

**Supplementary Information (SI)**  
**For**  
**Symmetry Correlations Between Crystallography and**  
**Photoluminescence Study Of Ternary  $\beta$ -Diketone Europium (III)**  
**Based Complexes Using 1,10-Phenanthroline As The Ancillary**  
**Ligand.**

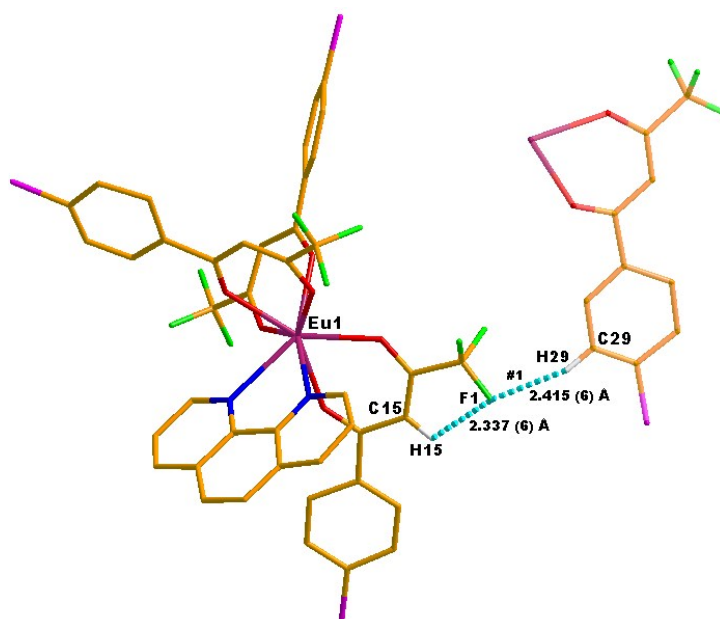
