temperature.

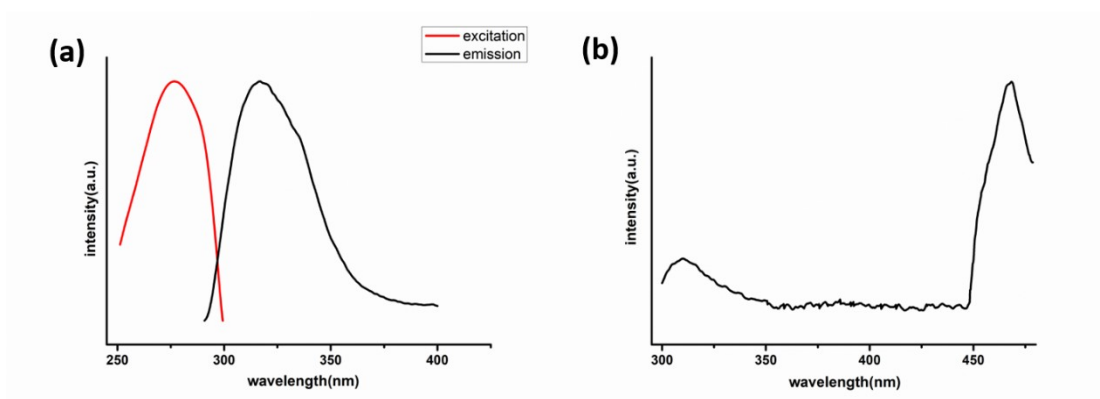


Figure S11. (a) Excitation and emission spectra of **Gd(m-bpc)** in solid state at room temperature, (b) Emission spectrum of **Gd(m-bpc)** at 77 K.

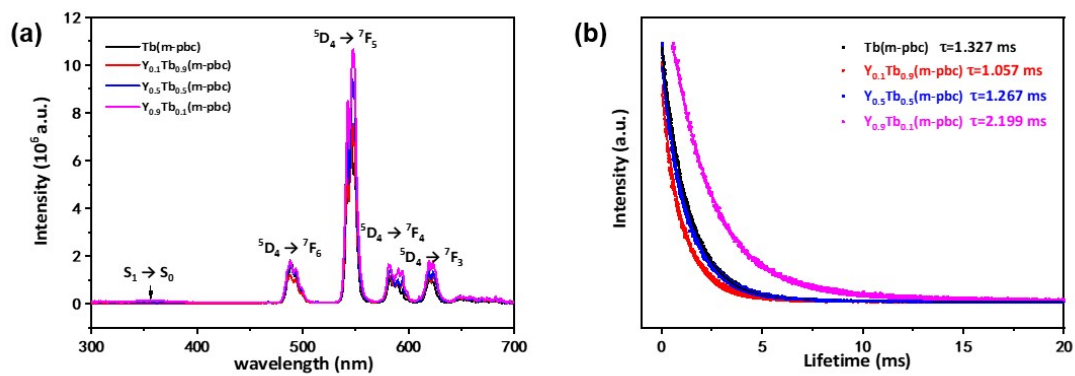


Figure S12. (a) **Emission** spectra ($\lambda_{exc} = 254$ nm) of $Y_xTb_{1-x}(m-bpc)$, (b) Temporal decay curves of the $Y_xTb_{1-x}(m-bpc)$, ($x=10\%$, 50% , 90%), monitored at 545 nm (${}^5D_4 \rightarrow {}^7F_5$ of Tb^{3+})

