Supporting Information

Faster Synthesis of Beta-Diketonate Ternary Europium Complexes: Elapsed Times & Reaction Yields

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**Table**

S1 Table. Summary of characterization data for all complexes synthesized in this article........38
Characterization

MALDI-TOF Mass Spectrometry

The matrix-assisted laser desorption-ionization/time-of-flight mass, MALDI-TOF, mass spectra were acquired on an Autoflex 3 Smart Beam Vertical spectrometer by BruckerDaltonics, USA. The system utilizes a 100 Hz pulsed nitrogen laser Nd:Yag emitting at 355 nm. The spectra were acquired in positive reflection mode between m/z 500 and 4880. All spectra represent the average of 1000 single laser shots. The laser intensity was kept sufficiently low to prevent degradation of the complexes and to obtain a good signal-to-noise ratio of the analyte. The equipment was calibrated with the peptide calibration standard (Bruker), and the spectra were acquired with FlexControl software (Bruker Daltonics, version 3.0).

The spectra of the novel intermediate complexes are shown in S1–S3 Figs below:

![MALDI-TOF/MS spectrum of the complex EuCl₃(TPPO)₄(H₂O)₃](image-url)
S2 Fig. MALDI-TOF/MS spectrum of the complex EuCl₃(DBSO)₄(H₂O)₄.

S3 Fig. MALDI-TOF/MS spectrum of the complex EuCl₃(PTSO)₄(H₂O)₄.
Infrared Spectra

Samples of the complexes were prepared as KBr disks, and the spectra were measured in a Bruker model IFS 66 spectrophotometer (4000 cm\(^{-1}\) - 400 cm\(^{-1}\)). S4-S25 Figs show the obtained infrared spectra for all free ligands and synthesized complexes.

DBMH free ligand (KBr): \(\nu=\text{C-H} \) 3060 cm\(^{-1}\)– 3038 cm\(^{-1}\), \(\nu=\text{C=O} \) 1599 cm\(^{-1}\).

**S4 Fig.** Infrared spectrum DBMH free ligand.

TTAH free ligand (KBr): \(\nu=\text{C-H} \) 3107 cm\(^{-1}\)– 3087 cm\(^{-1}\), \(\nu=\text{C=O} \) 1655 cm\(^{-1}\).

**S5 Fig.** Infrared spectrum TTAH free ligand.
TPPO free ligand (KBr): $\nu$=C-H 3091 cm$^{-1}$ – 3000 cm$^{-1}$, $\nu$P=O 1118 cm$^{-1}$.

S6 Fig. Infrared spectrum TPPO free ligand.

DBSO free ligand (KBr): $\nu$=C-H 3102 cm$^{-1}$ – 3036 cm$^{-1}$, $\nu$CH$_2$ 2960 cm$^{-1}$ – 2913 cm$^{-1}$, $\nu$S=O 1032 cm$^{-1}$.

S7 Fig. Infrared spectrum DBSO free ligand.
PTSO free ligand (KBr): $\nu=\text{C-H} \ 3051 \text{ cm}^{-1} - 3017 \text{ cm}^{-1}$, $\nu\text{CH}_3 \ 2975 \text{ cm}^{-1} - 2862 \text{ cm}^{-1}$, $\nu\text{S=O} \ 1037 \text{ cm}^{-1}$.

**S8 Fig.** Infrared spectrum PTSO free ligand.

$\text{EuCl}_3(\text{TPPO})_4(\text{H}_2\text{O})_3 (\text{KBr})$: $\nu\text{O-H} \ 3661 \text{ cm}^{-1}$, $\nu=\text{C-H} \ 3092 \text{ cm}^{-1} - 3017 \text{ cm}^{-1}$, $\nu\text{P=O} \ 1088 \text{ cm}^{-1}$.

**S9 Fig.** Infrared spectrum of $\text{EuCl}_3(\text{TPPO})_4(\text{H}_2\text{O})_3$. 
EuCl₃(DBSO)₄(H₂O)₄ (KBr): vO-H 3407 cm⁻¹, vS=O 1031 cm⁻¹.  
S10 Fig. Infrared spectrum of EuCl₃(DBSO)₄(H₂O)₄.

