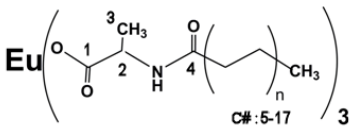
**ESI**

**Table:**

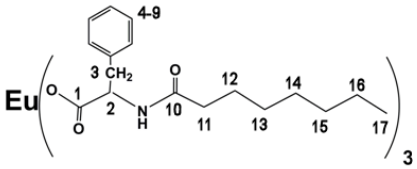
**$^{13}$C NMR chemical shifts (ppm) for each Eu(III) Complex in Methanol (10wt%)**

**(notes)**

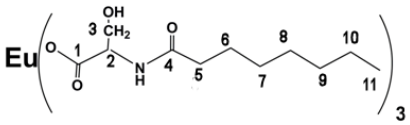
1. The assignment for each carbon was followed the previous paper. (Ref. 3c)
2. The assignments for the alkylchains in the dec-ala, dod-ala, and tetd-ala complexes were not performed.
3. Chemical shifts for the carbon-2 were overlapped with that of methanol.




(a) Eu(acyl-ala)$_3$ , n = 0-6




(b) Eu(oct-phe)$_3$




(c) Eu(oct-ser)$_3$

Scheme 1

1) **Eu(act-ala)$_3$**
   **C1, C4 : 168.90, C3,C5: 24.15, 23.50**
2) **Eu(but-ala)$_3$**
   **C1, C4: 173.39, C5: 40.44, C3: 24.26, C6: 22.87, C7: 16.60**
3) **Eu(hex-ala)$_3$**
   **C1, C4: 174.78, C5: 37.63, C7: 33.64, C6: 27.69, C3: 24.52, C8: 22.27, C9: 15.39**
4) **Eu(oct-ala)$_3$**
   **C1, C4: 174.81, C5: 37.89, C9: 34.43, C7, C8: 31.92, 31.73, C6: 28.54, C10: 25.22, C3: 23.24, C11: 16.00**
5) **Eu(dec-ala)$_3$**
   **C1, C4: 174.34, C5: 37.72, C3, C6-C13: 34.21, 31.83, 31.74, 31.64, 31.62, 28.20,**

**24.91, 22.73, 15.68**

6) **Eu(dod-ala)$_3$**

   **C1, C4: 175.63, C5: 36.98, C3, C6-C15: 33.20 31.83, 30.91, 30.84, 30.69, 30.63, 30.57, 27.17, 23.87, 21.19, 14.65**

7) **Eu(tetd-ala)$_3$**

   **C1, C4: 175.58, C5: 36.55, C3, C6-C17:32.32, 30.01, 29.88, 29.73, 29.59, 28.45, 26.21, 22.99, 18.61, 17.70, 13.72 (two carbons were almost overlapped with others)**

8) **Eu(oct-phe)$_3$**

   **C1, C10: 173.83, C4-C9 (benzene ring): 139.11, 130.65, 129.90, 128.05, C3: 42.38, C11: 37.12, C15: 33.68, C13, C14: 31.45, 31.05, C12: 27.88, C16: 24.54, C17: 15.35**