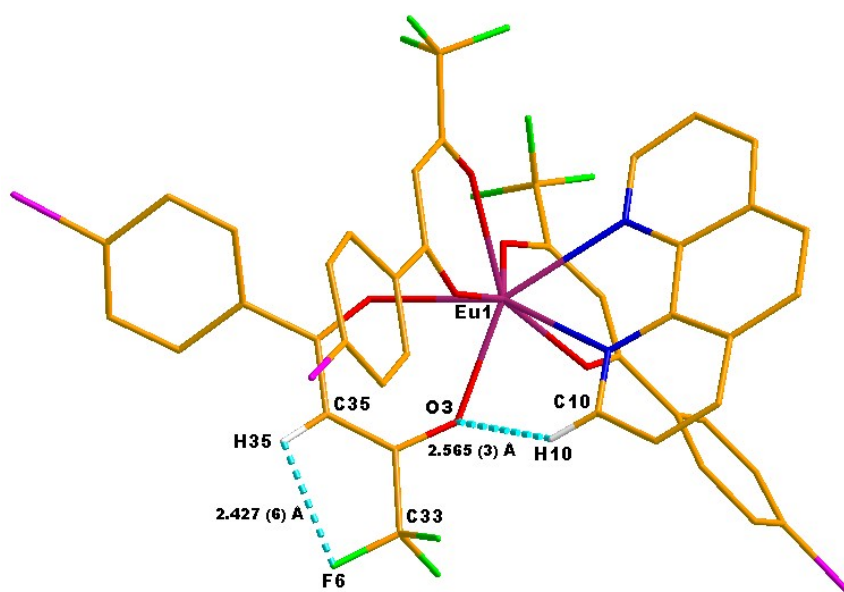
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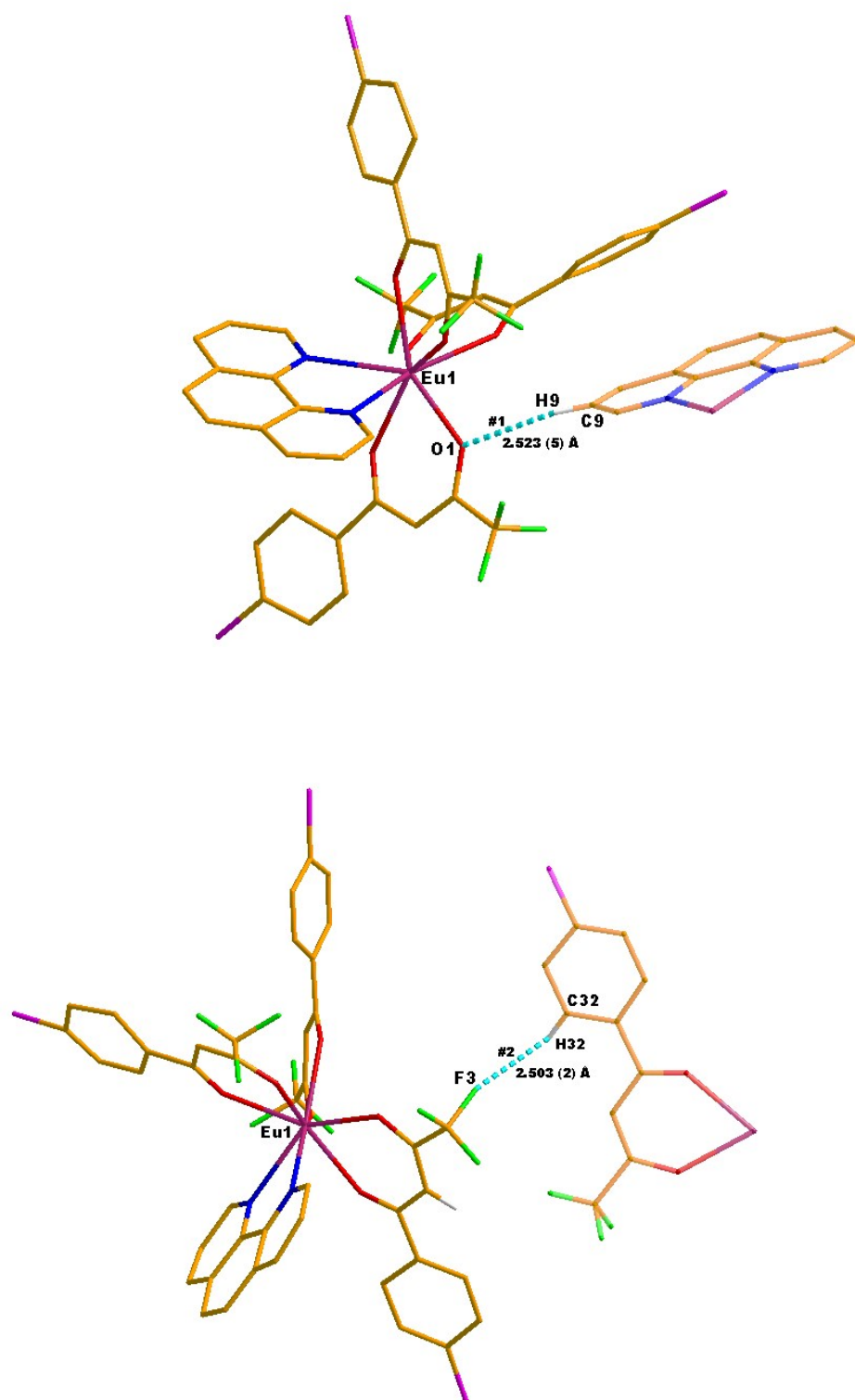
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**Table S11:** Crystallographic and refinement details for crystal structures **1**, **2** and **3**.

