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Supporting Information for

Diverse lanthanide coordination polymers tuned by the flexility of ligands and the lanthanide contraction effect: syntheses, structures and luminescence

Xiaoyan Zhou, Yanling Guo, Zhaohua Shi, Xueqin Song, Xiaoliang Tang, Xiong Hu, Zhentong Zhu, Pengxuan Li,Weisheng Liu

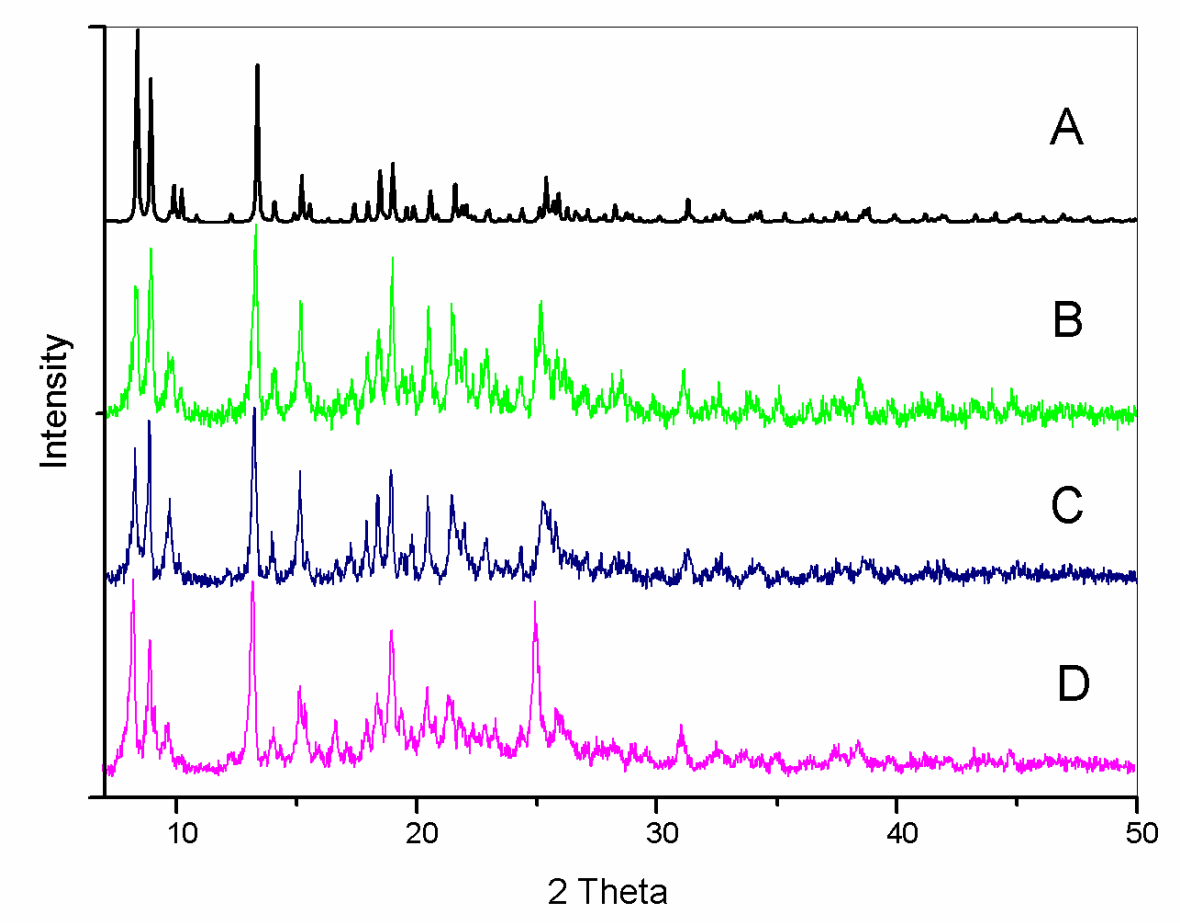

Figure S1. XRPD patterns of lanthanide complexes of ligand L^I: (A) simulated for complex **4**; (B) as-synthesized of Eu^{3+} complex of ligand L^I (complex **4**); (C) as-synthesized of Tb^{3+} complex of ligand L^I (complex **5**); (D) as-synthesized of Er^{3+} complex of ligand L^I (complex **6**).

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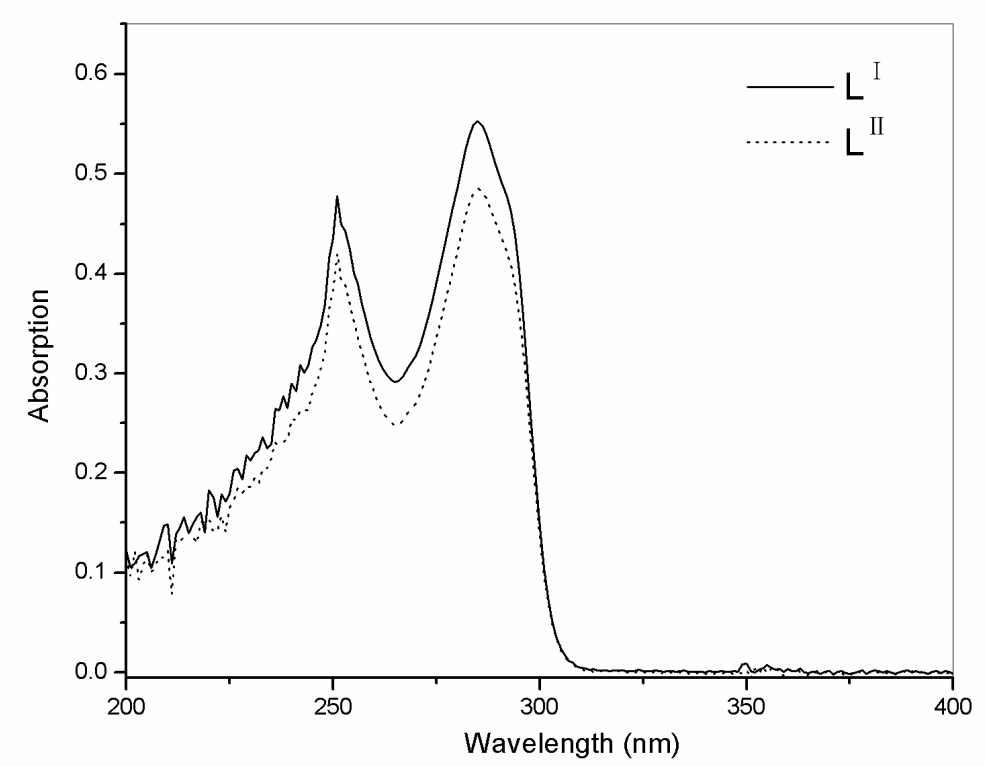

Figure S2. Absorption spectra of L^{I} (solid line) and L^{II} (dotted line) in ethyl acetate (5×10^{-5} M).

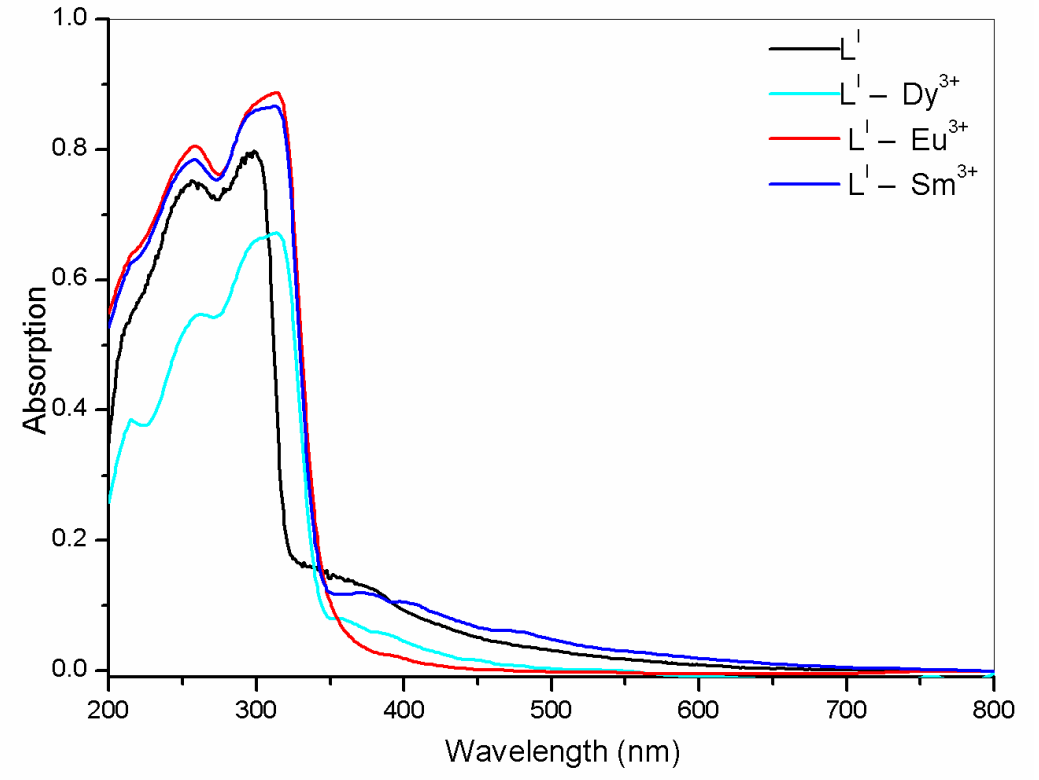

Figure S3. Absorption spectra of L^{I} and the lanthanide complexes in solid states.

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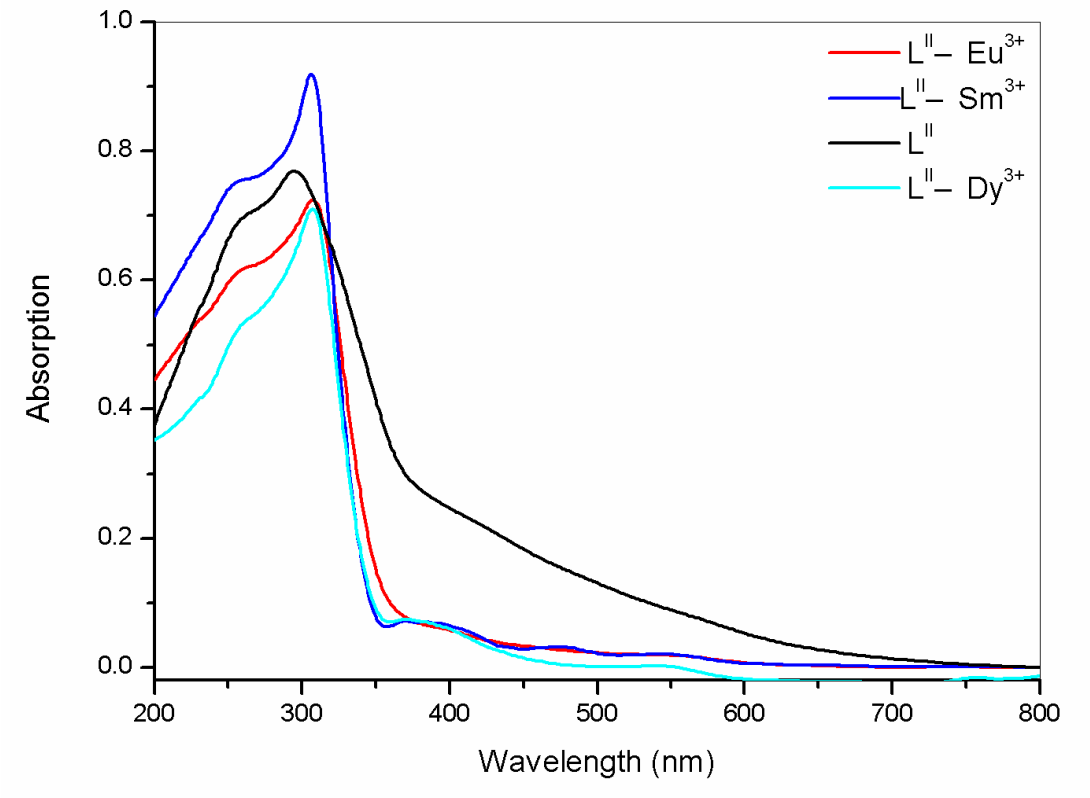

Figure S4. Absorption spectra of L^{II} and the lanthanide complexes in solid states.