9) **Eu(oct-ser)$_3$**

   **C1, C4: 175.01, C3: 70.35, C5: 37.93, C9: 34.14, C7, C8: 31.93, 31.52, C6: 28.15, C10: 24.93, C11: 15.69**

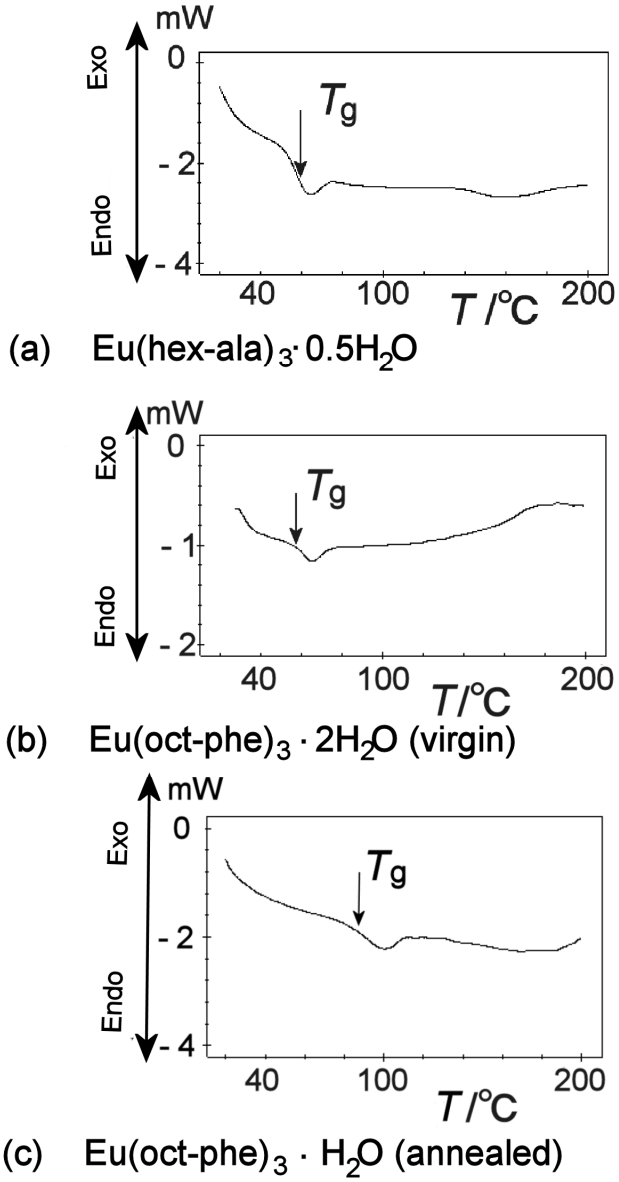



**Fig. S1.**

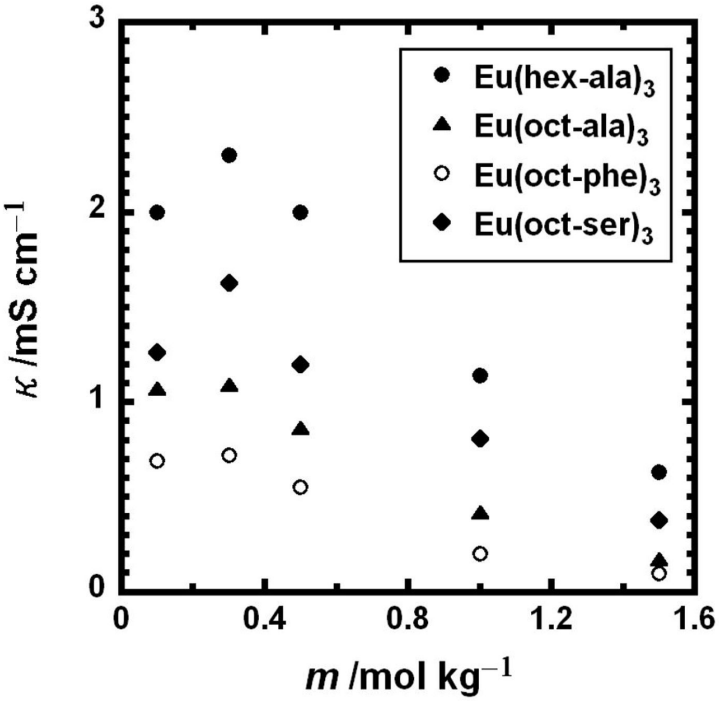



**Fig. S2.**