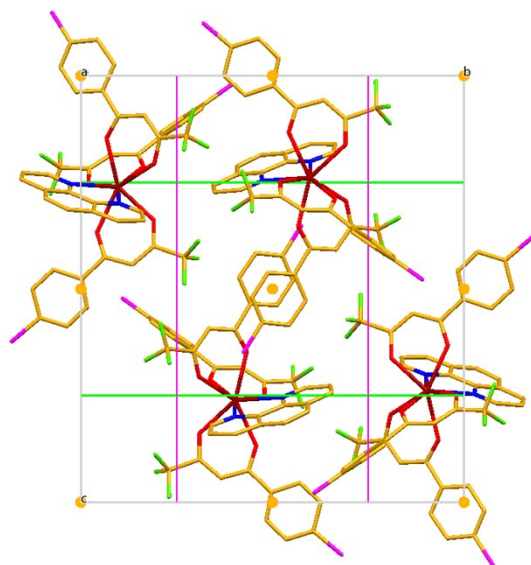
Crystal Formula	[Eu(TCPB) <sub>3</sub> Phen] (1)	[Eu(TMHD) <sub>3</sub> Phen] (2)	{[Eu <sub>2</sub> (BCA) <sub>6</sub> (Phen) <sub>2</sub> ]-μ-[κ <sup>2</sup> -O,O <sup>2</sup> -(BCA)]} (3)
Empirical formula	C <sub>42</sub> H <sub>23</sub> Cl <sub>3</sub> EuF <sub>9</sub> N <sub>2</sub> O <sub>6</sub>	C <sub>45</sub> H <sub>65</sub> EuN <sub>2</sub> O <sub>6</sub>	C <sub>66</sub> H <sub>46</sub> Eu <sub>2</sub> N <sub>4</sub> O <sub>12</sub>
Formula weight (g.mol <sup>-1</sup> )	1080.97	881.99	1390.99
Crystal system, Space Group	Monoclinic, <i>P</i> 2 <sub>1</sub> / <i>n</i>	Triclinic, <i>P</i> -1	Triclinic, <i>P</i> -1
<i>a</i> , <i>b</i> , <i>c</i> (Å)	12.097 (3), 18.354(5), 21.031 (5)	10.860 (5), 12.285 (4), 18.398 (5)	10.761 (5), 11.865 (5), 12.275 (4)
<i>α</i> , <i>β</i> , <i>γ</i> (°)	90, 75.889(8), 90	80.396 (5), 87.575 (5), 68.761 (4)	105.044 (5), 93.811 (5), 112.908 (4)
Volume (Å <sup>3</sup> ), <i>Z</i>	4528.6 (2), 4	2255.3 (15), 2	1369.2 (10), 1
Density (calculated, Mg/m <sup>3</sup> )	1.585	1.2999	1.687
Crystal colour	Colourless	Colourless	Colourless
Crystal size (mm <sup>3</sup> )	0.173 x 0.093 x 0.093	0.154 x 0.162 x 0.276	0.180 x 0.184 x 0.186
Absorption coefficient <i>μ</i> (mm <sup>-1</sup> ), F(000)	1.646, 2128	1.436, 920	2.341, 692
Theta range	2.986 – 28°	3.101 – 27.99	4.187 – 27.99°
Index ranges	-11<= <i>h</i> <=16, -23<= <i>k</i> <=24, -28<= <i>l</i> <=28	-10<= <i>h</i> <=10, -11<= <i>k</i> <=12, -18<= <i>l</i> <=18	-14<= <i>h</i> <=14, -15<= <i>k</i> <=11, -16<= <i>l</i> <=16
Reflections collected, Independent Reflections, <i>R</i> <sub>int</sub>	79772, 10911, 0.1779	26736, 4659, 0.0306	37980, 6597, 0.0454
Completeness to 2 <i>θ</i> (°, %)	56, 100	56, 99.0	56, 99.3
Max. and min. transmission	0.7457 and 0.4820	0.7457 and 0.7044	0.7457 and 0.662
Data, restraints, parameters	10911, 248, 580	4659, 61, 523	6597, 0, 380
Goodness-of-fit on F <sup>2</sup>	1.097	1.075	1.076
Final R indices [ <i>I</i> >2σ( <i>I</i> )]	<i>R</i> <sub>1</sub> = 0.0914 <i>wR</i> <sub>2</sub> = 0.2389	<i>R</i> <sub>1</sub> = 0.0180 <i>wR</i> <sub>2</sub> = 0.0445	<i>R</i> <sub>1</sub> = 0.0195 <i>wR</i> <sub>2</sub> = 0.0479
R indices (all data)	<i>R</i> <sub>1</sub> = 0.1934 <i>wR</i> <sub>2</sub> = 0.3593	<i>R</i> <sub>1</sub> = 0.0190 <i>wR</i> <sub>2</sub> = 0.0456	<i>R</i> <sub>1</sub> = 0.0215 <i>wR</i> <sub>2</sub> = 0.489
Largest diff. peak and hole (e.Å <sup>-3</sup> )	1.45, -4.13	0.31, -0.33	0.528, -0.570

