

*Electronic Supplementary Information*

**Ln(III) complexes (Ln = Eu, Gd, Tb, Dy) with chiral ligand containing 1,10-phenanthroline and (–)-menthol fragments: synthesis, structure, magnetic properties and photoluminescence**

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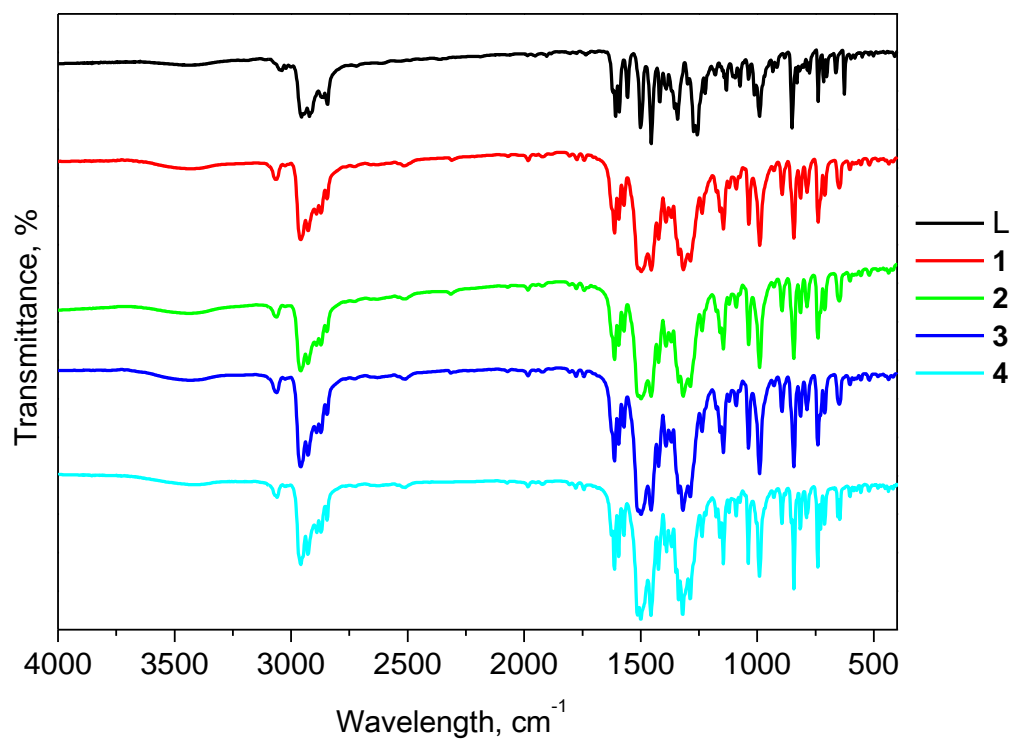