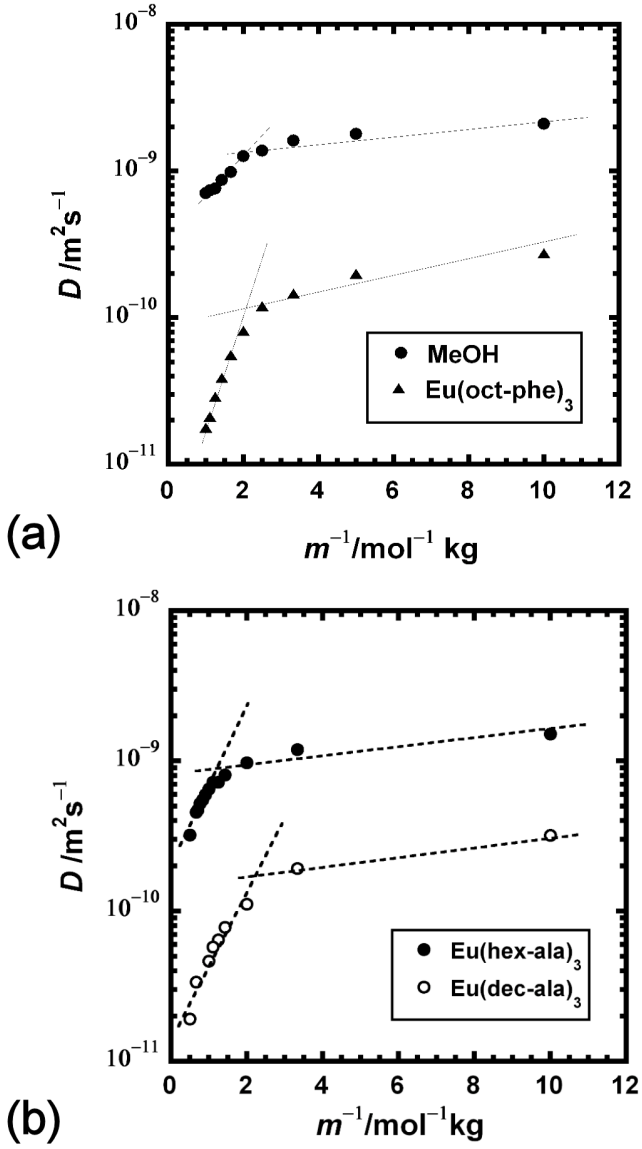



**Fig. S3.**

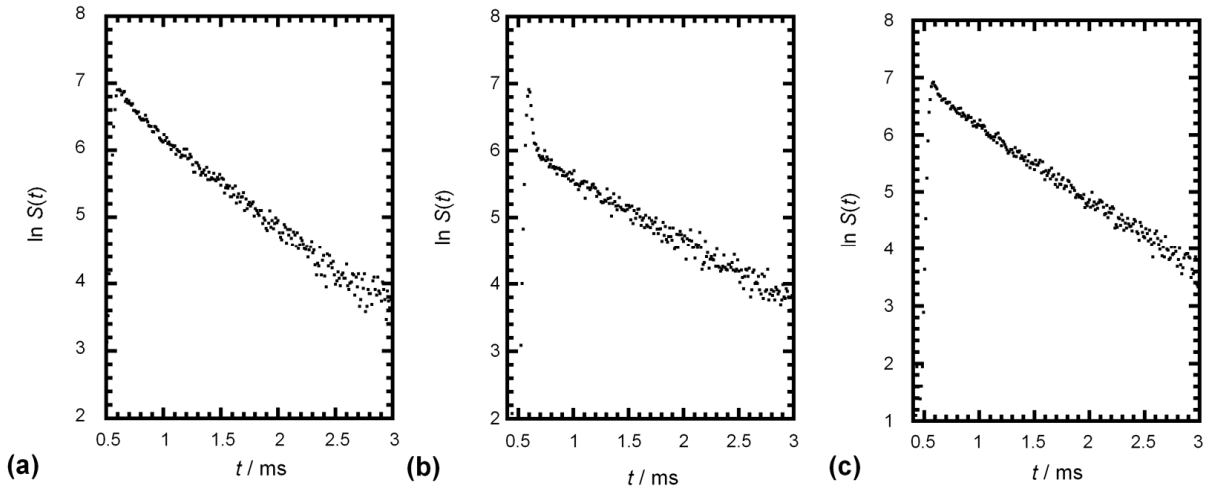



**Fig. S4.**

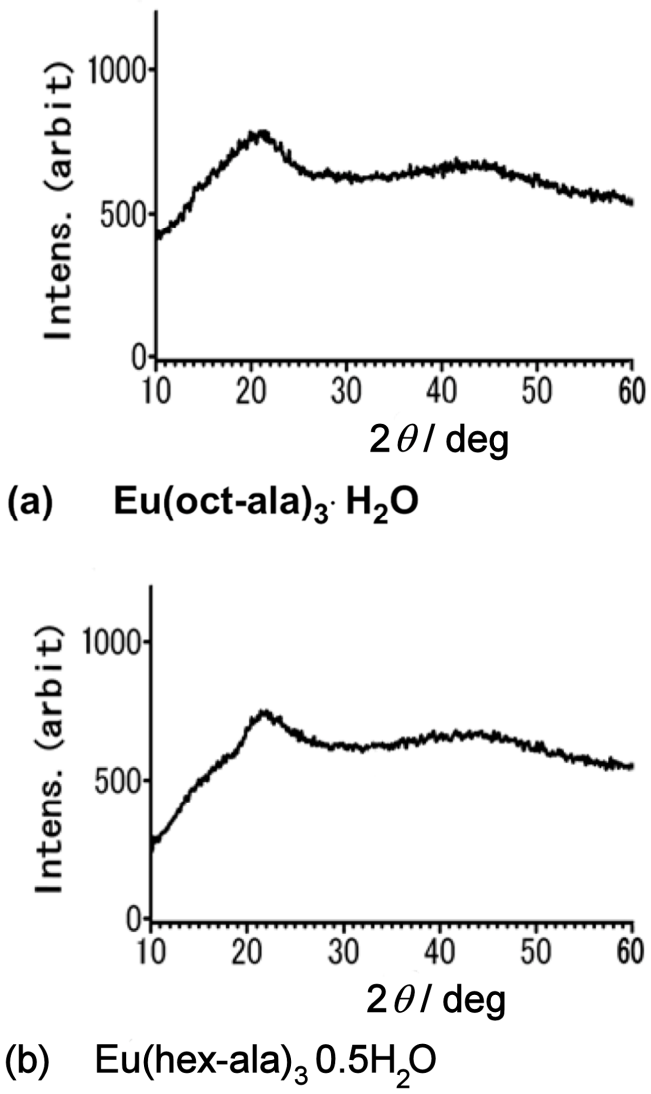