# Molecular Interactions undertaken in structure 1.



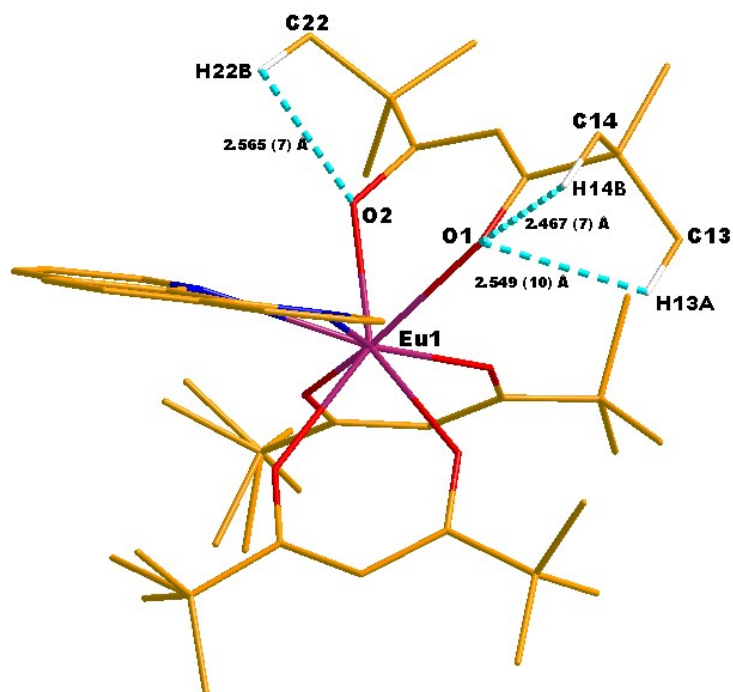


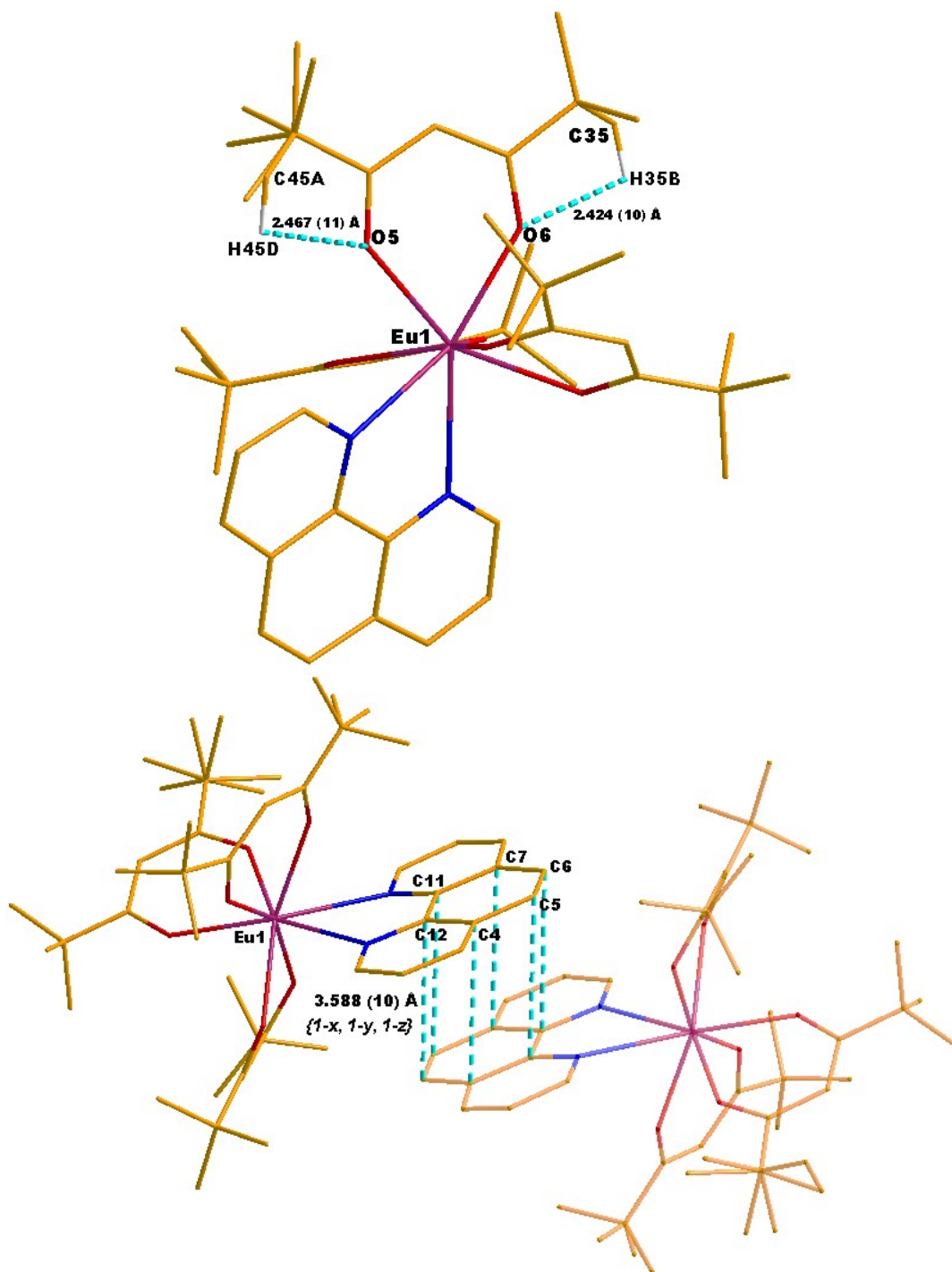
**Figure S11:** The graphical representation of occurring intra- and inter-molecular networking in 2.



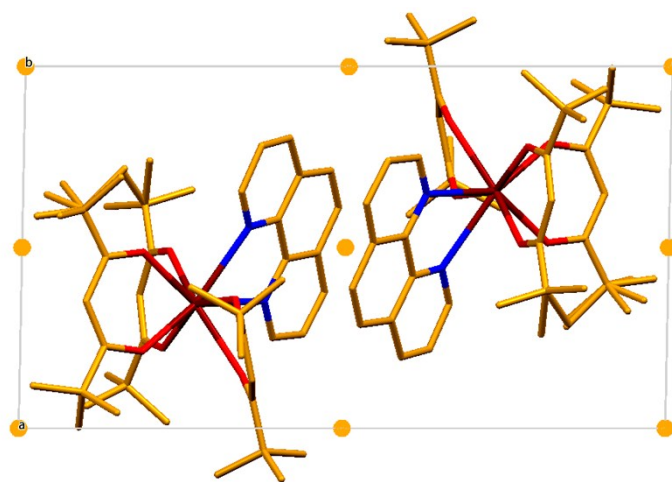
**Figure S12:** Graphical presentations of the molecular packing of **1** with symmetry operations.