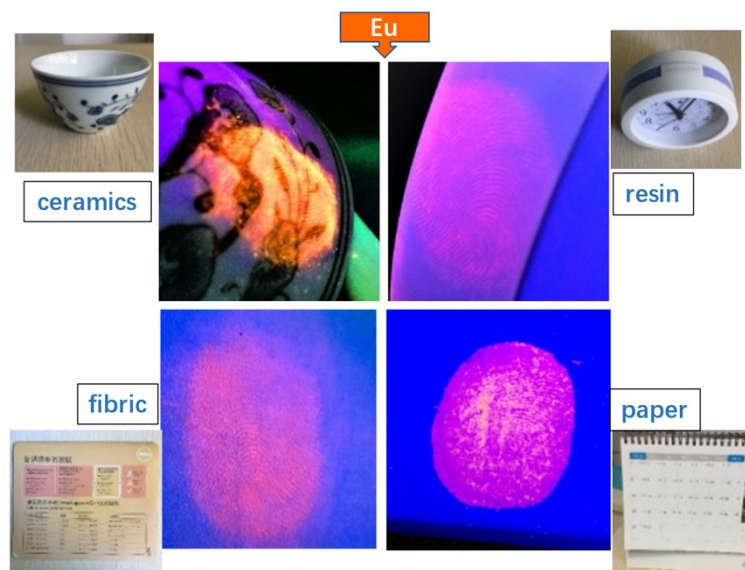


Figure S13. Luminescent images of fingerprints on some daily substrates (ceramics, resin, fabric and paper) treated with $Y_{0.9}Eu_{0.1}(m-pbc)$ -NS.

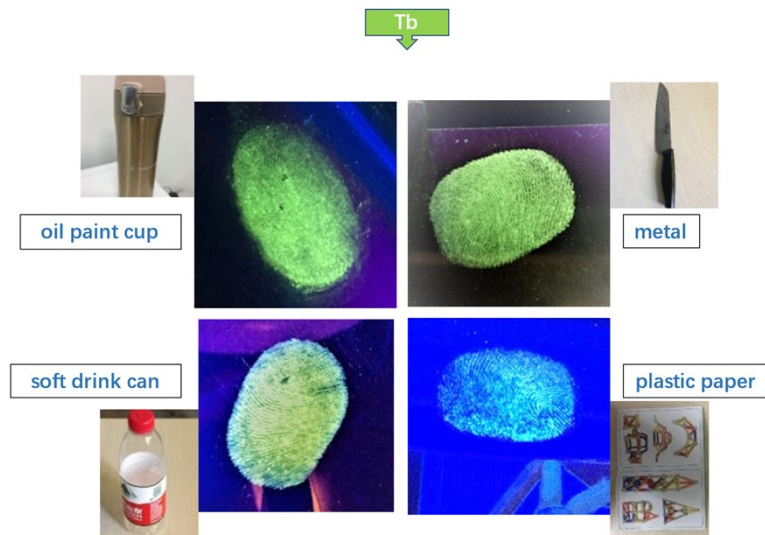


Figure S14. Luminescent images of fingerprints on some daily substrates (oil paint cup, metal, soft drink can and plastic paper) treated with $Y_{0.9}Tb_{0.1}(m-pbc)$ -NS.

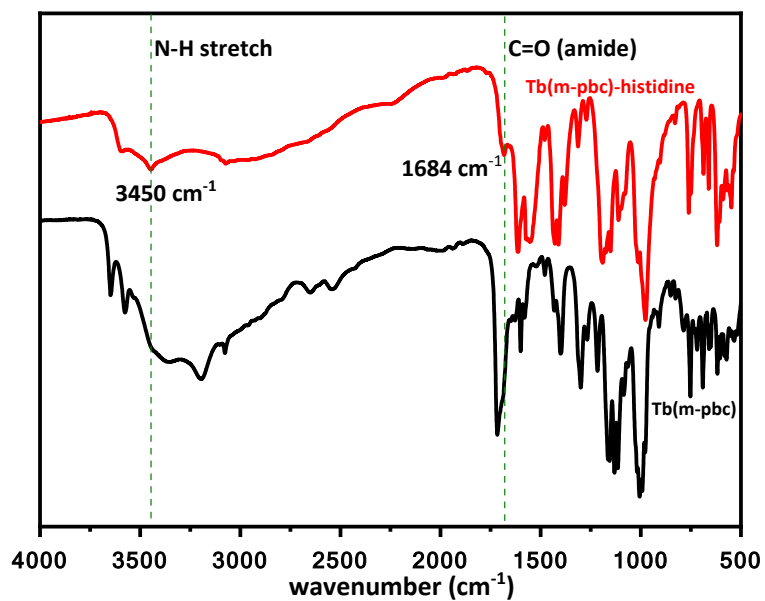
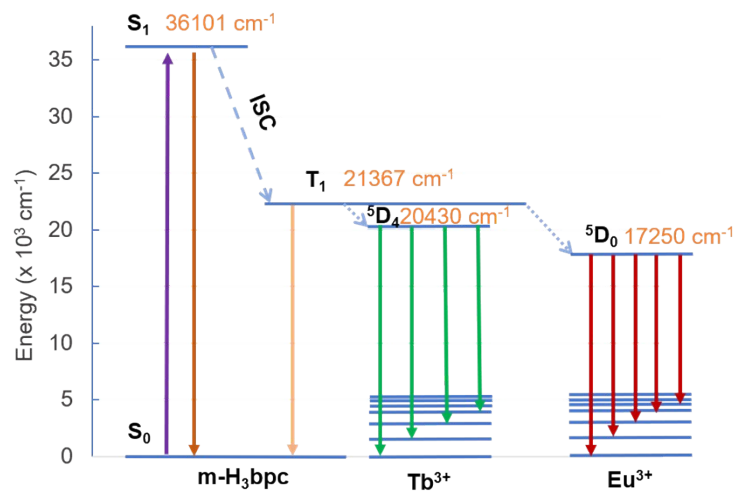