**Fig. S5.**

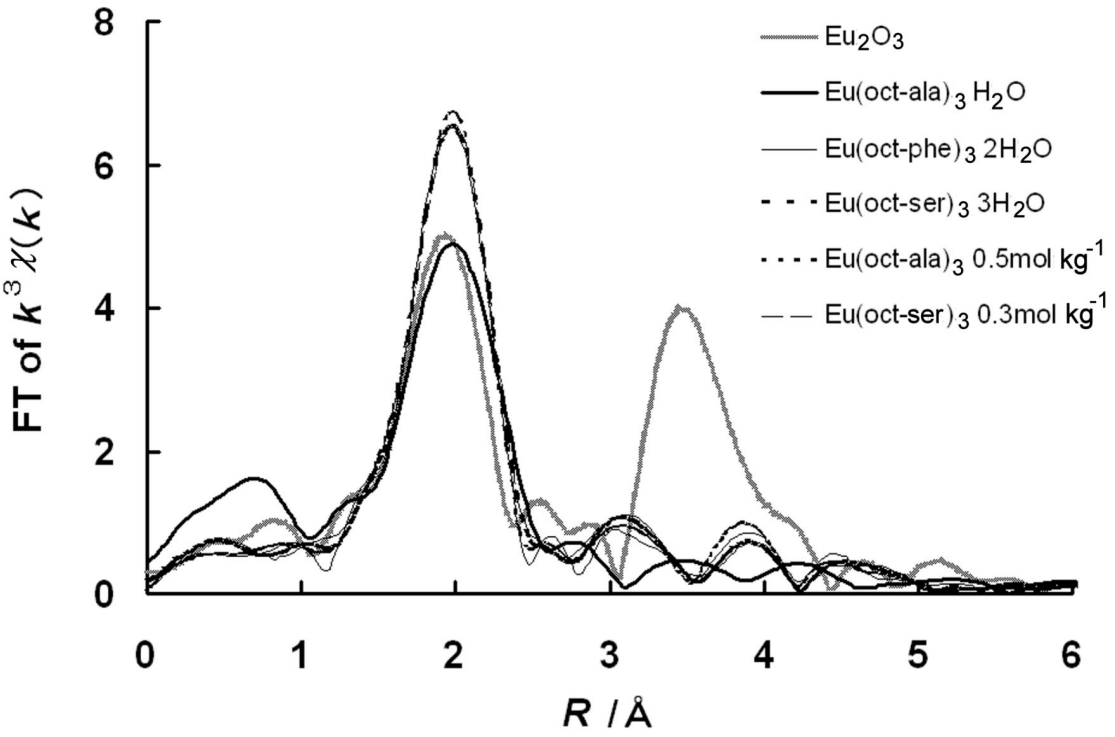



**Fig. S6.**

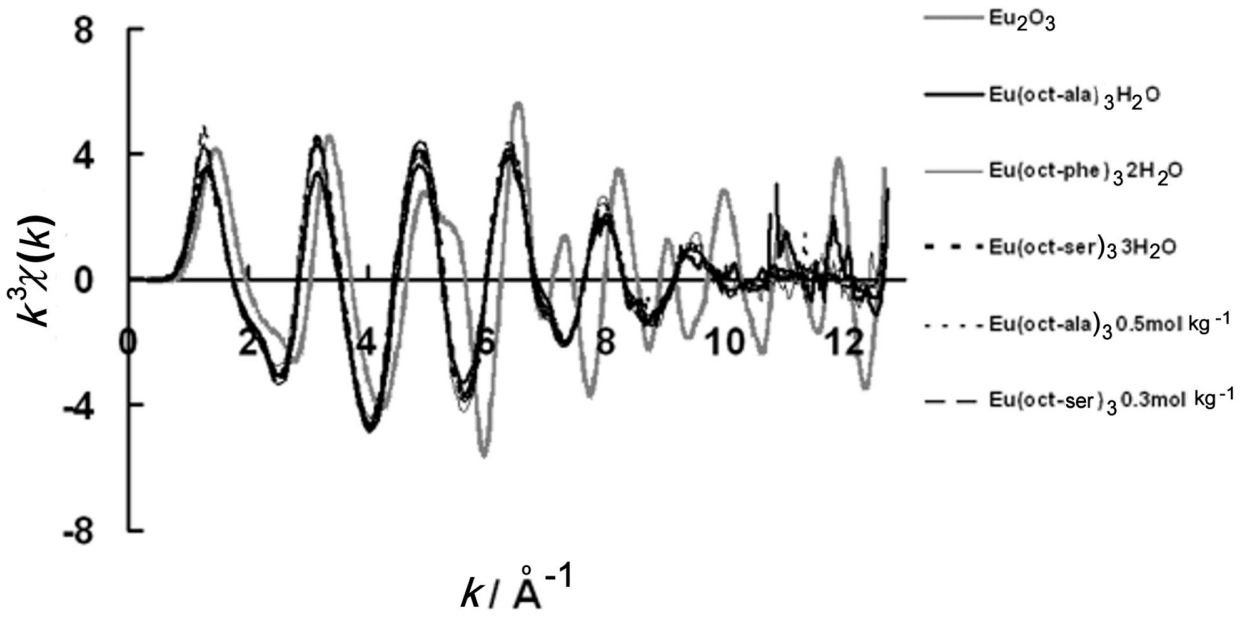



**Fig. S7.**