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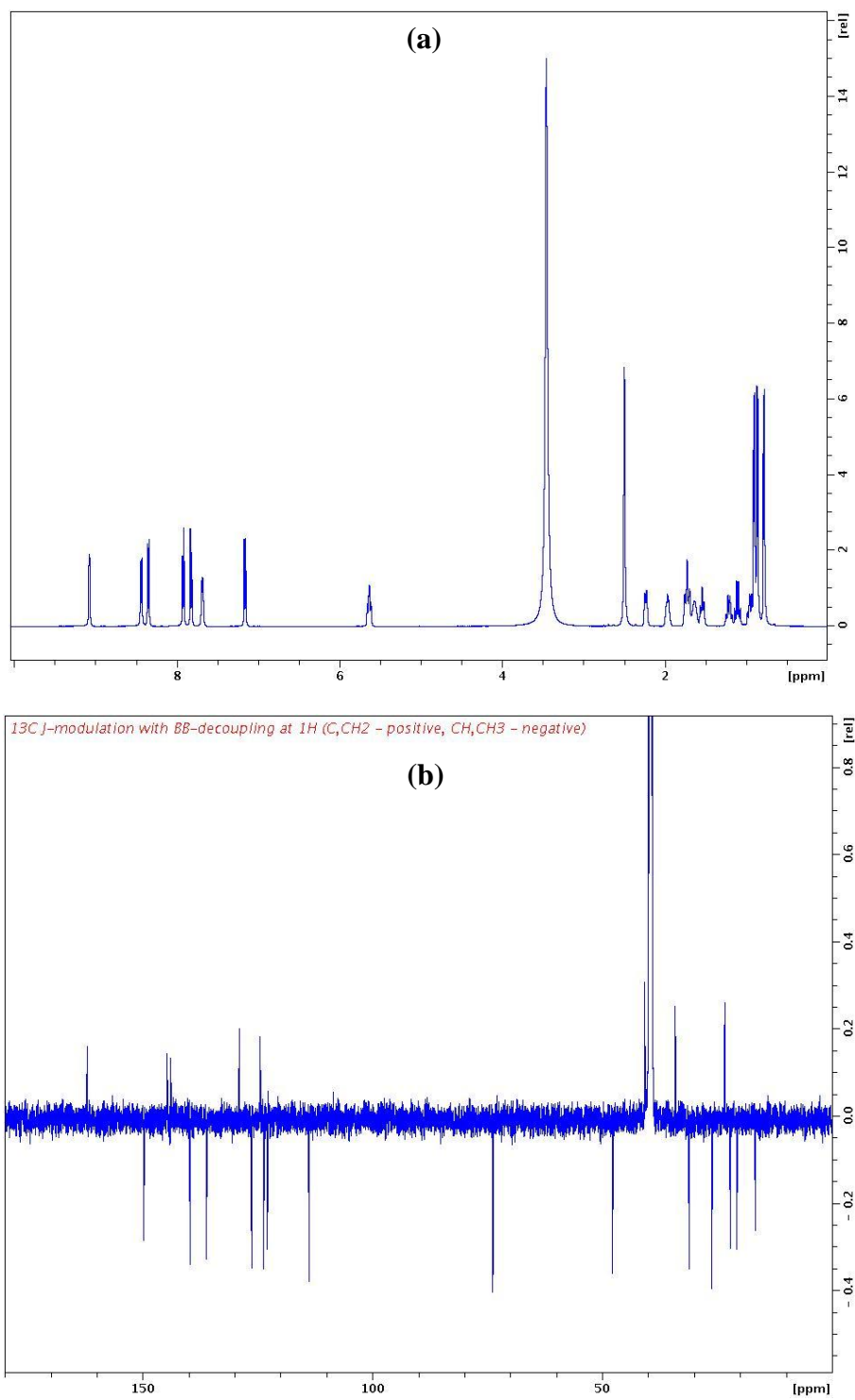
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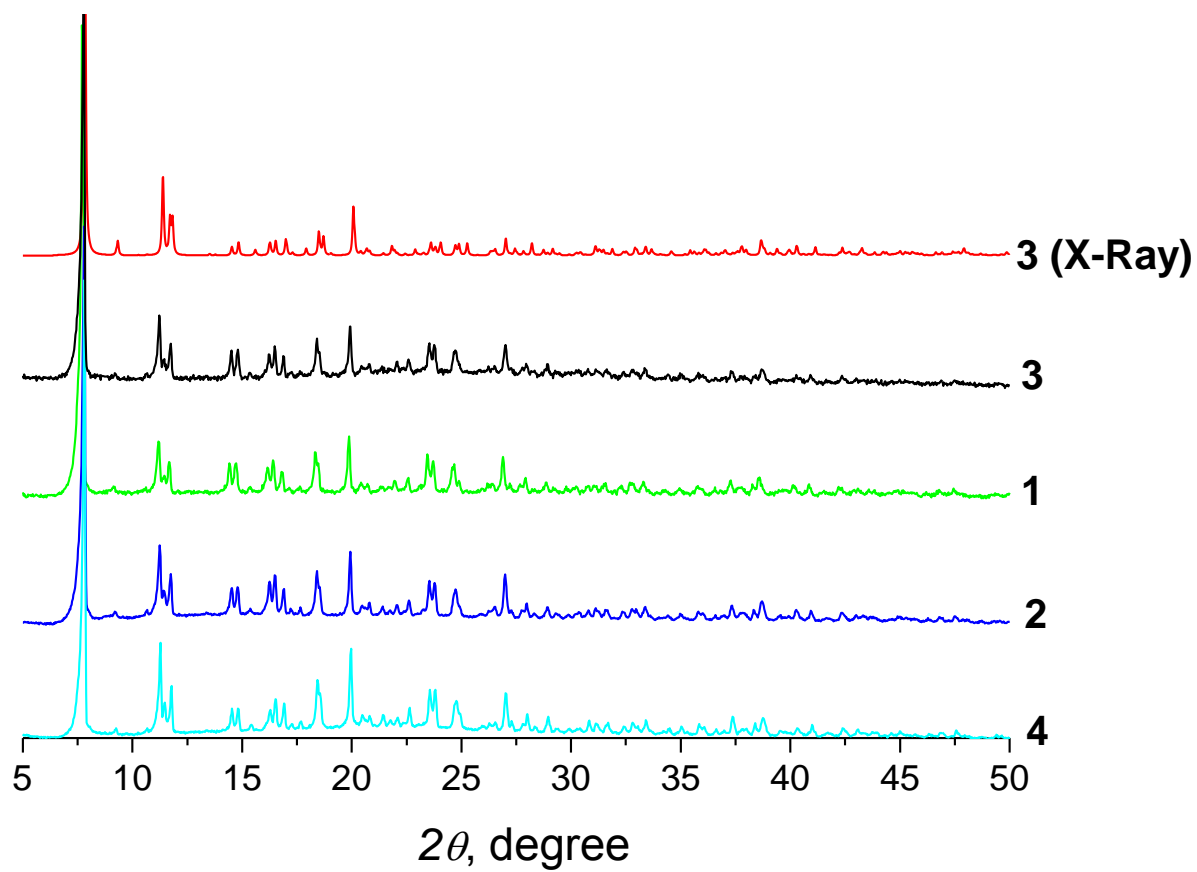
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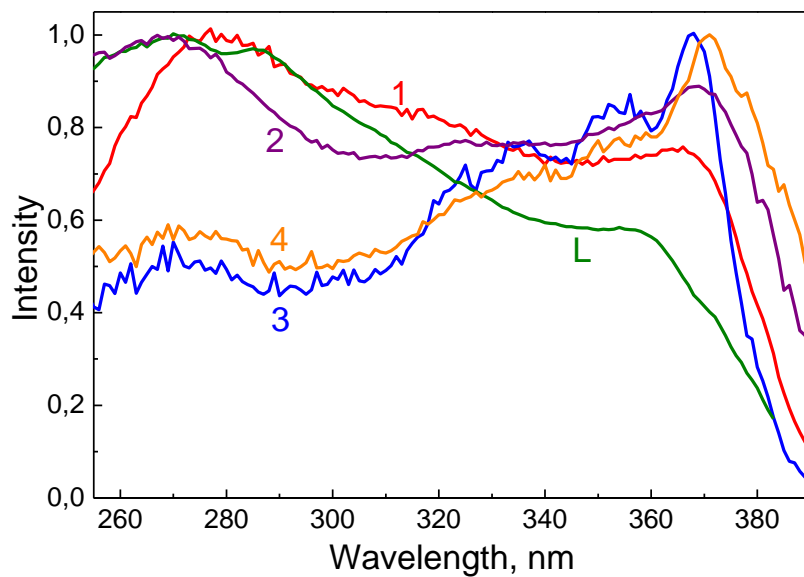
**Fig. S1** Infrared spectra of L and the complexes 1–4.