EuCl₃(PTSO)₄(H₂O)₄ (KBr): vO-H 3704 cm⁻¹, vS=O 1036 cm⁻¹.  
S11 Fig. Infrared spectrum of EuCl₃(PTSO)₄(H₂O)₄.
Eu(TTA)$_3$(H$_2$O)$_2$(KBr): $\nu$=O-H 3394 cm$^{-1}$, $\nu$C=O 1617 cm$^{-1}$.

S12 Fig. Infrared spectrum of Eu(TTA)$_3$(H$_2$O)$_2$.

Eu(DBM)$_3$(H$_2$O)$_2$(KBr): $\nu$ O-H 3604, $\nu$ (=C-H) 3060 - 3015 cm$^{-1}$, $\nu$ C=O 1596 cm$^{-1}$.

S13 Fig. Infrared spectrum of Eu(DBM)$_3$(H$_2$O)$_2$. 
**Eu(DBM)$_3$(TPPO)$_2$ (KBr):** \(\nu(=\text{C-H})\) 3082-3027 cm\(^{-1}\), \(\nu\text{C=O}\) 1599 cm\(^{-1}\), \(\nu\text{P=O}\) 1070 cm\(^{-1}\).

**S14 Fig.** Infrared spectrum of Eu(DBM)$_3$(TPPO)$_2$ by usual synthesis route.

**Eu(DBM)$_3$(TPPO)$_2$ (KBr):** \(\nu(=\text{C-H})\) 3067 cm\(^{-1}\) – 3020 cm\(^{-1}\), \(\nu\text{C=O}\) 1597 cm\(^{-1}\), \(\nu\text{P=O}\) 1074 cm\(^{-1}\).

**S15 Fig.** Infrared spectrum of Eu(DBM)$_3$(TPPO)$_2$ by faster synthesis route.
**Eu(TTA)$_3$(TPPO)$_2$ (KBr):** $\nu$=C-H 3102 cm$^{-1}$ – 3032 cm$^{-1}$, $\nu$ C=O 1608 cm$^{-1}$, $\nu$P=O 1065 cm$^{-1}$.

**S16 Fig.** Infrared spectrum of Eu(TTA)$_3$(TPPO)$_2$ by usual synthesis route.

**Eu(TTA)$_3$(TPPO)$_2$ (KBr):** $\nu$=C-H 3104 cm$^{-1}$ – 3030 cm$^{-1}$, $\nu$ C=O 1607 cm$^{-1}$, $\nu$P=O 1060 cm$^{-1}$.

**S17 Fig.** Infrared spectrum of Eu(TTA)$_3$(TPPO)$_2$ by faster synthesis route.
**Eu(DBM)$_3$(DBSO)$_2$ T(KBr):** ν(=C-H) 3055 -3018 cm$^{-1}$, ν CH$_2$ 2956 cm$^{-1}$, ν C=O 1594 cm$^{-1}$, νS=O 1022 cm$^{-1}$.

**S18 Fig.** Infrared spectrum of Eu(DBM)$_3$(DBSO)$_2$ by usual synthesis route.

**Eu(DBM)$_3$(DBSO)$_2$ R(KBr):** ν=C-H 3083 cm$^{-1}$ – 3032 cm$^{-1}$, ν CH$_2$ 2960 cm$^{-1}$ - 2913 cm$^{-1}$, ν C=O 1599 cm$^{-1}$, νS=O 1028 cm$^{-1}$.

**S19 Fig.** Infrared spectrum of Eu(DBM)$_3$(DBSO)$_2$ by faster synthesis route.
$\text{Eu(TTA)}_3(\text{DBSO})_2$ (KBr): $\nu$=C-H 3107 cm$^{-1}$ – 3031 cm$^{-1}$, $\nu$ CH$_2$ 2975 cm$^{-1}$ - 2919 cm$^{-1}$, $\nu$ C=O 1606 cm$^{-1}$, $\nu$S=O 1012 cm$^{-1}$.

**S20 Fig.** Infrared spectrum of $\text{Eu(TTA)}_3(\text{DBSO})_2$ by usual synthesis route.

$\text{Eu(TTA)}_3(\text{DBSO})_2$ (KBr): $\nu$=C-H 3088 cm$^{-1}$ – 3032 cm$^{-1}$, $\nu$ CH$_2$ 2975 cm$^{-1}$ - 2918 cm$^{-1}$, $\nu$ C=O 1607 cm$^{-1}$, $\nu$S=O 1013 cm$^{-1}$.

