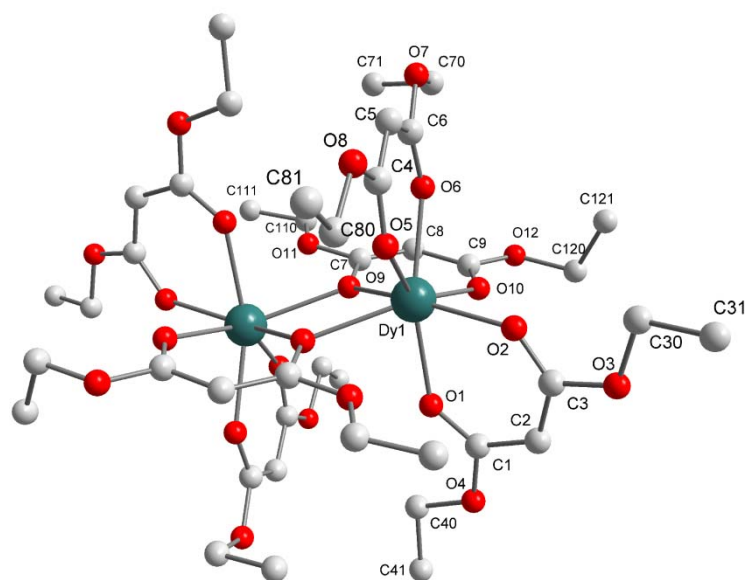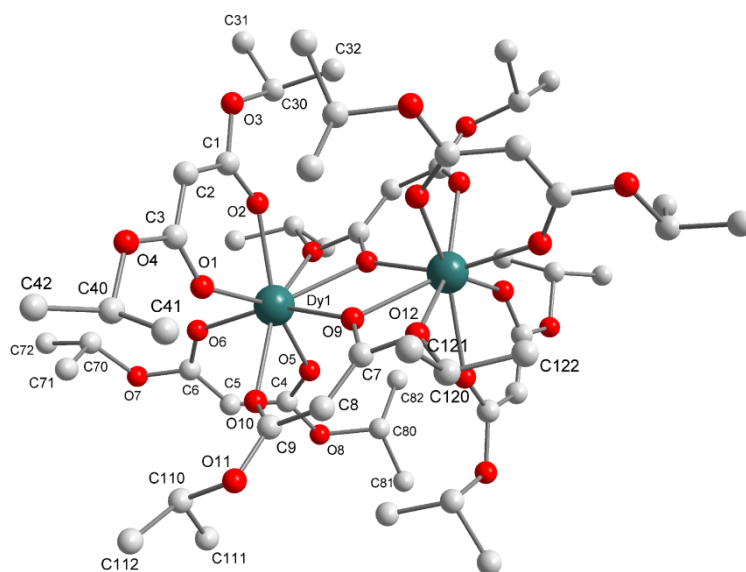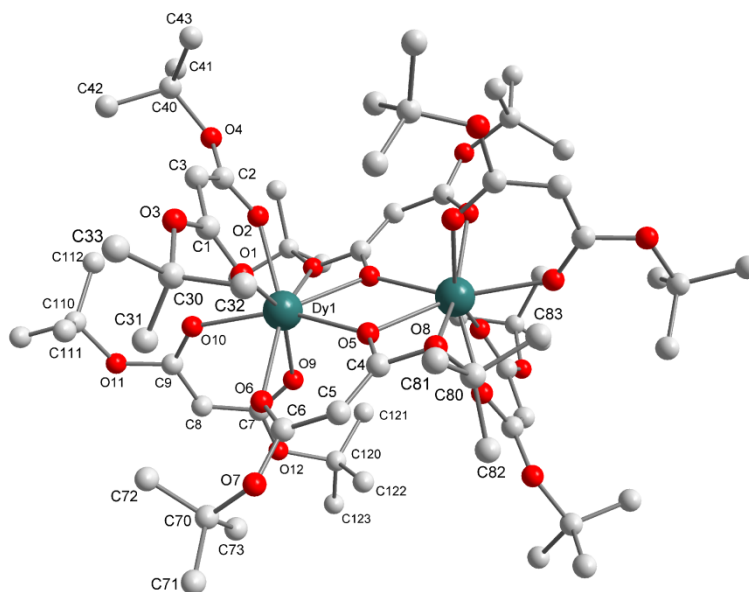## Supporting Information
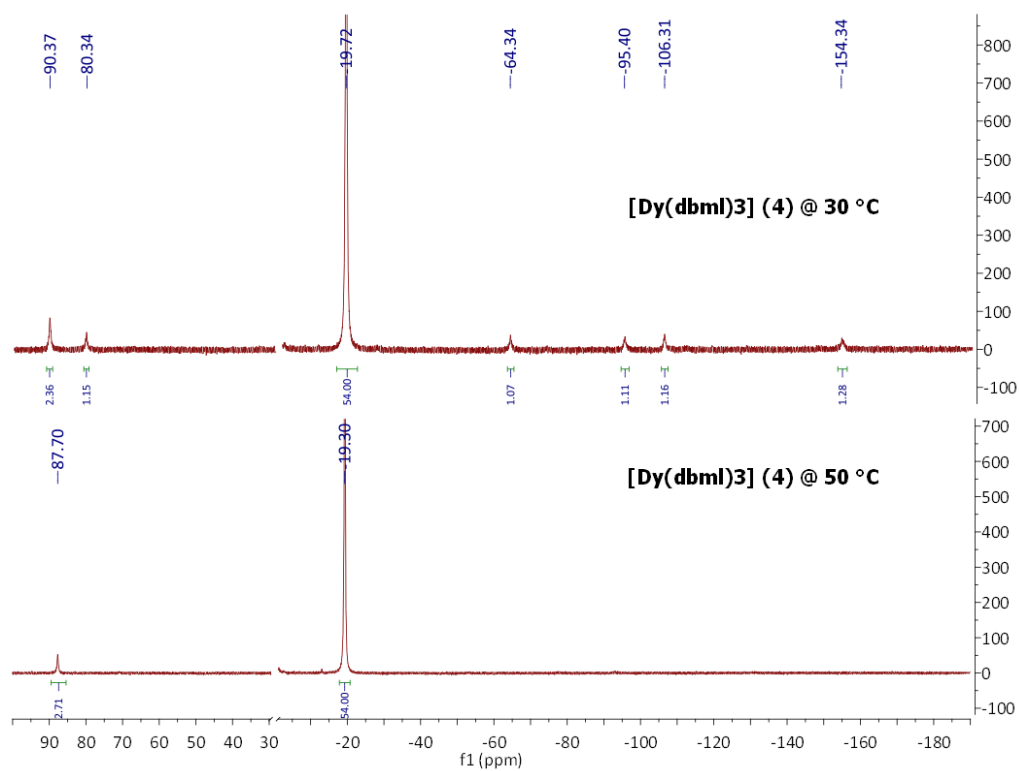