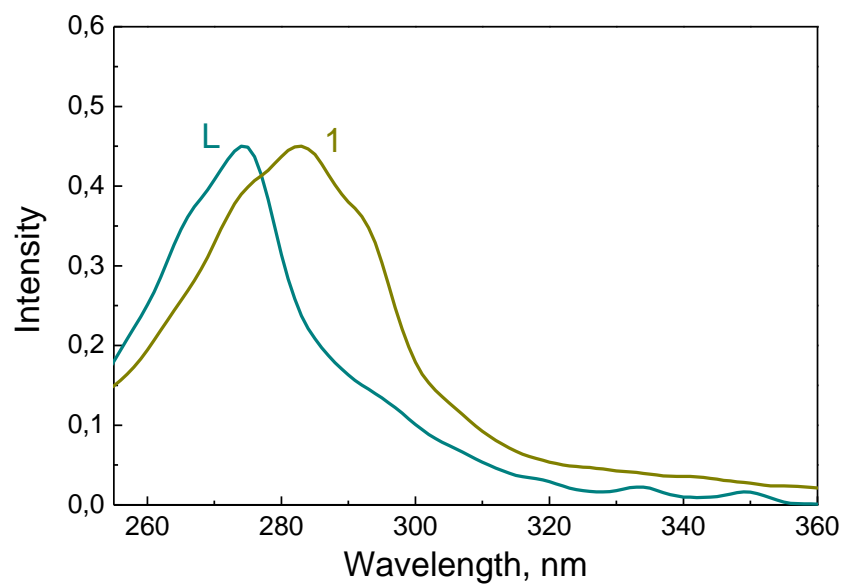
**Fig. S2**  $^1\text{H}$  NMR (a) and  $^{13}\text{C}$  NMR (b) spectra of the ligand L.



**Fig. S3** Theoretical (red) and experimental (black, green, blue, cyan) diffraction patterns of the complexes **1–4**.



**Fig. S4** The normalized excitation spectra of the ligand L (recorded at 393 nm) and the complexes **1** (615 nm), **2** (404 nm), **3** (545 nm) and **4** (575 nm) in solid state.