Absorption Spectra of Ligands.

As shown in Fig. S2, the absorption spectrum of the ligand L^{I} in ethyl acetate features two main bands in the UV region with apparent maxima at ca. 251 nm (ε ~ 9558 L mol^{-1} cm^{-1}) and 285 nm (ε ~ 11053 L mol^{-1} cm^{-1}) which can be assigned to characteristic π–π* based transitions centered on the salicylamide groups, respectively. It is interesting to note that the UV-vis absorption spectrum of L^{II} in ethyl acetate is essentially identical to that observed for L^{I}. The apparent maximum of L^{II} at ca. 250 (ε~ 8405 L mol^{-1} cm^{-1}) and ca. 285 nm (ε ~ 9709 L mol^{-1} cm^{-1}) show that the different chain length of the backbone does not have a significant influence on the electronic properties of the salicylamide moiety considerably. We note that molar absorption coefficients at the maxima of the bands for the ligands are large, indicates that the two ligands have a strong ability to absorb light and thus favor the efficient antenna effect, making them possible candidates as activators for lanthanide luminescence.

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The absorption spectra of ligands (L^{I}, L^{II}) and their complexes (Sm^{3+}, Eu^{3+}, Dy^{3+}) were also measured in solid states (Fig. S3, S4). The apparent maximum of L^{I} at ca. 257 and ca. 299 nm, L^{II} at ca. 259 and ca. 294 nm, and no significant changes are apparent in the shapes of the absorption bands upon formation of the lanthanide complexes (Sm^{3+}, Eu^{3+}, Dy^{3+}). Therefore, it suggests that the coordination of the Ln^{3+} ion does not have a significant influence on the π–π* transition. However, a small red shift that is discernible in the absorption maximum of all three complexes with these two ligands is attributable to the perturbation induced by the metal coordination.

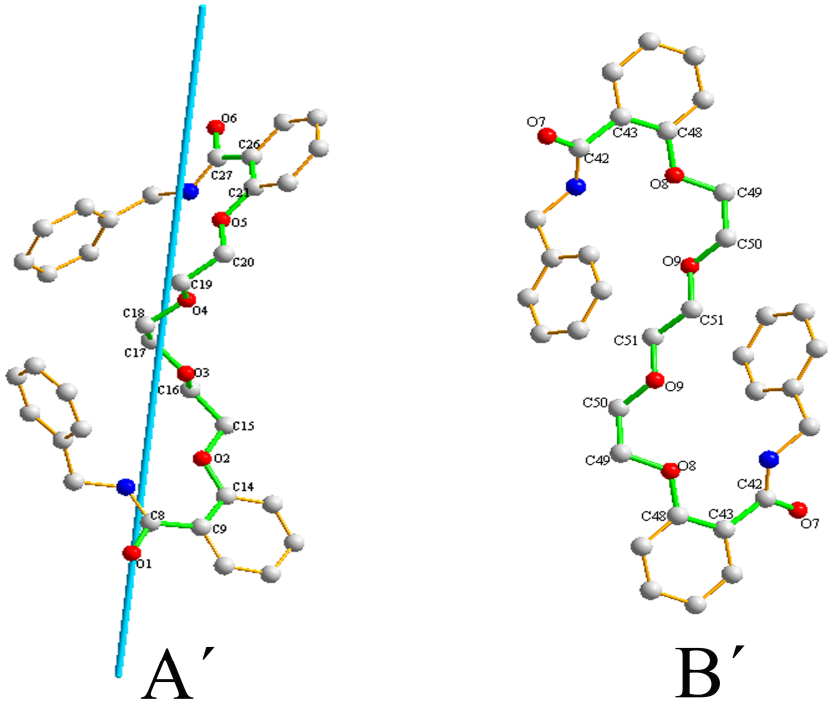

Figure S5. View of the conformations of ligand L^{II} in complex **11** (A′, B′).

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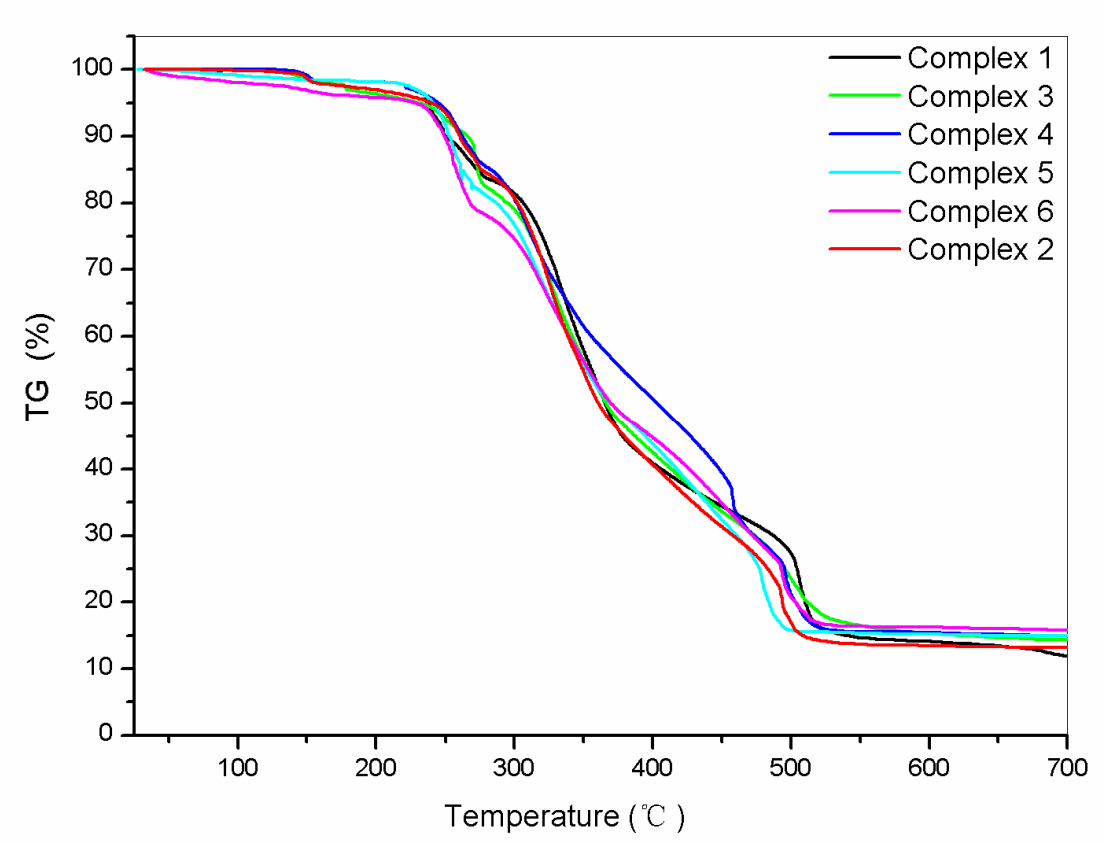

Figure S6. The TGA curves of complexes **1** − **6**.

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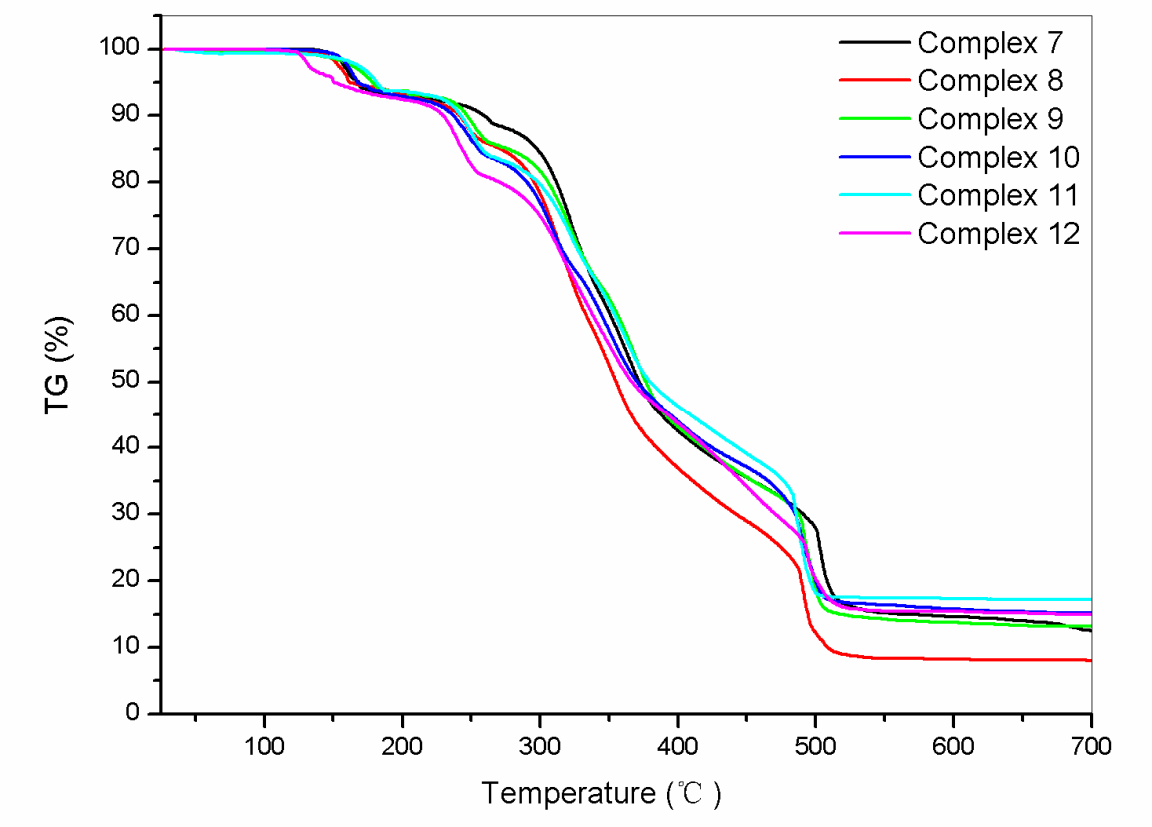

Figure S7. The TGA curves of complexes **7**−**12**.