**S21 Fig.** Infrared spectrum of $\text{Eu(TTA)}_3(\text{DBSO})_2$ by faster synthesis route.
**Eu(DBM)$_3$(PTSO)$_2$(KBr):** $\nu$(=C–H) 3060 – 3013 cm$^{-1}$, $\nu$ CH$_3$ 2980 - 2861 cm$^{-1}$, $\nu$ C=O 1595 cm$^{-1}$, $\nu$S=O 1012 cm$^{-1}$.

**S22 Fig.** Infrared spectrum of Eu(DBM)$_3$(PTSO)$_2$ by usual synthesis route.

**Eu(DBM)$_3$(PTSO)$_2$ (KBr):** $\nu$(C–H) 3059 cm$^{-1}$ – 3027 cm$^{-1}$, $\nu$ CH$_3$ 2947cm$^{-1}$ - 2857cm$^{-1}$, $\nu$ C=O 1599 cm$^{-1}$, $\nu$S=O 1018 cm$^{-1}$.

**S23 Fig.** Infrared spectrum of Eu(DBM)$_3$(PTSO)$_2$ by faster synthesis route.
Eu(TTA)$_3$(PTSO)$_2$ (KBr): \( \nu=\text{C-H } 3097 \text{ cm}^{-1} - 3032 \text{ cm}^{-1} \), \( \nu \text{CH}_3 2975 \text{ cm}^{-1} - 2866 \text{ cm}^{-1} \), \( \nu \text{C=O} 1603 \text{ cm}^{-1} \), \( \nu \text{S=O} 1022 \text{ cm}^{-1} \).

**S24 Fig.** Infrared spectrum of Eu(TTA)$_3$(PTSO)$_2$ by usual synthesis route.

Eu(TTA)$_3$(PTSO)$_2$ (KBr): \( \nu=\text{C-H } 3102 \text{ cm}^{-1} - 3032 \text{ cm}^{-1} \), \( \nu \text{CH}_3 2975 \text{ cm}^{-1} - 2871 \text{ cm}^{-1} \), \( \nu \text{C=O} 1604 \text{ cm}^{-1} \), \( \nu \text{S=O} 1012 \text{ cm}^{-1} \).

**S25 Fig.** Infrared spectrum of Eu(TTA)$_3$(PTSO)$_2$ by faster synthesis route.
NMR Spectra

All NMR spectra of all complexes were obtained in CDCl$_3$ solutions via a Varian Unity Plus 400 MHz equipament.

$^1$H NMR Spectra

S26-S53 Figs show $^1$H NMR spectra for all free ligands and synthesized complexes.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$8.01 - 6.67 (m, Ar.), 4.69 (m, CH$_2$).

S26 Fig. $^1$H NMR spectrum of DBMH free ligand.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$7.62 - 6.43 ppm (m, Ar.), 3.34 ppm (m, CH$_2$).

S27 Fig. $^1$H NMR spectrum of TTAH free ligand.
$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.60 - 7.37 ppm (m, Ar).

S28 Fig. $^1$H NMR spectrum of TPPO free ligand.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.36 - 7.30 (m, Ar.), 3.91 -3.88 (m, CH$_2$).

S29 Fig. $^1$H NMR spectrum of DBSO free ligand.
$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.48 - 7.22 ppm (m, Ar.), 2.33 ppm (s, CH$_3$).

**S30 Fig.** $^1$H NMR spectrum of PTSO free ligand.

$^1$H NMR spectrum of EuCl$_3$(TPPO)$_4$(H$_2$O)$_3$, measured from 0 to 200 ppm to rule out the possibility that the charts could contain reflection signals of protons outside of the usual 0-20ppm range.
S32 Fig. $^1$H NMR spectrum of EuCl$_3$(TPPO)$_4$(H$_2$O)$_3$, measured from 20 to -200 ppm to rule out the possibility that the charts could contain reflection signals of protons outside of the usual 0-20ppm range.

S33 Fig. $^1$H NMR spectrum of EuCl$_3$(DBSO)$_4$(H$_2$O)$_4$, measured from 0 to 200 ppm to rule out the possibility that the charts could contain reflection signals of protons outside of the usual 0-20ppm range.
**S34 Fig.** $^1$H NMR spectrum of EuCl$_3$(DBSO)$_4$(H$_2$O)$_4$, measured from 20 to -200 ppm to rule out the possibility that the charts could contain reflection signals of protons outside of the usual 0-20ppm range.