**Fig. S5** The optical absorption spectra of the ligand **L** and the complex **1** in CH<sub>3</sub>CN.

**Note S1.**

For many compounds (organic and inorganic) in solid state the luminescence kinetics are usually not exponential. In most cases, this is due to the nonequivalence of luminescent centers and the possibility of migration of excitation within the microcrystal. The distribution of centers on the times of emission is smooth (not discrete). However, such luminescence kinetics are usually processed in two or three exponential approximations (four exponents are required only in some exceptional cases (femtosecond studies)). The obtained three times simply demonstrate the width of times values. There are centers for which the energy transfer to neighboring complexes (with lowered energy levels) competes actively with radiative (and non-radiative) processes. These centers will flash quickly and will contribute to the first fast exponent. Migration of excitation usually leads to the fact that a significant part of the luminescence is displayed in the third longest exponent (on the centers with the lowest location of energy levels). In all cases, we processed the kinetic curves firstly in usual exponential approximation, then in two-exponential approximation. And only if these approximations did not satisfy us (the square parameter  $\chi^2$ ), we used the three-exponential approximation.



**Table S1** Selected bond lengths and angles for the ligand **L** and the complex **3**.

<b>L</b>		<b>3</b>	
Bond	Bond lengths (Å)	Bond	Bond length (Å)
O(1)–C(11)	1.357(4)	Tb(1)–O(3)	2.458(3)x2
O(1)–C(3)	1.452(4)	Tb(1)–O(5)	2.497(2)x2
N(1)–C(11)	1.306(4)	Tb(1)–O(2)	2.571(3)x2
N(1)–C(22)	1.361(4)	Tb(1)–N(2)	2.520(3)x2
N(2)–C(20)	1.318(5)	Tb(1)–N(1)	2.573(4)x2
N(2)–C(21)	1.359(5)	O(1)–C(11)	1.340(5)
C(1)–C(2)	1.527(5)	O(1)–C(3)	1.465(4)
C(1)–C(6)	1.524(6)	O(2)–N(3)	1.265(4)
C(1)–C(7)	1.516(7)	O(3)–N(3)	1.281(5)
C(2)–C(3)	1.523(5)	C(1)–C(6)	1.521(6)
C(3)–C(4)	1.527(5)	C(1)–C(7)	1.524(6)
C(4)–C(5)	1.521(7)	C(1)–C(2)	1.533(6)
C(4)–C(8)	1.530(6)	C(2)–C(3)	1.527(7)
C(5)–C(6)	1.525(7)	C(3)–C(4)	1.531(7)
C(8)–C(9)	1.426(9)	C(4)–C(5)	1.549(7)
C(8)–C(10)	1.503(7)	C(4)–C(8)	1.535(8)
O(2)–C(33)	1.361(4)	C(5)–C(6)	1.522(8)
O(2)–C(25)	1.454(4)	C(8)–C(10)	1.535(8)
N(3)–C(33)	1.298(4)	C(8)–C(9)	1.541(9)
N(3)–C(44)	1.366(4)	N(1)–C(11)	1.343(6)
N(4)–C(42)	1.323(5)	N(1)–C(22)	1.361(6)
N(4)–C(43)	1.361(5)	N(2)–C(20)	1.327(6)
C(23)–C(24)	1.528(6)	N(2)–C(21)	1.359(6)
C(23)–C(28)	1.526(6)	N(4)–O(5)	1.274(4)
C(23)–C(29)	1.522(7)	O(4)–N(3)	1.228(5)
C(24)–C(25)	1.507(5)	O(5)–N(4)	1.274(4)
C(25)–C(26)	1.529(5)	O(6)–N(4)	1.221(6)
C(26)–C(27)	1.538(6)		
C(26)–C(30)	1.533(5)	Angle	Angle size (°)
C(27)–C(28)	1.526(6)	O(5)–Tb(1)–O(2)	68.6(1)
C(30)–C(31)	1.542(6)	O(3)–Tb(1)–O(2)	50.9(1)
C(30)–C(32)	1.516(5)	O(3)–Tb(1)–N(1)	148.5(1)
		O(3)–Tb(1)–O(5)	71.7(1)
		O(3)–Tb(1)–N(2)	118.9(1)

Note. The lengths of C–C bonds in six-membered cycles of the Phen fragment vary from 1.344(6) to 1.453(5) Å for **L** and from 1.344(8) to 1.444(7) Å for **3**.

**Table S2** Crystallographic parameters for the complexes **1–4**.

Complex	a, Å	c, Å	V, 10 <sup>6</sup> pm <sup>3</sup>
<b>1</b>	12.218(2)	30.787(9)	4595.87
<b>2</b>	12.185(2)	30.84(2)	4578.9
<b>3</b>	12.183(1)	30.837(7)	4577.00
<b>4</b>	12.165(1)	30.793(8)	4556.97