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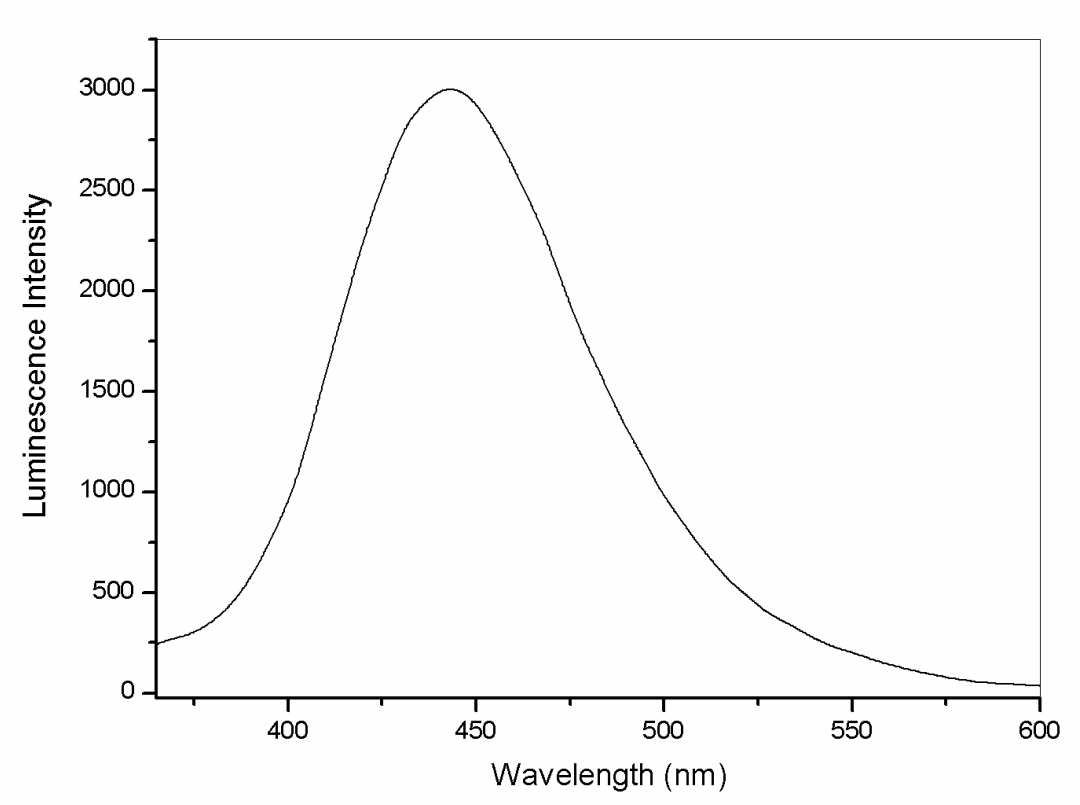

Figure S8. Room-temperature emission spectrum for ligand L^I excited at 325 nm (excitation and emission passes = 2.5 nm).

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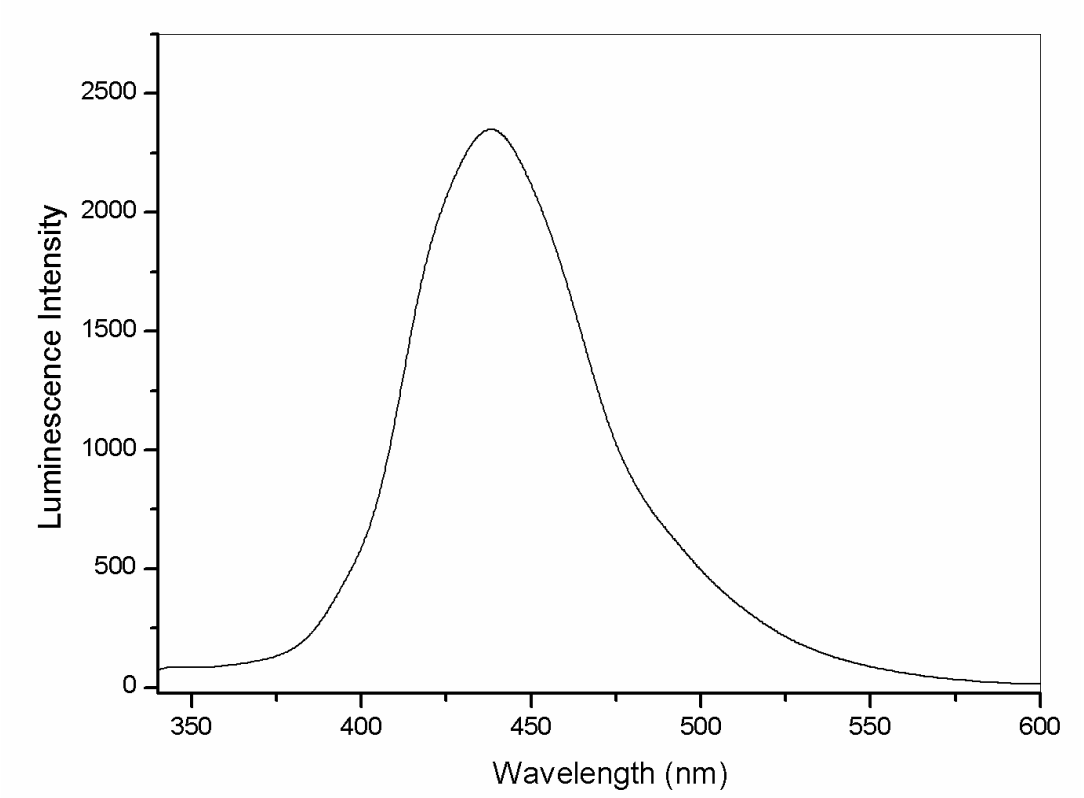

Figure S9. Room-temperature emission spectrum for ligand L^{II} excited at 323 nm (excitation and emission passes = 2.5 nm).

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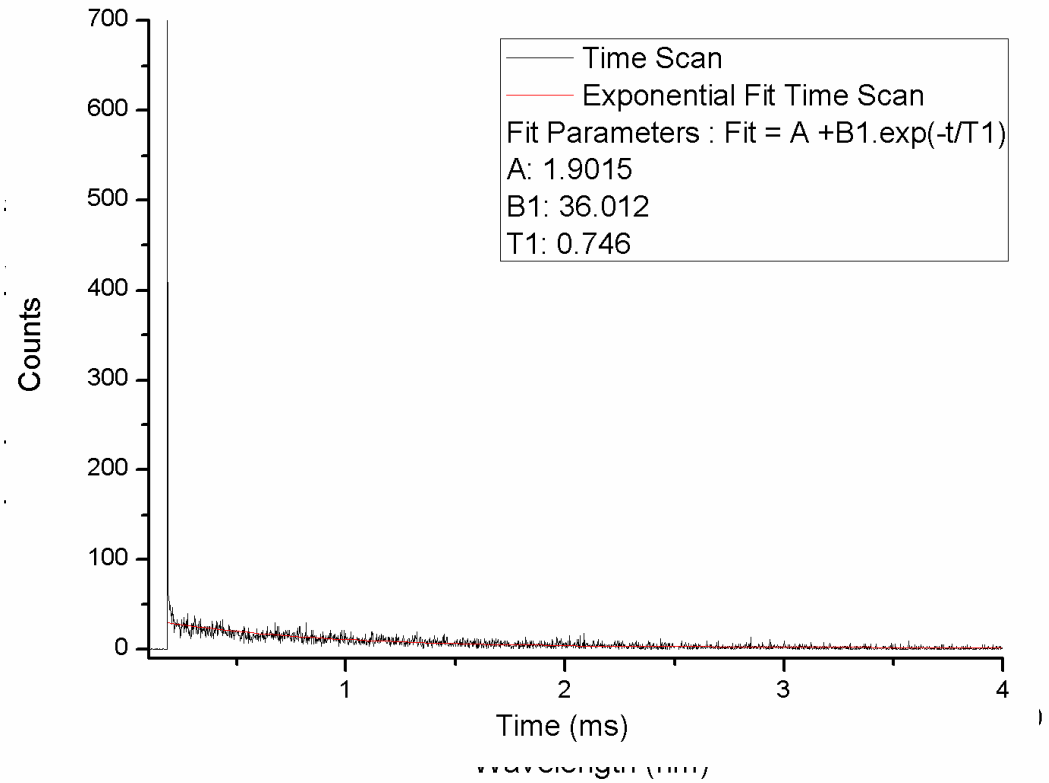

Figure S10. The room-temperature solid-state phosphorescence lifetime of Eu^{3+} complex of Ligand L^{I}.

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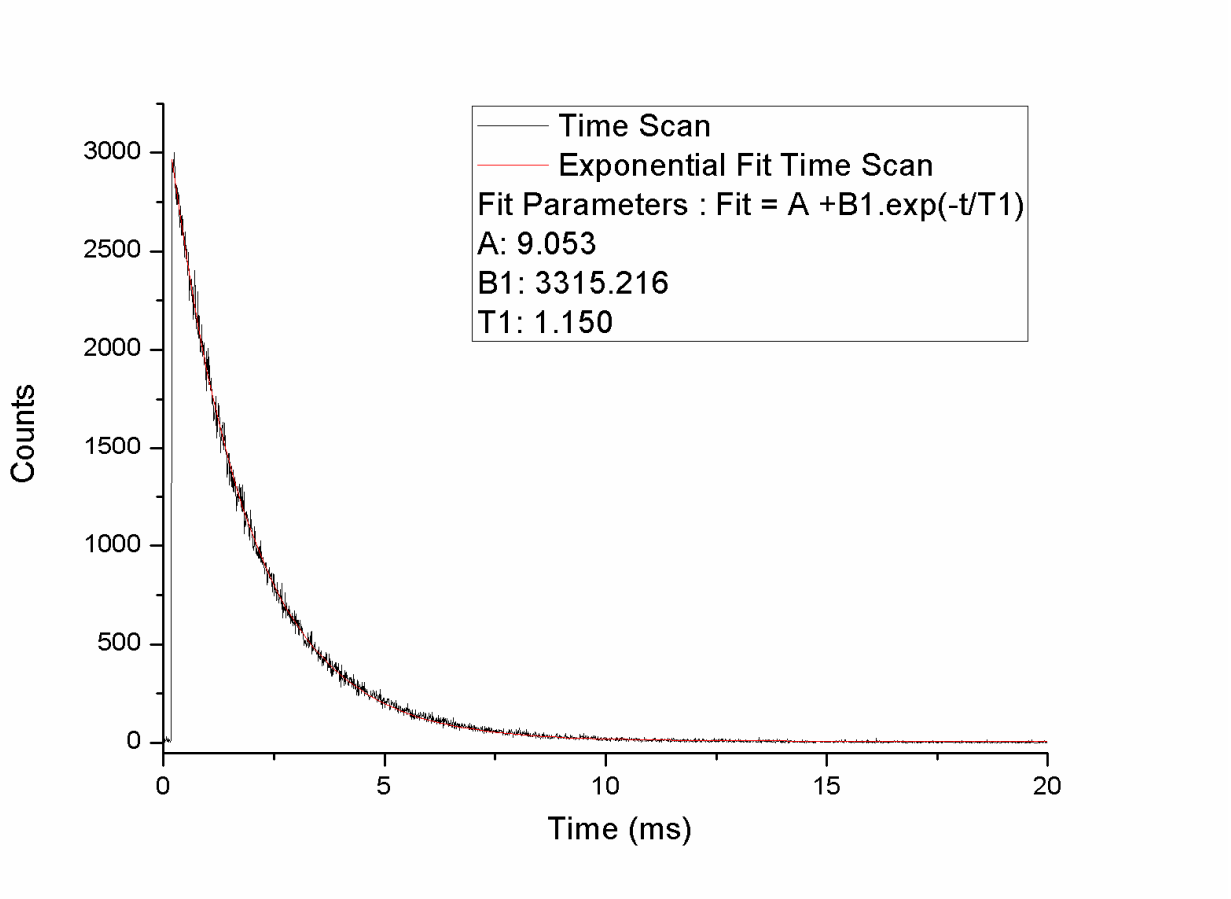

Figure S11. The room-temperature solid-state phosphorescence lifetime of Tb^{3+} complex of Ligand L^{I}.