### Molecular Interactions undertaking in structure **2**.



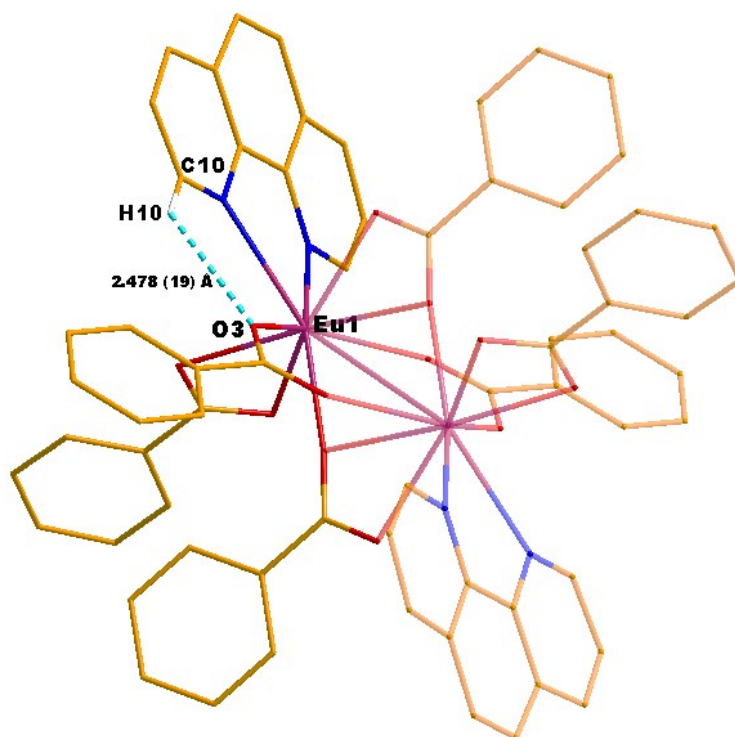


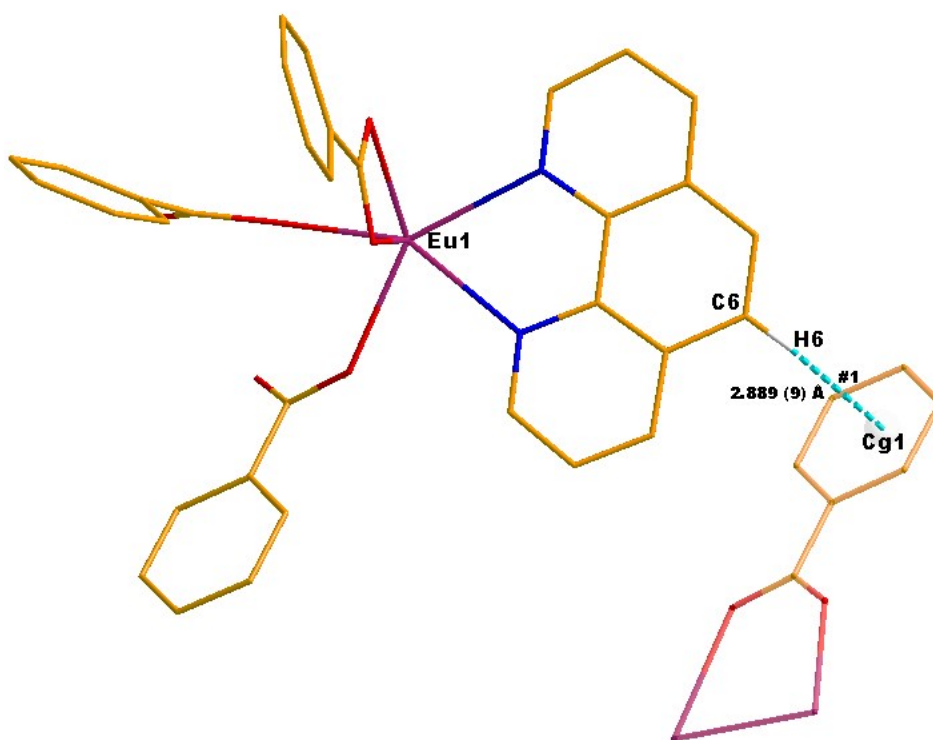
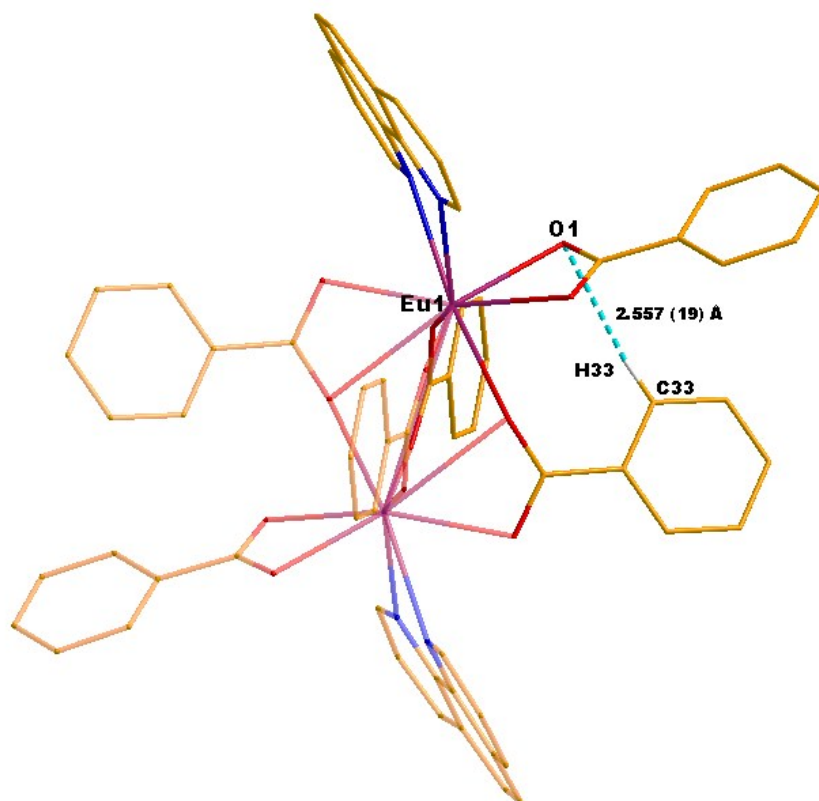
**Figure SI3:** The graphical representation of occurring intra- and inter-molecular networking in **2**.