**S35 Fig.** $^1$H NMR spectrum of EuCl$_3$(PTSO)$_4$(H$_2$O)$_4$, measured from 0 to 200 ppm to rule out the possibility that the charts could contain reflection signals of protons outside of the usual 0-20ppm range.
S36 Fig. $^1$H NMR spectrum of EuCl$_3$(PTSO)$_4$(H$_2$O)$_4$, measured from 20 to -200 ppm to rule out the possibility that the charts could contain reflection signals of protons outside of the usual 0-20ppm range.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.43 (m, Ar.), 2.62 (s, OH).

S37 Fig. $^1$H NMR spectrum of EuCl$_3$(TPPO)$_4$(H$_2$O)$_3$. 
$^1$H NMR (400 MHz, CDCl$_3$): $\delta$7.38-7.31 (m, Ar.), 3.90 (m, CH$_2$) and 2.21 (s, OH).

**S38 Fig.** $^1$H NMR spectrum of EuCl$_3$(DBSO)$_4$(H$_2$O)$_4$.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$7.49-7.24 (m, Ar.), 2.34 (s, CH$_3$) and 2.07 (s, OH).

**S39 Fig.** $^1$H NMR spectrum of EuCl$_3$(PTSO)$_4$(H$_2$O)$_4$. 

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$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 10.79 (s, CH), 7.03-5.30 (m, Ar.).

S40 Fig. $^1$H NMR spectrum of Eu(TTA)$_3$(H$_2$O)$_2$.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 16.66 (s, CH), 8.01-7.29 (m, Ar.).

S41 Fig. $^1$H NMR spectrum of Eu(DBM)$_3$(H$_2$O)$_2$. 
$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 17.14 (s, CH), 8.28-7.03 (m, Ar).

Fig. S42 $^1$H NMR spectrum of Eu(DBM)$_3$(TPPO)$_2$ of the usual synthesis.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 17.15 (s, CH), 8.28-7.83 (m, Ar).

Fig. S43 $^1$H NMR spectrum of Eu(DBM)$_3$(TPPO)$_2$ of the faster synthesis.
$^1$H NMR (400 MHz, CDCl$_3$): \( \delta \) 9.89 (s, CH), 7.71-6.04 (m, Ar.).

S44 Fig. $^1$H NMR spectrum of Eu(TTA)$_3$(TPPO)$_2$ of the usual synthesis.

$^1$H NMR (400 MHz, CDCl$_3$): \( \delta \) 9.09 (s, CH), 7.66-6.01 (m, Ar.).

S45 Fig. $^1$H NMR spectrum of Eu(TTA)$_3$(TPPO)$_2$ of the faster synthesis.
$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 16.79 (s, CH), 7.93-7.19 (m, Ar.) and 4.00 (m, CH$_2$).

**S46 Fig.** $^1$H NMR spectrum of Eu(DBM)$_3$(DBSO)$_2$ of the usual synthesis.

$^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 16.80 (s, CH), 7.93-7.19 (m, Ar.) and 4.72 (m, CH$_2$).

**S47 Fig.** $^1$H NMR spectrum of Eu(DBM)$_3$(DBSO)$_2$ of the faster synthesis.
\[ ^1\text{H NMR} (400 \text{ MHz, CDCl}_3); \delta \ 12.42 (\text{s, CH}), \ 8.76 - 6.03 (\text{m, Ar.}) \text{ and } 2.65-2.52 (\text{m,CH}_2). \]

**S48** Fig. \(^1\text{H NMR} \text{ spectrum of Eu(TTA)}_3(\text{DBSO})_2 \text{ of the usual synthesis.} \)

\[ ^1\text{H NMR} (400 \text{ MHz, CDCl}_3); \delta \ 11.64 (\text{s,CH}), \ 7.68 – 6.22 (\text{m, Ar.}) \text{ and } 4.54-4.44 (\text{m,CH}_2). \]

**S49** Fig. \(^1\text{H NMR} \text{ spectrum of Eu(TTA)}_3(\text{DBSO})_2 \text{ of the faster synthesis.} \)
$^1$H NMR (400 MHz, CDCl$_3$): δ 16.80 (s, CH) 7.93- 7.25 (m, Ar.) and 2.32 (m, CH$_3$).