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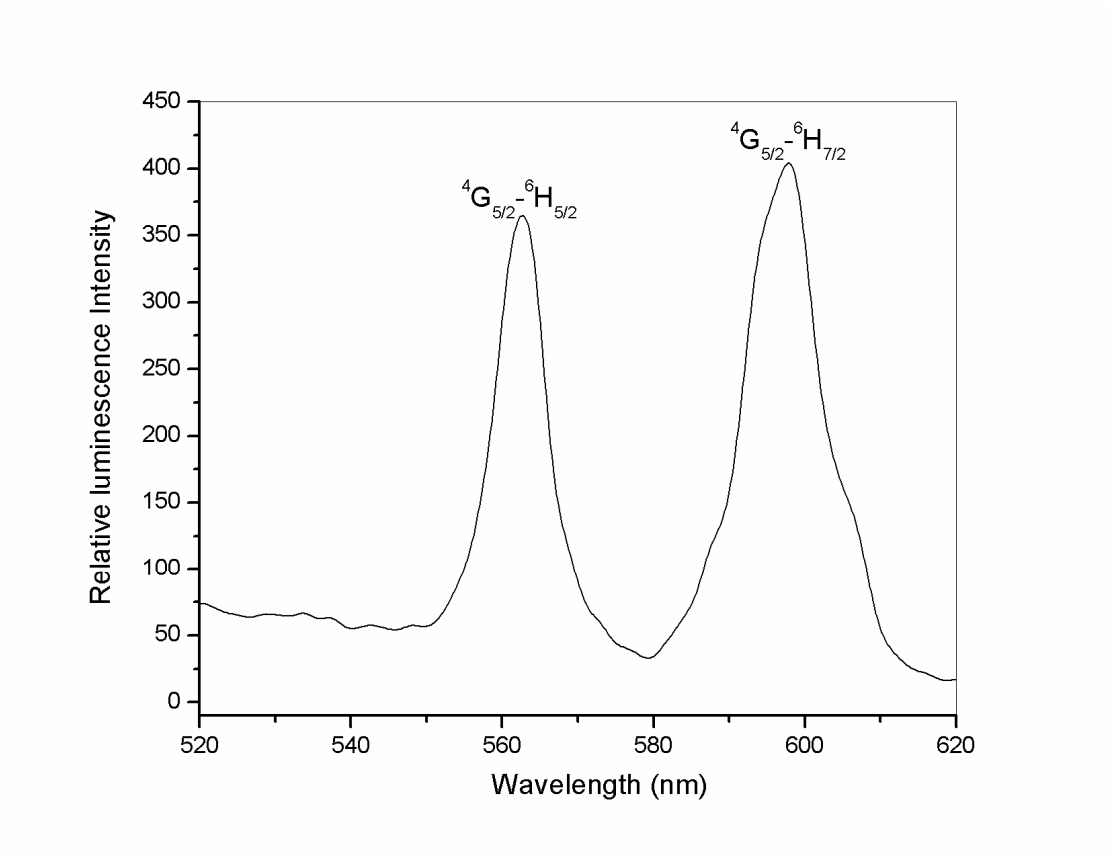

Figure S12. Room-temperature emission spectrum for Sm^{3+} complex of ligand L^I excited at 324 nm (excitation and emission passes = 2.5 nm).

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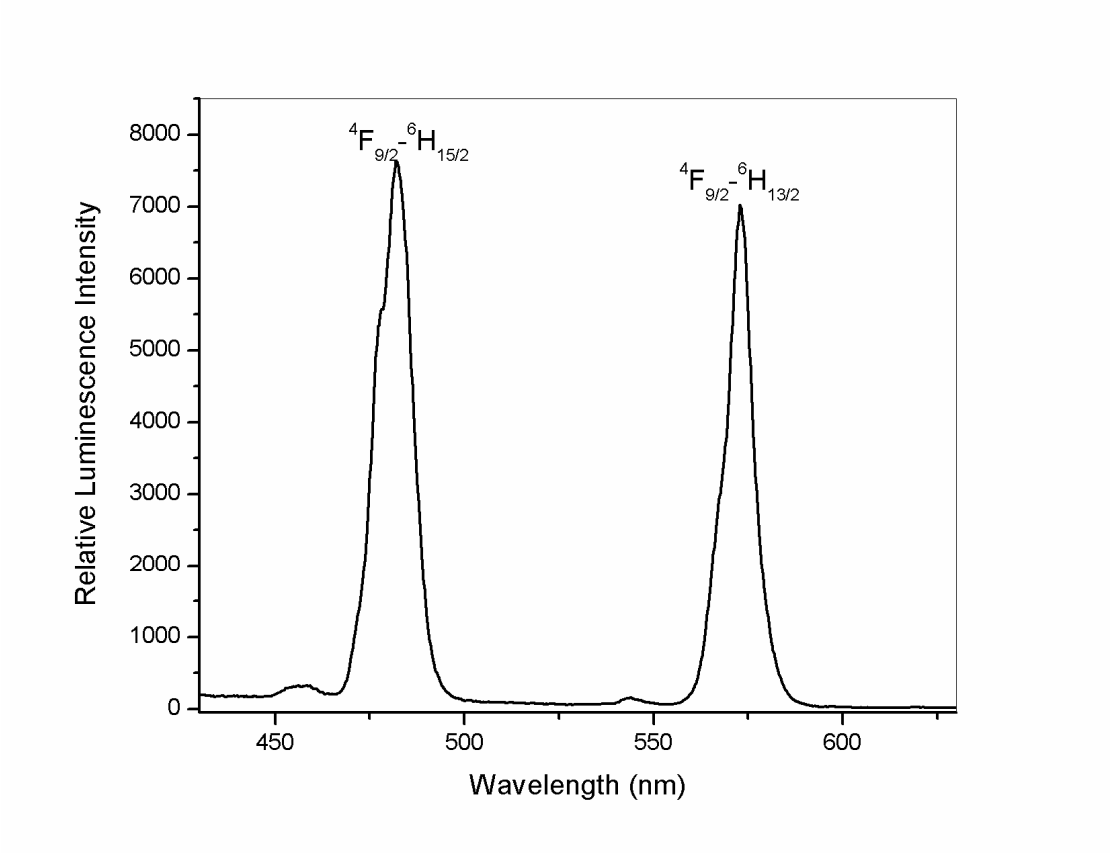

Figure S13. Room-temperature emission spectrum for Dy^{3+} complex of ligand L^I excited at 324 nm (excitation and emission passes = 2.5 nm).

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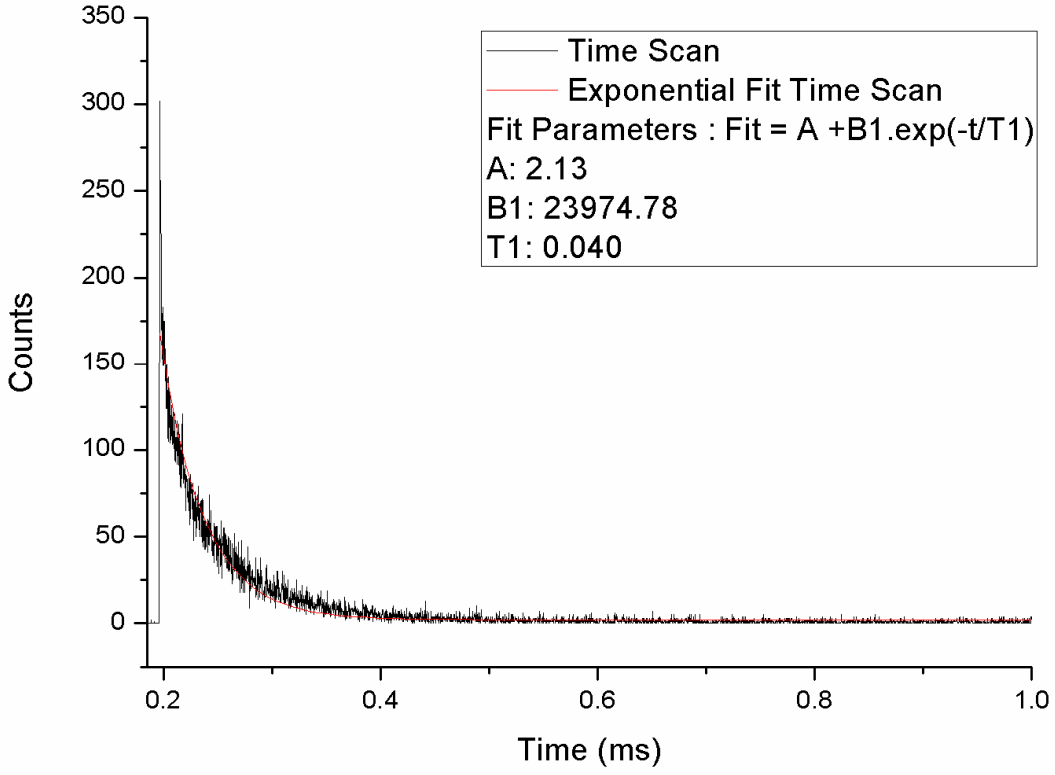

Figure S14. The room-temperature solid-state phosphorescence lifetime of Sm^{3+} complex of Ligand L^{I}.

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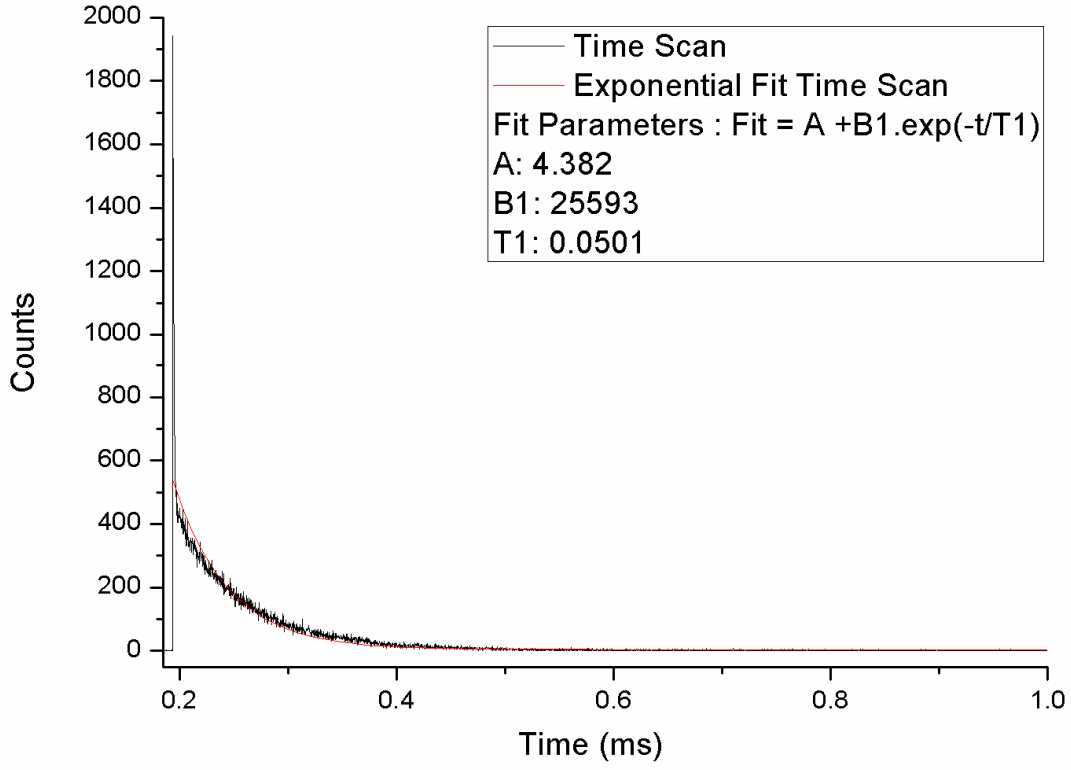

Figure S15. The room-temperature solid-state phosphorescence lifetime of Dy^{3+} complex of Ligand L^{I}.