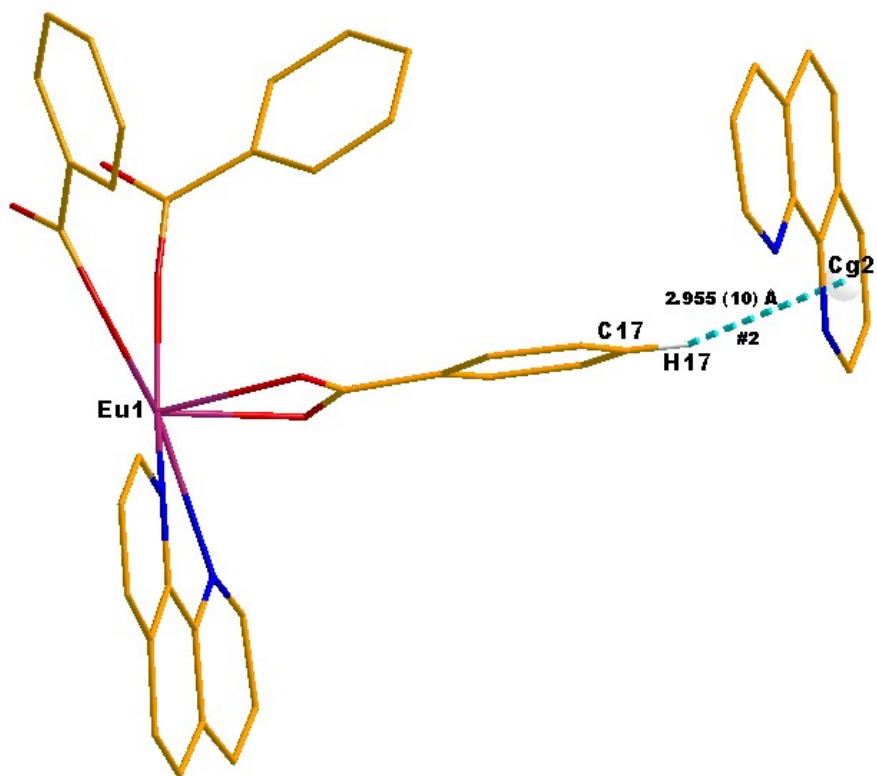
**Figure SI4:** Graphical presentations of the molecular packing of **2** with symmetry operations.