Figure S15. FT-IR spectra of **Tb(m-pbc)-NS** and **Tb(m-pbc)-NS** treated by EDC/NHS then reacted with histidine.



Scheme S1. The schematic emission and “antenna effect” processed in Ln(m-pbc).

Table S1. Hydrogen bonds for **Eu(m-pbc)** [\AA and $^\circ$].

D-H...A	d(D-H)	d(H...A)	d(D...A)	<(DHA)
O(5)-H(5)...O(10)#4	0.82	2.10	2.661(7)	125.2
O(6)-H(6A)...O(1)#5	0.85	1.82	2.653(5)	166.9
O(6)-H(6B)...O(9)#6	0.84	2.07	2.870(6)	158.8
O(9)-H(9A)...O(3)#3	0.82	1.87	2.685(5)	172.5
O(11)-H(11A)...O(4)#7	0.82	1.84	2.642(7)	166.8
C(5)-H(5A)...O(7)#3	0.93	2.54	3.303(7)	139.4
C(12)-H(12)...O(6)#1	0.93	2.47	3.386(7)	167.9

Symmetry transformations used to generate equivalent atoms:

#1 $-x+2, -y, -z+2$ #2 $-x+3, -y+1, -z+2$ #3 $-x+2, -y+1, -z+2$
#4 $x+1, y, z-1$ #5 $x-1, y, z$ #6 $-x+1, -y, -z+2$ #7 $x-1, y, z+1$

Table S2. ICP results and calculated molar contents of Y and Eu/Tb in $Y_xEu_{1-x}(\text{m-pbc})$ and $Y_xTb_{1-x}(\text{m-pbc})$ ($x= 10\%, 30\%, 50\%, 70\%, 90\%$).

Sample	Element	Reported Conc (mg/L)	Real molar content (%)
$Y_{0.1}Eu_{0.9}\text{-pbc}$	Y	4.51	9.44
	Eu	73.9	90.56
$Y_{0.3}Eu_{0.7}\text{-pbc}$	Y	10.86	31.20
	Eu	40.96	68.80
$Y_{0.5}Eu_{0.5}\text{-pbc}$	Y	14.97	57.72
	Eu	19.53	42.28
$Y_{0.7}Eu_{0.3}\text{-pbc}$	Y	12.54	72.64
	Eu	8.072	27.36
$Y_{0.9}Eu_{0.1}\text{-pbc}$	Y	30.41	90.84
	Eu	5.237	9.16
$Y_{0.1}Tb_{0.9}\text{-pbc}$	Y	3.092	12.35
	Tb	39.25	87.65
$Y_{0.3}Tb_{0.7}\text{-pbc}$	Y	7.828	32.57
	Tb	28.96	67.43
$Y_{0.5}Tb_{0.5}\text{-pbc}$	Y	14.16	50.11
	Tb	25.21	49.89
$Y_{0.7}Tb_{0.3}\text{-pbc}$	Y	20.37	71.55
	Tb	14.48	28.45
$Y_{0.9}Tb_{0.1}\text{-pbc}$	Y	30.56	85.63
	Tb	5.126	14.37