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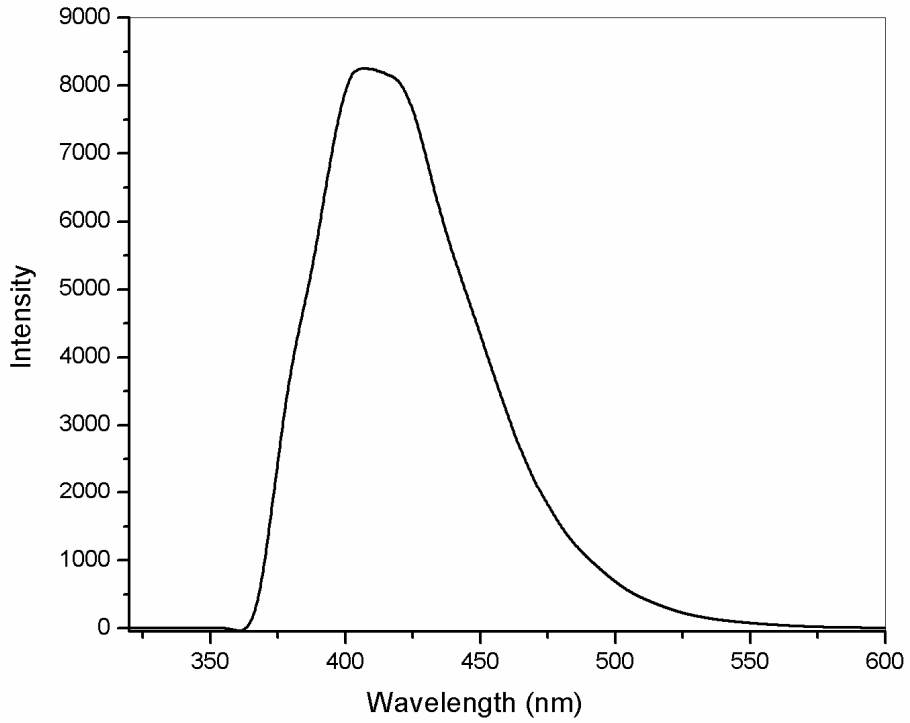

Figure S16. Phosphorescence spectrum of Gd^{3+} complex of ligand L^{I} excited at 325 nm at 77K.

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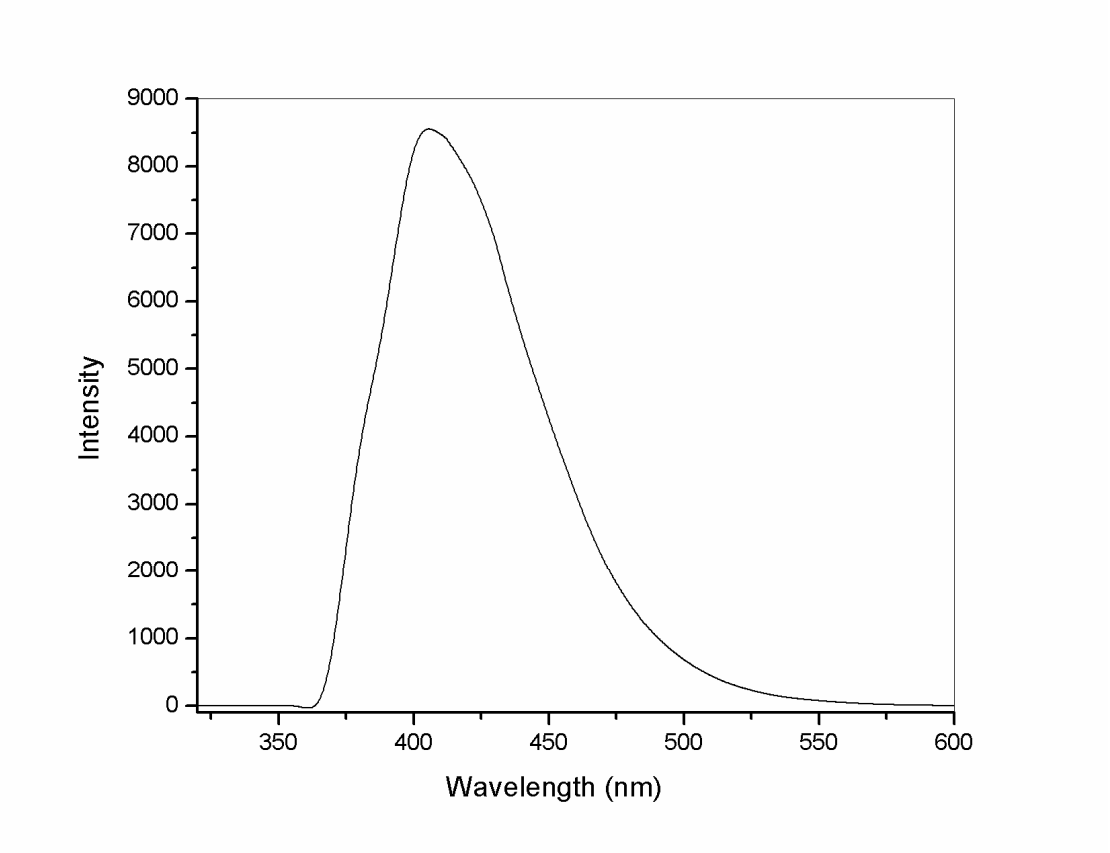

Figure S17. Phosphorescence spectrum of Gd^{3+} complex of ligand L^{II} excited at 323 nm at 77K.

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Table S1. Elemental Analytical and IR Spectral Data for All Complexes

complex	elemental analysis (%)[a]			IR (λ_{max} /cm^{-1}), ν(C=O)
	C	H	N	
$La_2L^{I}_3(NO_3)_6 \cdot 2C_4H_8O_2$	51.85 (52.01)	4.54 (4.70)	6.92 (7.00)	1611
$Pr_2L^{I}_3(NO_3)_6 \cdot C_4H_8O_2$	51.86 (51.79)	4.53 (4.38)	7.26 (7.34)	1611
$Nd_2L^{I}_3(NO_3)_6 \cdot 3CH_3OH$	51.11 (51.02)	4.56 (4.67)	7.37 (7.21)	1611
$Eu_2L^{I}_3(NO_3)_6 \cdot 3CH_3OH$	50.73 (50.69)	4.59 (4.64)	7.18 (7.16)	1613
$Tb_2L^{I}_3(NO_3)_6$	50.87 (50.94)	4.15 (4.27)	7.35 (7.43)	1611
$Er_2L^{I}_3(NO_3)_6$	50.62 (50.56)	4.18 (4.24)	7.41 (7.37)	1612
$La_2L^{II}_3(NO_3)_6 \cdot 2C_4H_8O_2$	52.13 (52.18)	4.87 (4.94)	6.58 (6.64)	1613
$Pr_2L^{II}_3(NO_3)_6 \cdot 2C_4H_8O_2$	52.03 (52.10)	4.83 (4.93)	6.72 (6.63)	1612
$Nd_2L^{II}_3(NO_3)_6 \cdot 2C_4H_8O_2$	51.89 (51.96)	4.87 (4.92)	6.78 (6.61)	1611
$Eu_2L^{II}_3(NO_3)_6 \cdot 2C_4H_8O_2$	51.36 (51.30)	4.92 (5.07)	6.38 (6.41)	1610
$Tb_2L^{II}_3(NO_3)_6 \cdot 2C_4H_8O_2 \cdot 2CH_3OH$	50.95 (51.03)	5.09 (5.05)	6.39 (6.38)	1612
$Er_2L^{II}_3(NO_3)_6 \cdot 2C_4H_8O_2$	50.78 (50.71)	4.89 (5.02)	6.26 (6.34)	1614

[a] Data in parentheses are calculated values.

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Table S2. Photophysical Characterization of the ligand L^{I} and L^{II} Complexes, where RLI is the relative luminescent intensity.

		λ_{max}[a]/nm	RLI/au	τ/ms	Φ[b] (%)
L^{I}					
	Sm	563	367	0.040	0.84
		598	409		
	Eu	580	138		
		593	890		
		617	1656	0.746	10.62
	Tb	490	5843		
		545	>10 000	1.150	32.51
		583	2143		
		621	965		
	Dy	482	7619	0.0501	5.05
		573	6995		
L^{II}					
	Sm	562	239	0.045	1.13
		595	379		
	Eu	579	181		
		591	1362		
		617	4399	0.873	22.26
	Tb	490	>10 000		
		545	>10 000	1.289	43.95
		583	3425		
		621	2188		
	Dy	482	9445	0.063	7.56
		573	8924		

[a] Excitation and emission passes = 2.5 nm. [b] Luminescence lifetimes and quantum yield values are reported here with an error of $\pm$15%.

Table S3. Selected Torsion Angles (°) of complexes **2**, **4**, **9**, and **11**.

