A new family of dinuclear lanthanide complexes constructed from 8-hydroxyquinoline Schiff base and β-diketone: Magnetic properties and near-infrared luminescence

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Supplementary Experimental section

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Scheme S1 The synthesis route of the ligand HL.

Fig. S1 $^1$H NMR spectrum (400 MHz, $d_6$-DMSO) of HL.

Fig. S2 IR spectra of a crystalline sample of HL.

Table S1 The important bond lengths (Å) and angles (°) of complexes 1-6.

<table>
<thead>
<tr>
<th>Complexes</th>
<th>The range of Ln-O bond lengths / Å</th>
<th>The range of Ln-N bond lengths / Å</th>
<th>The distance of Ln····Ln / Å</th>
<th>The range of Ln-O-Ln bond angles / °</th>
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<tbody>
<tr>
<td>1</td>
<td>2.367(2) – 2.453(2)</td>
<td>2.584(3) – 2.739(3)</td>
<td>3.979(5) – 3.991(2)</td>
<td>109.16(8) – 109.59(9)</td>
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<td>2</td>
<td>2.333(4) – 2.433(1)</td>
<td>2.519(5) – 2.689(1)</td>
<td>3.899(4)</td>
<td>108.51(5)</td>
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<td>3</td>
<td>2.325(2) – 2.429(8)</td>
<td>2.501(2) – 2.679(2)</td>
<td>3.889(8)</td>
<td>108.96(7)</td>
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<tr>
<td>4</td>
<td>2.312(01) – 2.414(5)</td>
<td>2.491(1) – 2.671(8)</td>
<td>3.863(3)</td>
<td>108.85(6)</td>
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<tr>
<td>5</td>
<td>2.300(2) – 2.408(2)</td>
<td>2.480(2) – 2.670(3)</td>
<td>3.863(8)</td>
<td>109.08(8)</td>
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<tr>
<td>6</td>
<td>2.274(2) – 2.380(2)</td>
<td>2.453(2) – 2.649(3)</td>
<td>3.823(3)</td>
<td>109.41(7)</td>
</tr>
</tbody>
</table>
**Fig. S3** TGA curves of complexes 1-6 on crystalline sample under the air atmosphere in the temperature range of 30-800 °C.

**Fig. S4** PXRD patterns for 1-6.

**Fig. S5** UV-Vis absorption spectra of complexes 1-6 in methanol solution at room temperature.
**Fig. S6** The luminescence spectra of complex 2 (a) and 4 (b) in methanol solution at room temperature.

**Fig. S7** Plots of $\chi_M^{-1}$ vs $T$ at 2-300 K with a dc magnetic field of 1000 Oe for complexes 3 (a), 4 (b) and 5 (c). The solid lines were generated from the best fits by the Curie-Weiss expression.
Fig. S8: Temperature dependence of $\chi'$ (a) and $\chi''$ (b) signals of the ac susceptibilities under different frequency (Hz) for 4 ($H_{ac} = 3$ Oe, $H_{dc} = 3000$ Oe).