S50 Fig. $^1$H NMR spectrum of Eu(DBM)$_3$(PTSO)$_2$ of the usual synthesis.

$^1$H NMR (400 MHz, CDCl$_3$): δ 16.79 (s, CH) 7.96- 7.24 (m, Ar.) and 2.32 (m, CH$_3$).

S51 Fig. $^1$H NMR spectrum of Eu(DBM)$_3$(PTSO)$_2$ of the faster synthesis.
$^{1}$H NMR (400 MHz, CDCl$_3$): δ 10.45 (s, CH), 7.68 - 5.62 (m, Ar.) and 2.57 (m, CH$_3$).

**S52 Fig.** $^{1}$H NMR spectrum of Eu(TTA)$_3$(PTSO)$_2$ of the usual synthesis.

$^{1}$H NMR (400 MHz, CDCl$_3$): δ 9.43 (s, CH$_3$), 7.49 - 5.66 (m, Ar.) and 2.47 (m, CH$_3$).

**S53 Fig.** $^{1}$H NMR spectrum of Eu(TTA)$_3$(PTSO)$_2$ of the faster synthesis.
19F NMR Spectra

S54-S61 Figs show 19F NMR spectra for the TTAH free ligand and for the all synthesized complexes with TTA ligand.

19F NMR (400 MHz, CDCl3): δ -75.80 and -87.06 ppm (CF3).

S54 Fig. 19F NMR spectrum of TTA free ligand.

19F NMR (400 MHz, CDCl3): δ -80.77 ppm (CF3).

S55 Fig. 19F NMR spectrum of Eu(TTA)3(H2O)2.
$^{19}\text{F NMR (400 MHz, CDCl}_3\text{): } \delta -80.03 \text{ to } -80.69 \text{ ppm (CF}_3\text{).}$

**S56 Fig.** $^{19}\text{F NMR spectrum of Eu(TTA)}_3\text{(TPPO)}_2\text{ of the usual synthesis.}$

$^{19}\text{F NMR (400 MHz, CDCl}_3\text{): } \delta -79.97 \text{ to } -82.68 \text{ ppm (CF}_3\text{).}$

**S57 Fig.** $^{19}\text{F NMR spectrum of Eu(TTA)}_3\text{(TPPO)}_2\text{ of the faster synthesis.}$
$^{19}$F NMR (400 MHz, CDCl$_3$): δ -74.98 to 80.49 ppm (CF$_3$).

**S58 Fig.** $^{19}$F NMR spectrum of Eu(TTA)$_3$(DBSO)$_2$ of the usual synthesis.

$^{19}$F NMR (400 MHz, CDCl$_3$): δ –75.06 to -82.18 ppm (CF$_3$).

**S59 Fig.** $^{19}$F NMR spectrum of Eu(TTA)$_3$(DBSO)$_2$ of the faster synthesis.
$^{19}$F NMR (400 MHz, CDCl$_3$): $\delta$ -74.45 to -80.79 ppm (CF$_3$).

**S60 Fig.** $^{19}$F NMR spectrum of Eu(TTA)$_3$(PTSO)$_2$ of the usual synthesis.

$^{19}$F NMR (400 MHz, CDCl$_3$): $\delta$ -75.22 to -80.51 ppm (CF$_3$).

**S61 Fig.** $^{19}$F NMR spectrum of Eu(TTA)$_3$(PTSO)$_2$ of the faster synthesis.
$^{31}$P NMR Spectra

S62-S67 Figs show $^{31}$P NMR spectra for the TPPO free ligand and for the all synthesized complexes with TPPO ligand.

$^{31}$P NMR (400 MHz, CDCl$_3$): $\delta$ 28 ppm.

S62 Fig. $^{31}$P NMR spectrum of TPPO free ligand.

$^{31}$P NMR (400 MHz, CDCl$_3$): $\delta$ 30 ppm.

S63 Fig. $^{31}$P NMR spectrum of EuCl$_3$(TPPO)$_4$(H$_2$O)$_3$. 

\[^{31}\text{P NMR (400 MHz, CDCl}_3\text{): } \delta 26 \text{ ppm.}\]

\[\text{S64 Fig. } \text{^{31}P NMR spectrum of Eu(DBM)}_3\text{(TPPO)}_2\text{ of the usual synthesis.}\]

\[^{31}\text{P NMR (400 MHz, CDCl}_3\text{): } \delta 25 \text{ ppm}\]

\[\text{S65 Fig. } \text{^{31}P NMR spectrum of Eu(DBM)}_3\text{(TPPO)}_2\text{ of the faster synthesis.}\]
$^{31}$P NMR (400 MHz, CDCl$_3$): $\delta$ -66 ppm.