Complex **2**		Complex **4**		Complex **9**		Complex **11**	
A		A		A		A′	
O12–C79–C80–O13	68.3 (13)	O2–C15–C16–O3	45 (3)	O2–C15–C16–O3	72.1 (4)	O2–C15–C16–O3	67.2 (14)
C79–C80–O13–C81	–176.4 (10)	C15–C16–O3–C17	79 (2)	C15–C16–O3–C17	156.6 (3)	C15–C16–O3–C17	–176.8 (12)
C80–O13–C81–C82	–175.8(10)	C16–O3–C17–C18	173.9 (13)	C16–O3–C17–C18	172.5 (3)	C16–O3–C17–C18	177.9 (2)
O13–C81–C82–O14	65.6 (11)	O3–C17–C18–O4	–67.2 (14)	O3–C17–C18–O4	–78.0 (4)	O3–C17–C18–O4	75.2 (14)
B				C17–C18–O4–C19	–170.7 (3)	C17–C18–O4–C19	176.5 (11)
O2–C15–C16–O3	74.9 (11)			C18–O4–C19–C20	177.8 (4)	C18–O4–C19–C20	–175.8 (10)
C15–C16–O3–C17	–150.9 (8)			O4–C19–C20–O5	–68.2 (3)	O4–C19–C20–O5	63.4 (13)
C16–O3–C17–C18	–163.5 (9)			B		B′	
O3–C17–C18–O4	64.6 (12)			O8–C49–C50–O9	56.8 (4)	O8–C49–C50–O9	63.2 (17)
C				C49–C50–O9–C51	–177.0 (3)	C49–C50–O9–C51	179.3 (14)
O7–C47–C48–O8	–62.6 (12)			C50–O9–C51–C51	–178.2 (3)	C50–O9–C51–C51	179.8 (17)
C47–C48–O8–C49	–174.8 (9)			O9–C51–C51–O9	180.0 (0)	O9–C51–C51–O9	180.0 (0)
C48–O8–C49–C50	177.3 (8)						
O8–C49–C50–O9	–73.4(10)						

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Table S4. Selected bond distances (Å) and angles (º) for polymer **1**

La1—O5 2.403 (5)	La1—O6 2.415 (4)	La1—O1^{i} 2.456 (5)	La1—O19 2.569 (5)
La1—O18 2.569 (5)	La1—O21 2.568 (6)	La1—O24 2.593 (5)	La1—O16 2.607(6)
La1—O22 2.600 (4)	La2—O10 2.420 (5)	La2—O15^{ii} 2.443 (6)	La2—O11 2.457 (5)
La2—O25 2.547 (5)	La2—O28 2.599 (5)	La2—O33 2.603 (5)	La2—O31 2.602 (5)
La2—O30 2.600(5)	La2—O27 2.604 (7)		

O5—La1—O6 153.67 (15)	O5—La1—O1^{i} 81.82 (18)	O6—La1—O1i 81.23 (14)
O5—La1—O21 75.3 (2)	O6—La1—O21 124.54 (18)	O1^{i}—La1—O21 153.87 (17)
O5—La1—O18 119.48 (17)	O6—La1—O18 76.93 (16)	O1^{i}—La1—O18 79.86 (15)
O21—La1—O18 100.38 (18)	O5—La1—O19 123.95 (19)	O6—La1—O19 78.32 (17)
O1^{i}—La1—O19 150.96 (17)	O21—La1—O19 48.65 (19)	O18—La1—O19 75.59 (17)
O5—La1—O24 91.00 (17)	O6—La1—O24 82.61 (14)	O1^{i}—La1—O24 125.37 (15)
O21—La1—O24 68.24 (18)	O18—La1—O24 144.51 (17)	O19—La1—O24 72.04 (17)
O5—La1—O22 75.51 (16)	O6—La1—O22 81.48 (16)	O1^{i}—La1—O22 78.60 (15)
O21—La1—O22 107.20 (18)	O18—La1—O22 151.47 (17)	O19—La1—O22 118.01 (16)
O24—La1—O22 47.48 (15)	O5—La1—O16 73.9 (2)	O6—La1—O16 125.90 (19)
O1^{i}—La1—O16 89.67 (19)	O21—La1—O16 72.0 (2)	O18—La1—O16 49.00 (19)
O19—La1—O16 85.87 (19)	O24—La1—O16 139.9 (2)	O22—La1—O16 148.47 (19)
O10—La2—O15^{ii} 83.51 (14)	O10—La2—O11 154.71 (15)	O15^{ii}—La2—O11 86.99 (16)
O10—La2—O25 83.76 (16)	O15^{ii}—La2—O25 125.2 (2)	O11—La2—O25 82.71 (16)
O10—La2—O28 117.67 (16)	O15^{ii}—La2—O28 156.99 (16)	O11—La2—O28 76.95 (17)
O25—La2—O28 69.43 (19)	O10—La2—O30 70.65 (16)	O15^{ii}—La2—O30 147.27 (17)
O11—La2—O30 124.62 (17)	O25—La2—O30 72.66 (19)	O28—La2—O30 48.19 (17)
O10—La2—O31 125.89 (16)	O15^{ii}—La2—O31 84.01 (18)	O11—La2—O31 76.01 (15)
O25—La2—O31 142.86 (19)	O28—La2—O31 76.26 (17)	O30—La2—O31 94.92 (17)
O10—La2—O33 77.88 (15)	O15^{ii}—La2—O33 83.74 (18)	O11—La2—O33 124.33 (14)
O25—La2—O33 143.62 (18)	O28—La2—O33 91.75 (16)	O30—La2—O33 71.70 (17)
O31—La2—O33 48.49 (14)	O10—La2—O27 76.0(2)	O15^{ii}—La2—O27 76.4 (2)
O11—La2—O27 79.0 (2)	O25—La2—O27 48.9 (2)	O28—La2—O27 115.7 (2)
O30—La2—O27 114.63 (19)	O31—La2—O27 148.9 (2)	O33—La2—O27 148.6 (2)

Symmetry codes: (i) $-x+1, y-1/2, -z+2$; (ii) $-x+2, y+1/2, -z+1$; (iii) $-x+1, y+1/2, -z+2$; (iv) $-x+2, y-1/2, -z+1$.

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Table S5. Selected bond distances (Å) and angles (º) for polymer **2**

Pr1—O5 2.347 (7)	Pr1—O11 2.385 (9)	Pr1—O15^{i} 2.395 (7)	Pr1—O22 2.514 (10)
Pr1—O24 2.525 (13)	Pr1—O19 2.548 (8)	Pr1—O18 2.554 (7)	Pr1—O21 2.562 (8)
Pr1—O16 2.577 (7)	Pr2—O10^{ii} 2.365 (8)	Pr2—O1 2.388 (6)	Pr2—O6 2.430 (7)
Pr2—O28 2.521 (6)	Pr2—O27 2.539 (8)	Pr2—O25 2.550 (7)	Pr2—O30 2.551 (7)
Pr2—O31 2.551 (7)	Pr2—O33 2.571 (10)		
O5—Pr1—O11 84.2 (2)	O5—Pr1—O15^{i} 153.8 (2)	O11—Pr1—O15^{i} 85.8 (2)	
O5—Pr1—O22 84.4 (3)	O11—Pr1—O22 125.2 (3)	O15^{i}—Pr1—O22 81.8 (3)	
O5—Pr1—O24 75.5 (4)	O11—Pr1—O24 75.2 (3)	O15^{i}—Pr1—O24 78.6 (4)	
O22—Pr1—O24 50.0 (4)	O5—Pr1—O19 70.3 (3)	O11—Pr1—O19 147.2 (3)	
O15^{i}—Pr1—O19 125.8 (3)	O22—Pr1—O19 73.8 (3)	O24—Pr1—O19 115.9 (3)	
O5—Pr1—O18 126.1 (2)	O11—Pr1—O18 82.9 (3)	O15^{i}—Pr1—O18 76.4 (2)	
O22—Pr1—O18 142.9 (3)	O24—Pr1—O18 147.7 (3)	O19—Pr1—O18 95.3 (3)	
O5—Pr1—O21 119.2 (3)	O11—Pr1—O21 154.7 (3)	O15^{i}—Pr1—O21 76.5 (3)	
O22—Pr1—O21 70.4 (3)	O24—Pr1—O21 117.7 (4)	O19—Pr1—O21 50.0 (3)	
O18—Pr1—O21 75.5 (3)	O5—Pr1—O16 77.7 (2)	O11—Pr1—O16 83.0 (3)	
O15^{i}—Pr1—O16 125.0 (2)	O22—Pr1—O16 144.8 (3)	O24—Pr1—O16 146.8 (4)	
O19—Pr1—O16 71.8 (3)	O18—Pr1—O16 48.9 (2)	O21—Pr1—O16 92.4 (3)	
O10^{ii}—Pr2—O1 153.1 (2)	O10^{ii}—Pr2—O6 80.8 (3)	O1—Pr2—O6 82.0 (2)	
O10^{ii}—Pr2—O28 124.8 (3)	O1—Pr2—O28 78.0 (2)	O6—Pr2—O28 150.8 (2)	
O10^{ii}—Pr2—O27 92.0 (2)	O1—Pr2—O27 81.9 (2)	O6—Pr2—O27 126.6 (2)	
O28—Pr2—O27 71.2 (3)	O10^{ii}—Pr2—O25 76.0 (3)	O1—Pr2—O25 80.3 (2)	
O6—Pr2—O25 78.0 (2)	O28—Pr2—O25 118.7 (3)	O27—Pr2—O25 49.2 (2)	
O10^{ii}—Pr2—O30 76.1 (3)	O1—Pr2—O30 123.6 (3)	O6—Pr2—O30 154.3 (3)	
O28—Pr2—O30 48.9 (3)	O27—Pr2—O30 66.1 (3)	O25—Pr2—O30 106.9 (3)	
O10^{ii}—Pr2—O31 119.4 (2)	O1—Pr2—O31 77.5 (2)	O6—Pr2—O31 80.5 (2)	
O28—Pr2—O31 74.7 (2)	O27—Pr2—O31 143.1 (2)	O25—Pr2—O31 150.9 (3)	
O30—Pr2—O31 101.0 (3)	O10^{ii}—Pr2—O33 73.8 (3)	O1—Pr2—O33 126.5 (3)	
O6—Pr2—O33 89.4 (3)	O28—Pr2—O33 85.8 (3)	O27—Pr2—O33 139.3 (3)	
O25—Pr2—O33 148.7 (3)	O30—Pr2—O33 73.4 (3)	O31—Pr2—O33 49.0 (3)	

Symmetry codes: (i) $-x+1, y+1/2, -z$; (ii) $-x, y-1/2, -z+1$; (iii) $-x, y+1/2, -z+1$; (iv) $-x+1, y-1/2, -z$.

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Table S6. Selected bond distances (Å) and angles (º) for polymer **3**