### Molecular Interactions undertaking in structure **3**.

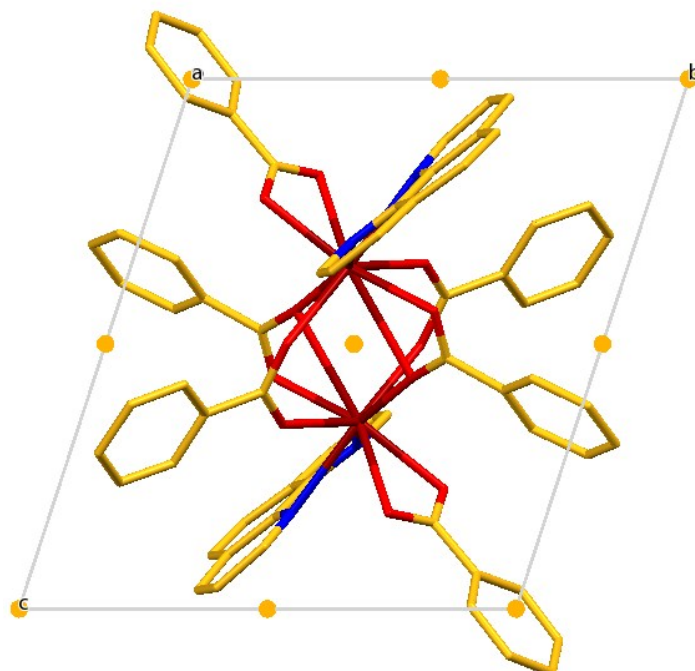








**Figure SI5:** The graphical representation of occurring intra- and inter-molecular networking in **3**.



**Figure SI6:** Graphical presentations of the molecular packing of **3** with symmetry operations.

## Continuous Shape Measurements Calculations Results

%path

%maxdev 30.

8 1

5 4

### Trimethyl-BDK-Eu (2)

Eu1	6.65587	7.01562	-14.45379
N1	6.89385	8.81586	-12.56307
N2	5.45698	6.55018	-12.16935
O1	7.38496	4.86288	-13.72204
O2	8.95328	7.14377	-13.90247
O3	4.77513	5.79787	-15.12832
O4	4.77972	8.43776	-14.40211
O5	7.31417	8.81943	-15.82132
O6	7.43445	6.13393	-16.44566

### TriChloro-BDK-Eu (1)

Eu1	21.52847	-10.16597	-12.29908
N1	22.71676	-7.90492	-11.83081
N2	24.07660	-10.16451	-12.63106
O1	21.78004	-11.81158	-13.92652
O2	21.78945	-9.06757	-14.40359
O3	19.62686	-8.76973	-12.39665
O4	19.57690	-11.43993	-11.71627
O5	22.44685	-11.94427	-11.07762
O6	21.25972	-9.71567	-9.95460

### Dimer (3)

Eu1	-0.33774	-4.13908	-3.76041
N1	-0.36193	-1.90226	-5.06692
N2	1.92282	-2.74966	-3.85797
O1	-0.34974	-2.75346	-1.77841
O2	-2.25639	-2.76803	-2.88823
O3	1.18676	-5.51821	-2.58788
O4	-2.04497	-4.52459	-5.37306
O5	-1.61947	-5.73424	-2.63399
O6	1.01493	-4.49497	-5.74705