S66 Fig. $^{31}$P NMR spectrum of Eu(TTA)$_3$(TPPO)$_2$ of the usual synthesis.

$^{31}$P NMR (400 MHz, CDCl$_3$): $\delta$ -66 ppm.

S67 Fig. $^{31}$P NMR spectrum of Eu(TTA)$_3$(TPPO)$_2$ of the faster synthesis.
Summary of characterizations

S1 Table, below, contains a summary of all characterization data for all free ligands and complexes synthesized in this article.

**S1 Table.** Summary of characterization data for all complexes synthesized in this article

| Free ligand/Complex | IR (cm⁻¹) | NMR (ppm) |
|---------------------|-----------|------------|
|                     |           | ¹H  | ¹⁹F | ³¹P |
| DBMH                | v=C-H 3060 cm⁻¹– 3038 cm⁻¹, vC=O 1599 cm⁻¹. | δ88.01 - 6.67 (m, Ar.), 4.69 (m, CH₂). | ----- | ----- |
| TTAH                | v=C-H 3107 cm⁻¹– 3087 cm⁻¹, vC=O 1655 cm⁻¹. | δ87.62 - 6.43 ppm (m, Ar.), 3.34 ppm (m, CH₂). | δ -75.80 | ----- |
| TPPO                | v=C-H 3091 cm⁻¹– 3000 cm⁻¹, vP=O 1118 cm⁻¹. | δ87.60 - 7.37 ppm (m, Ar.). | ----- | δ 28 |
| DBSO                | v=C-H 3102 cm⁻¹– 3036 cm⁻¹, v CH₂ 2960 cm⁻¹– 2913 cm⁻¹, vS=O 1032 cm⁻¹. | δ87.36 - 7.30 (m, Ar.), 3.91 -3.88 (m, CH₂). | ----- | ----- |
| PTSO                | v=C-H 3051 cm⁻¹– 3017 cm⁻¹, v CH₃ 2975 cm⁻¹– 2862 cm⁻¹, vS=O 1037 cm⁻¹. | δ87.48 - 7.22 ppm (m, Ar.), 2.33 ppm (s,CH₃). | ----- | ----- |
| EuCl₃(TPPO)₄(H₂O)₃ | vO-H 3661 cm⁻¹,v=C-H 3092 cm⁻¹– 3017 cm⁻¹, vP=O 1088 cm⁻¹. | δ7.43 (m, Ar.) and 2.61 (s,OH). | ----- | δ 30 |
| Compound                  | νO-H/cm⁻¹, νS=O/cm⁻¹ | δ (δ7.38-7.31 (m, Ar.), 3.90 (m, CH₂) and 2.21 (s, OH).) | δ (s, CH) | δ (8.01-7.29 (m, Ar.).) | δ (10.79 (s, CH), 7.03-5.30 (m, Ar.).) | δ (-80.77) |
|--------------------------|----------------------|--------------------------------------------------------|-----------|-------------------------|----------------------------------------|------------|
| EuCl₃(DBSO)₄(H₂O)₄       | 3407, 1031           | 1251.15                                                |           |                         |                                        |            |
| EuCl₃(PTSO)₄(H₂O)₄       | 3704, 1036           | 1251.16                                                |           |                         |                                        |            |
| Eu(DBM)₃(H₂O)₂           | 3604, 3060-3015, 1596 | 16.66                                                 |           |                         |                                        |            |
| Eu(TTA)₃(H₂O)₂           | 3394, 1617           | 10.79                                                 | -80.77    |                         |                                        |            |
| Compound | Synthesis Method | ν(=C-H) 3082-3027 cm\(^{-1}\), νC=O 1599 cm\(^{-1}\), νP=O 1070 cm\(^{-1}\). | δ 17.14 (s,CH), 8.28-7.03 (m, Ar.). | δ 26 |
|----------|-----------------|-------------------------------------------------|----------------------------------------|-------|
| Eu(DBM)\(_3\)(TPPO)\(_2\) | by usual synthesis | | | |
| Eu(DBM)\(_3\)(TPPO)\(_2\) | by faster synthesis | ν=C-H 3067 cm\(^{-1}\) – 3020 cm\(^{-1}\), νC=O 1597 cm\(^{-1}\), νP=O 1074 cm\(^{-1}\). | δ 17.15 (s,CH), 8.28-7.83 (m, Ar.). | δ 25 |
| Eu(TTA)\(_3\)(TPPO)\(_2\) | by usual synthesis | ν=C-H 3102 cm\(^{-1}\) – 3032 cm\(^{-1}\), νC=O 1608 cm\(^{-1}\), νP=O 1065 cm\(^{-1}\). | δ 9.89 (s,CH), 7.71-6.04 (m, Ar.). | δ -66 |
| Eu(TTA)\(_3\)(TPPO)\(_2\) | by faster synthesis | ν=C-H 3104 cm\(^{-1}\) – 3030 cm\(^{-1}\), νC=O 1607 cm\(^{-1}\), νP=O 1060 cm\(^{-1}\). | δ 9.09 (s,CH), 7.66-6.01 (m, Ar.). | δ -66 |
| | | | δ -79.97 to -82.68 ppm (CF₃). | |
| Compound | Synthesis Method | ν(C=H) cm⁻¹ | ν(CH₂) cm⁻¹ | ν(C=O) cm⁻¹ | ν(S=O) cm⁻¹ | δ (s,CH) ppm | δ (m, CH₂) ppm |
|----------|-----------------|-------------|-------------|-------------|-------------|--------------|---------------|
| Eu(DBM)₃(DBSO)₂ | by usual synthesis | 3055 - 3018 | 2956 | 1594 | 1022 | 16.79 | 7.93 - 7.19 (m, Ar.) and 4.00 (m, CH₂) |
| Eu(DBM)₃(DBSO)₂ | by faster synthesis | 3083 - 3032 | 2960 - 2913 | 1599 | 1028 | 16.80 | 7.83 - 7.19 (m, Ar.) and 4.72 (m, CH₂) |
| Eu(TTA)₃(DBSO)₂ | by usual synthesis | 3107 - 3031 | 2975 - 2919 | 1606 | 1012 | 12.42 | 8.76 - 6.03 (m, Ar.) and 2.52 (m, CH₂) |
| Eu(TTA)₃(DBSO)₂ | by faster synthesis | 3088 - 3032 | 2975 - 2918 | 1607 | 1013 | 11.64 | 7.68 - 6.22 (m, Ar.) and 4.44 (m, CH₂) |