Nd1—O1 2.523 (4)	Nd1—O1^{iv} 2.523 (4)	Nd1—O1^{iii} 2.523 (4)	Nd1—O2 2.533 (4)
Nd1—O7^{iii} 2.380 (3)	Nd1—O7^{iv} 2.380 (3)	Nd1—O7 2.380 (3)	Nd1—O2^{iv} 2.533 (4)
Nd1—O2^{iii} 2.533 (4)	Nd2—O8^{i} 2.373 (4)	Nd2—O8 2.373(4)	Nd2—O8^{ii} 2.373(4)
Nd2—O5^{ii} 2.524 (4)	Nd2—O5 2.524 (4)	Nd2—O5^{i} 2.524 (4)	Nd2—O4^{ii} 2.541 (4)
Nd2—O4^{i} 2.541(4)	Nd2—O4 2.541 (4)		
O8—Nd2—O8^{i} 82.90 (14)	O8—Nd2—O8^{ii} 82.90 (14)	O8^{i}—Nd2—O8^{ii} 82.90 (14)	
O8—Nd2—O5^{ii} 69.57 (15)	O8^{i}—Nd2—O5^{ii} 83.71 (15)	O8^{ii}—Nd2—O5^{ii} 150.62 (16)	
O8—Nd2—O5 150.62 (16)	O8^{i}—Nd2—O5 69.57 (15)	O8^{ii}—Nd2—O5 83.71 (15)	
O5^{ii}—Nd2—O5 115.58 (8)	O8—Nd2—O5^{i} 83.71 (15)	O8^{i}—Nd2—O5^{i} 150.62 (16)	
O8^{ii}—Nd2—O5^{i} 69.57 (15)	O5^{ii}—Nd2—O5^{i} 115.58 (8)	O5—Nd2—O5^{i} 115.58 (8)	
O8—Nd2—O4^{ii} 119.35 (15)	O8^{i}—Nd2—O4^{ii} 91.08 (16)	O8^{ii}—Nd2—O4^{ii} 156.16 (16)	
O5^{ii}—Nd2—O4^{ii} 49.80 (16)	O5—Nd2—O4^{ii} 72.60 (16)	O5^{i}—Nd2—O4^{ii} 118.26 (17)	
O8—Nd2—O4^{i} 91.08 (16)	O8^{i}—Nd2—O4^{i} 156.16 (16)	O8^{ii}—Nd2—O4^{i} 119.35 (15)	
O5^{ii}—Nd2—O4^{i} 72.60 (16)	O5—Nd2—O4^{i} 118.26 (17)	O5^{i}—Nd2—O4^{i} 49.80 (16)	
O4^{ii}—Nd2—O4^{i} 71.79 (18)	O8—Nd2—O4 156.16 (16)	O8^{i}—Nd2—O4 119.35 (15)	
O8^{ii}—Nd2—O4 91.08 (16)	O5^{ii}—Nd2—O4 118.26 (17)	O5—Nd2—O4 49.80 (16)	
O5^{i}—Nd2—O4 72.60 (15)	O4^{ii}—Nd2—O4 71.79 (18)	O4^{i}—Nd2—O4 71.79 (18)	
O7^{iii}—Nd1—O7^{iv} 84.62 (13)	O7^{iii}—Nd1—O7 84.62 (13)	O7^{iv}—Nd1—O7 84.62 (13)	
O7^{iii}—Nd1—O1 71.02 (13)	O7^{iv}—Nd1—O1 80.36 (12)	O7—Nd1—O1 152.35 (14)	
O7^{iii}—Nd1—O1^{iv} 80.36 (13)	O7^{iv}—Nd1—O1^{iv} 152.35 (14)	O7—Nd1—O1^{iv} 71.02 (13)	
O1—Nd1—O1^{iv} 115.78 (7)	O7^{iii}—Nd1—O1^{iii} 152.35 (14)	O7^{iv}—Nd1—O1^{iii} 71.02 (13)	
O7—Nd1—O1^{iii} 80.36 (12)	O1—Nd1—O1^{iii} 115.78 (7)	O1^{iv}—Nd1—O1^{iii} 115.78 (7)	
O7^{iii}—Nd1—O2^{iv} 87.22 (14)	O7^{iv}—Nd1—O2^{iv} 151.99 (14)	O7—Nd1—O2^{iv} 121.24 (14)	
O1—Nd1—O2^{iv} 71.66 (14)	O1^{iv}—Nd1—O2^{iv} 50.25 (14)	O1^{iii}—Nd1—O2^{iv} 120.43 (15)	
O7^{iii}—Nd1—O2 121.24 (14)	O7^{iv}—Nd1—O2 87.22 (14)	O7—Nd1—O2 151.99 (14)	
O1—Nd1—O2 50.25 (14)	O1^{iv}—Nd1—O2 120.43 (15)	O1^{iii}—Nd1—O2 71.66 (14)	
O2^{iv}—Nd1—O2 74.29 (17)	O7^{iii}—Nd1—O2^{iii} 151.99 (14)	O7^{iv}—Nd1—O2^{iii} 121.24 (14)	
O7—Nd1—O2^{iii} 87.22 (14)	O1—Nd1—O2^{iii} 120.43 (15)	O1^{iv}—Nd1—O2^{iii} 71.66 (14)	
O1^{iii}—Nd1—O2^{iii} 50.25 (14)	O2^{iv}—Nd1—O2^{iii} 74.29 (17)	O2—Nd1—O2^{iii} 74.29 (17)	

Symmetry codes: (i) $-x+y-1, -x, z$; (ii) $-y, x-y+1, z$; (iii) $-x+y, -x+1, z$; (iv) $-y+1, x-y+1, z$.

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Table S7. Selected bond distances (Å) and angles (º) for polymer **4**

Eu1—O1 2.342 (6)	Eu1—O1^{i} 2.342 (6)	Eu1—O1^{ii} 2.342 (6)	Eu1—O8^{ii} 2.490 (7)
Eu1—O8^{i} 2.490 (7)	Eu1—O8 2.490 (7)	Eu1—O6^{ii} 2.499 (7)	Eu1—O6^{i} 2.499 (7)
Eu1—O6 2.499 (7)	Eu2—O5^{iii} 2.339 (7)	Eu2—O5^{iv} 2.339 (7)	Eu2—O5 2.339 (7)
Eu2—O9 2.488 (8)	Eu2—O9^{iii} 2.488 (8)	Eu2—O9^{iv} 2.488 (8)	Eu2—O11^{iv} 2.498 (8)
Eu2—O11^{iii} 2.498 (8)	Eu2—O11 2.498 (8)		
O1^{i}—Eu1—O1 84.2 (2)	O1^{i}—Eu1—O1^{ii} 84.2 (2)	O1—Eu1—O1^{ii} 84.2 (2)	
O1^{i}—Eu1—O8^{ii} 71.1 (2)	O1—Eu1—O8^{ii} 151.8 (3)	O1^{ii}—Eu1—O8^{ii} 80.0 (2)	
O1^{i}—Eu1—O8 151.8 (3)	O1—Eu1—O8 80.0 (2)	O1^{ii}—Eu1—O8 71.1 (2)	
O8^{ii}—Eu1—O8 116.04 (12)	O1^{i}—Eu1—O8^{i} 80.0 (2)	O1—Eu1—O8^{i} 71.1 (2)	
O1^{ii}—Eu1—O8^{i} 151.8 (3)	O8^{ii}—Eu1—O8^{i} 116.04 (12)	O8—Eu1—O8^{i} 116.04 (12)	
O1^{i}—Eu1—O6^{i} 151.3 (2)	O1—Eu1—O6^{i} 87.0 (3)	O1^{ii}—Eu1—O6^{i} 122.0 (3)	
O8^{ii}—Eu1—O6^{i} 121.2 (3)	O8—Eu1—O6^{i} 51.0 (3)	O8^{i}—Eu1—O6^{i} 71.3 (3)	
O1^{i}—Eu1—O6^{ii} 87.0 (3)	O1—Eu1—O6^{ii} 122.0 (3)	O1^{ii}—Eu1—O6^{ii} 151.3 (3)	
O8^{ii}—Eu1—O6^{ii} 71.3 (3)	O8—Eu1—O6^{ii} 121.2 (3)	O8^{i}—Eu1—O6^{ii} 51.0 (3)	
O6^{i}—Eu1—O6^{ii} 74.6 (3)	O1^{i}—Eu1—O6 122.0 (3)	O1—Eu1—O6 151.3 (3)	
O1^{ii}—Eu1—O6 87.0 (3)	O8^{ii}—Eu1—O6 51.0 (3)	O8—Eu1—O6 71.3 (3)	
O8^{i}—Eu1—O6 121.2 (3)	O6^{i}—Eu1—O6 74.6 (3)	O6^{ii}—Eu1—O6 74.6 (3)	
O5—Eu2—O5^{iii} 83.4 (3)	O5—Eu2—O5^{iv} 83.4 (3)	O5^{iii}—Eu2—O5^{iv} 83.4 (3)	
O5—Eu2—O9^{iii} 90.0 (3)	O5^{iii}—Eu2—O9^{iii} 154.5 (3)	O5^{iv}—Eu2—O9^{iii} 120.3 (3)	
O5—Eu2—O9^{iv} 120.3 (3)	O5^{iii}—Eu2—O9^{iv} 90.0 (3)	O5^{iv}—Eu2—O9^{iv} 154.5 (3)	
O9^{iii}—Eu2—O9^{iv} 72.2 (3)	O5—Eu2—O9 154.5 (3)	O5^{iii}—Eu2—O9 120.3 (3)	
O5^{iv}—Eu2—O9 90.0 (3)	O9^{iii}—Eu2—O9 72.2 (3)	O9^{iv}—Eu2—O9 72.2 (3)	
O5—Eu2—O11^{iii} 82.5 (3)	O5^{iii}—Eu2—O11^{iii} 151.3 (3)	O5^{iv}—Eu2—O11^{iii} 70.3 (3)	
O9^{iii}—Eu2—O11^{iii} 50.1 (3)	O9^{iv}—Eu2—O11^{iii} 118.7 (3)	O9—Eu2—O11^{iii} 72.1 (3)	
O5—Eu2—O11^{iv} 70.3 (3)	O5^{iii}—Eu2—O11^{iv} 82.5 (3)	O5^{iv}—Eu2—O11^{iv} 151.3 (3)	
O9^{iii}—Eu2—O11^{iv} 72.1 (3)	O9^{iv}—Eu2—O11^{iv} 50.1 (3)	O9—Eu2—O11^{iv} 118.7 (3)	
O11^{iii}—Eu2—O11^{iv} 115.60 (15)	O5—Eu2—O11 151.3 (3)	O5^{iii}—Eu2—O11 70.3 (3)	
O5^{iv}—Eu2—O11 82.5 (3)	O9^{iii}—Eu2—O11 118.7 (3)	O9^{iv}—Eu2—O11 72.1 (3)	
O9—Eu2—O11 50.1 (3)	O11^{iii}—Eu2—O11 115.60 (16)	O11^{iv}—Eu2—O11 115.60 (15)	

Symmetry codes: (i) $-y+1, x-y+2, z$; (ii) $-x+y-1, -x+1, z$; (iii) $-y+1, x-y+1, z$; (iv) $-x+y, -x+1, z$.

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Table S8. Selected bond distances (Å) and angles (º) for polymer **7**

La1—O1 2.369 (5)	La1—O4 2.402 (4)	La1—O7 2.405 (4)	La1—O12 2.533 (5)
La1—O16 2.547 (4)	La1—O15 2.552 (5)	La1—O18 2.553 (4)	La1—O13 2.553 (5)
La1—O10 2.585 (5)			
O1—La1—O4 80.66 (15)	O1—La1—O7 86.95 (15)	O4—La1—O7 89.43 (15)	
O1—La1—O12 124.56 (16)	O4—La1—O12 83.41 (15)	O7—La1—O12 145.61 (16)	
O1—La1—O16 92.41 (16)	O4—La1—O16 144.67 (16)	O7—La1—O16 125.00 (16)	
O12—La1—O16 72.13 (16)	O1—La1—O15 147.36 (16)	O4—La1—O15 127.56 (15)	
O7—La1—O15 78.37 (15)	O12—La1—O15 79.62 (16)	O16—La1—O15 73.31(16)	
O1—La1—O18 72.60 (16)	O4—La1—O18 150.91 (15)	O7—La1—O18 78.10 (14)	
O12—La1—O18 121.22 (15)	O16—La1—O18 49.89 (14)	O15—La1—O18 75.90 (16)	
O1—La1—O13 151.49 (15)	O4—La1—O13 77.24 (16)	O7—La1—O13 75.12 (15)	
O12—La1—O13 70.49 (16)	O16—La1—O13 116.00 (16)	O15—La1—O13 50.33 (15)	
O18—La1—O13 123.30 (17)	O1—La1—O10 74.79 (16)	O4—La1—O10 77.08 (15)	
O7—La1—O10 158.72(15)	O12—La1—O10 49.90 (16)	O16—La1—O10 67.69 (16)	
O15—La1—O10 122.90(16)	O18—La1—O10 105.94 (15)	O13—La1—O10 116.78 (16)	

Symmetry codes: (i) $x, y-1, z$; (ii) $x, y+1, z$; (iii) $-x+1, -y+1, -z+1$.