δ −74.98 to 80.49 ppm (CF₃)
| Compound                  | ν (cm⁻¹) | δ (ppm) |
|--------------------------|---------|---------|
| Eu(DBM)₃(PTSO)₂          |         |         |
| by usual synthesis       | v (=C-H) 3060 – 3013 cm⁻¹, ν CH₃ 2980 - 2861 cm⁻¹, ν C=O 1595 cm⁻¹, ν S=O 1012 cm⁻¹. | δ 16.80 (s, CH), 7.93-7.25 (m, Ar.) and 2.32 (m, CH₃). |
| Eu(DBM)₃(PTSO)₂          |         |         |
| by faster synthesis      | v=C-H 3059 cm⁻¹ – 3027 cm⁻¹, ν CH₃ 2947 cm⁻¹ - 2857 cm⁻¹, ν C=O 1599 cm⁻¹, ν S=O 1018 cm⁻¹. | δ 16.79 (s, CH), 7.96-7.24 (m, Ar.) and 2.32 (m, CH₃). |
| Eu(TTA)₃(PTSO)₂          |         |         |
| by usual synthesis       | v=C-H 3097 cm⁻¹ – 3021 cm⁻¹, ν CH₃ 2975 cm⁻¹ - 2866 cm⁻¹, ν C=O 1603 cm⁻¹, ν S=O 1022 cm⁻¹. | δ 10.45 (m, CH₃), 7.68-5.62 (m, Ar.) and 2.57 (m, CH₃). |
| Eu(TTA)₃(PTSO)₂          |         |         |
| by faster synthesis      | v=C-H 3102 cm⁻¹ – 3032 cm⁻¹, ν CH₃ 2975 cm⁻¹ - 2871 cm⁻¹, ν C=O 1604 cm⁻¹, ν S=O 1012 cm⁻¹. | δ -74.45 to -80.79 ppm (CF₃). |