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Table S9. Selected bond distances (Å) and angles (º) for polymer **8**

Pr1—O4 2.407 (4)	Pr1—O1 2.438 (4)	Pr1—O7 2.445 (4)	Pr1—O12 2.577 (4)
Pr1—O18 2.580 (5)	Pr1—O15 2.582 (4)	Pr1—O16 2.591(4)	Pr1—O10 2.597 (4)
Pr1—O13 2.628 (4)			
O4—Pr1—O1 80.76 (14)	O4—Pr1—O7 87.06 (14)		O1—Pr1—O7 89.05 (14)
O4—Pr1—O12 91.63 (15)	O1—Pr1—O12 145.22 (14)		O7—Pr1—O12 124.64 (14)
O4—Pr1—O18 147.21 (15)	O1—Pr1—O18 127.17 (14)		O7—Pr1—O18 77.77 (15)
O12—Pr1—O18 74.22 (15)	O4—Pr1—O15 123.80 (15)		O1—Pr1—O15 83.85 (14)
O7—Pr1—O15 146.36 (15)	O12—Pr1—O15 72.33 (15)		O18—Pr1—O15 80.57 (15)
O4—Pr1—O16 152.25 (15)	O1—Pr1—O16 77.76 (15)		O7—Pr1—O16 75.29 (14)
O12—Pr1—O16 115.99 (15)	O18—Pr1—O16 49.43 (15)		O15—Pr1—O16 71.07 (15)
O4—Pr1—O10 72.37 (16)	O1—Pr1—O10 150.80 (15)		O7—Pr1—O10 78.54 (13)
O12—Pr1—O10 48.94 (13)	O18—Pr1—O10 76.18 (16)		O15—Pr1—O10 120.57 (14)
O16—Pr1—O10 123.11 (16)	O4—Pr1—O13 75.15 (14)		O1—Pr1—O13 77.31 (14)
O7—Pr1—O13 159.00 (13)	O12—Pr1—O13 67.94 (14)		O18—Pr1—O13 123.21 (14)
O15—Pr1—O13 48.74 (14)	O16—Pr1—O13 116.34 (14)		O10—Pr1—O13 105.83 (14)

Symmetry codes: (i) $x, y-1, z$; (ii) $-x+1, -y+1, -z+1$; (iii) $x, y+1, z$.

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Table S10. Selected bond distances (Å) and angles (º) for polymer **9**

Nd1—O7 2.3602 (17)	Nd1—O6 2.3979 (18)	Nd1—O1 2.4010 (18)	Nd1—O13 2.5259 (19)
Nd1—O12 2.527 (2)	Nd1—O16 2.5352 (19)	Nd1—O18 2.543 (2)	Nd1—O10 2.551 (2)
Nd1—O15 2.5654 (19)			
O7—Nd1—O6 86.62 (7)	O7—Nd1—O1 80.80 (7)	O6—Nd1—O1 89.34 (6)	
O7—Nd1—O13 125.00 (7)	O6—Nd1—O13 145.50 (7)	O1—Nd1—O13 83.46 (7)	
O7—Nd1—O12 147.06 (7)	O6—Nd1—O12 78.01 (7)	O1—Nd1—O12 127.32 (7)	
O13—Nd1—O12 79.81 (7)	O7—Nd1—O16 92.36 (7)	O6—Nd1—O16 124.73 (6)	
O1—Nd1—O16 144.99 (7)	O13—Nd1—O16 72.49 (7)	O12—Nd1—O16 73.64 (7)	
O7—Nd1—O18 72.82 (7)	O6—Nd1—O18 77.78 (6)	O1—Nd1—O18 151.12 (7)	
O13—Nd1—O18 121.33 (7)	O12—Nd1—O18 75.52 (7)	O16—Nd1—O18 49.76 (6)	
O7—Nd1—O10 151.01 (7)	O6—Nd1—O10 74.72 (7)	O1—Nd1—O10 77.06 (6)	
O13—Nd1—O10 70.78 (7)	O12—Nd1—O10 50.26 (7)	O16—Nd1—O10 116.46 (7)	
O18—Nd1—O10 122.76 (7)	O7—Nd1—O15 74.92 (7)	O6—Nd1—O15 158.64 (7)	
O1—Nd1—O15 77.35 (6)	O13—Nd1—O15 50.23 (7)	O12—Nd1—O15 123.34 (7)	
O16—Nd1—O15 67.74 (6)	O18—Nd1—O15 106.12 (7)	O10—Nd1—O15 117.39 (7)	

Symmetry codes: (i) $x, y+1, z$; (ii) $-x+1, -y+1, -z+1$; (iii) $x, y-1, z$.

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Table S11. Selected bond distances (Å) and angles (º) for polymer **10**

Eu1—O18 2.317 (3)	Eu1—O10 2.343 (3)	Eu1—O15 2.349 (3)	Eu1—O1 2.456 (3)
Eu1—O4 2.479 (3)	Eu1—O7 2.487 (3)	Eu1—O8 2.508 (3)	Eu1—O5 2.513 (3)
Eu1—O2 2.519 (3)			
O18—Eu1—O10 151.22 (10)	O18—Eu1—O15 80.01 (9)	O10—Eu1—O15 83.94 (10)	
O18—Eu1—O1 92.83 (11)	O10—Eu1—O1 79.84 (11)	O15—Eu1—O1 130.84 (11)	
O18—Eu1—O4 123.58 (10)	O10—Eu1—O4 81.38 (10)	O15—Eu1—O4 147.92 (10)	
O1—Eu1—O4 74.04 (12)	O18—Eu1—O7 124.38 (10)	O10—Eu1—O7 73.55 (9)	
O15—Eu1—O7 75.87 (9)	O1—Eu1—O7 139.81 (12)	O4—Eu1—O7 72.66 (10)	
O18—Eu1—O8 77.00 (10)	O10—Eu1—O8 124.43 (9)	O15—Eu1—O8 82.59 (9)	
O1—Eu1—O8 143.33 (11)	O4—Eu1—O8 82.50 (10)	O7—Eu1—O8 50.88 (9)	
O18—Eu1—O5 72.97 (11)	O10—Eu1—O5 127.71 (11)	O15—Eu1—O5 147.89 (11)	
O1—Eu1—O5 68.55 (11)	O4—Eu1—O5 50.95 (10)	O7—Eu1—O5 105.44 (10)	
O8—Eu1—O5 74.80 (10)	O18—Eu1—O2 76.86 (10)	O10—Eu1—O2 77.14 (10)	
O15—Eu1—O2 80.91 (10)	O1—Eu1—O2 50.34 (11)	O4—Eu1—O2 122.76 (11)	
O7—Eu1—O2 144.11 (10)	O8—Eu1—O2 151.07 (11)	O5—Eu1—O2 108.76 (11)	

Symmetry codes: (i) $x, y, z-1$; (ii) $-x, -y+1, -z$; (iii) $x, y, z+1$.

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Table S12. Selected bond distances (Å) and angles (º) for polymer **11**

Tb1—O6 2.2950 (7)	Tb1—O1^{i} 2.3218 (7)	Tb1—O7 2.3281 (8)	Tb1—O16 2.4289 (9)
Tb1—O13 2.4520 (9)	Tb1—O12 2.4673 (8)	Tb1—O10 2.4831 (8)	Tb1—O15 2.4932 (9)
Tb1—O18 2.4970 (9)			
O6—Tb1—O1^{i} 150.65 (3)	O6—Tb1—O7 79.96 (3)		O1^{i}—Tb1—O7 83.71 (3)
O6—Tb1—O16 92.81 (3)	O1^{i}—Tb1—O16 79.81 (3)		O7—Tb1—O16 131.11 (3)
O6—Tb1—O13 123.85 (3)	O1^{i}—Tb1—O13 81.60 (3)		O7—Tb1—O13 147.78 (3)
O16—Tb1—O13 73.84 (3)	O6—Tb1—O12 125.07 (3)		O1^{i}—Tb1—O12 73.25 (3)
O7—Tb1—O12 75.94 (3)	O16—Tb1—O12 139.22 (3)		O13—Tb1—O12 72.42 (3)
O6—Tb1—O10 77.44 (3)	O1^{i}—Tb1—O10 124.46 (3)		O7—Tb1—O10 82.68 (3)
O16—Tb1—O10 143.12 (3)	O13—Tb1—O10 82.30 (3)		O12—Tb1—O10 51.20 (3)
O6—Tb1—O15 72.87 (3)	O1^{i}—Tb1—O15 128.36 (3)		O7—Tb1—O15 147.43 (3)
O16—Tb1—O15 68.88 (3)	O13—Tb1—O15 51.24 (3)		O12—Tb1—O15 105.36 (3)
O10—Tb1—O15 74.27 (3)	O6—Tb1—O18 76.55 (3)		O1^{i}—Tb1—O18 76.86 (3)
O7—Tb1—O18 80.73 (3)	O16—Tb1—O18 50.80 (3)		O13—Tb1—O18 122.99 (3)
O12—Tb1—O18 143.66 (3)	O10—Tb1—O18 151.17 (3)		O15—Tb1—O18 109.28 (3)

Symmetry codes: (i) $x, y, z-1$; (ii) $-x, -y, -z-1$; (iii) $x, y, z+1$.

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Table S13. Selected bond distances (Å) and angles (º) for polymer **12**

Er1—O1 2.259 (3)	Er1—O6 2.284 (3)	Er1—O7 2.288 (3)	Er1—O11 2.387 (3)
Er1—O13 2.417 (3)	Er1—O18 2.438 (3)	Er1—O16 2.438 (3)	Er1—O10 2.462 (3)
Er1—O15 2.477 (3)			
O1—Er1—O6 79.90 (10)	O1—Er1—O7 149.99 (12)	O6—Er1—O7 83.60 (11)	
O1—Er1—O11 92.49 (13)	O6—Er1—O11 131.54 (13)	O7—Er1—O11 79.95 (12)	
O1—Er1—O13 123.95 (11)	O6—Er1—O13 147.80 (11)	O7—Er1—O13 81.95 (11)	
O11—Er1—O13 73.57 (13)	O1—Er1—O18 77.27 (11)	O6—Er1—O18 82.70 (11)	
O7—Er1—O18 125.26 (10)	O11—Er1—O18 142.46 (12)	O13—Er1—O18 82.45 (12)	
O1—Er1—O16 125.81 (11)	O6—Er1—O16 76.02 (11)	O7—Er1—O16 73.10 (11)	
O11—Er1—O16 138.79 (13)	O13—Er1—O16 72.29 (11)	O18—Er1—O16 52.17 (10)	
O1—Er1—O10 76.29 (12)	O6—Er1—O10 80.27 (12)	O7—Er1—O10 76.33 (11)	
O11—Er1—O10 51.63 (12)	O13—Er1—O10 123.41 (12)	O18—Er1—O10 150.61 (12)	
O16—Er1—O10 142.94 (12)	O1—Er1—O15 72.54 (11)	O6—Er1—O15 146.78 (11)	
O7—Er1—O15 129.13 (11)	O11—Er1—O15 68.92 (12)	O13—Er1—O15 51.62 (11)	
O18—Er1—O15 73.56 (11)	O16—Er1—O15 105.46 (12)	O10—Er1—O15 109.96 (11)	

Symmetry codes: (i) $x, y, z-1$; (ii) $-x+1, -y+2, -z+1$; (iii) $x, y, z+1$.