SI 1. Molecular structures of $[\{Dy(deml)_3\}_2]$ (**2**) in the solid state (hydrogen atoms are omitted for clarity).
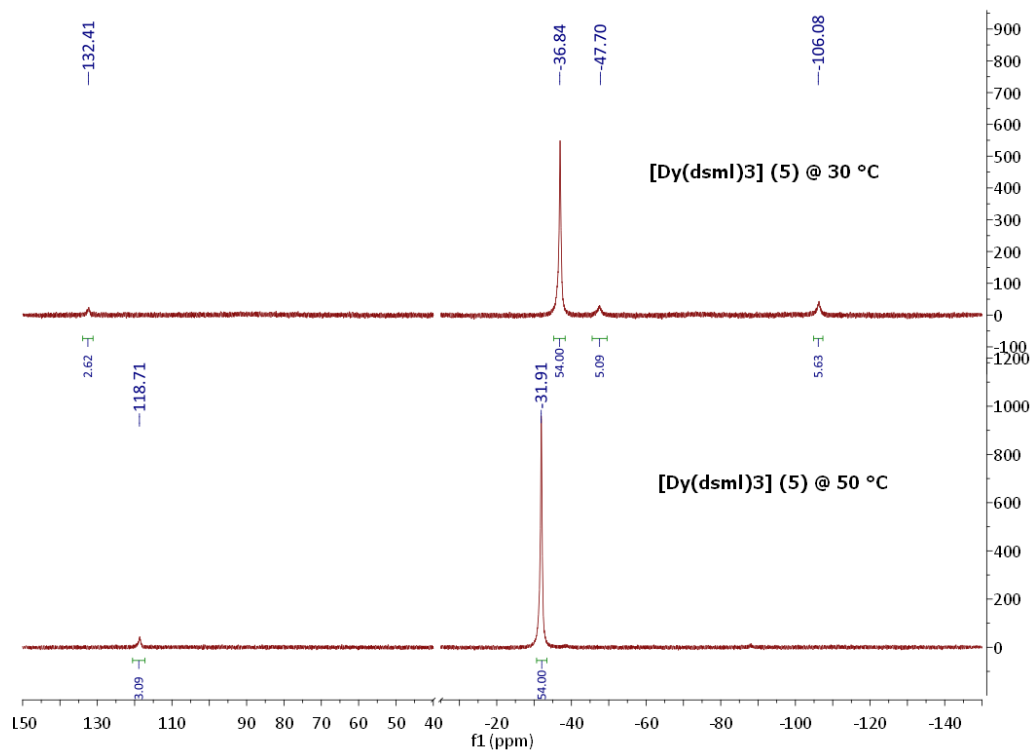

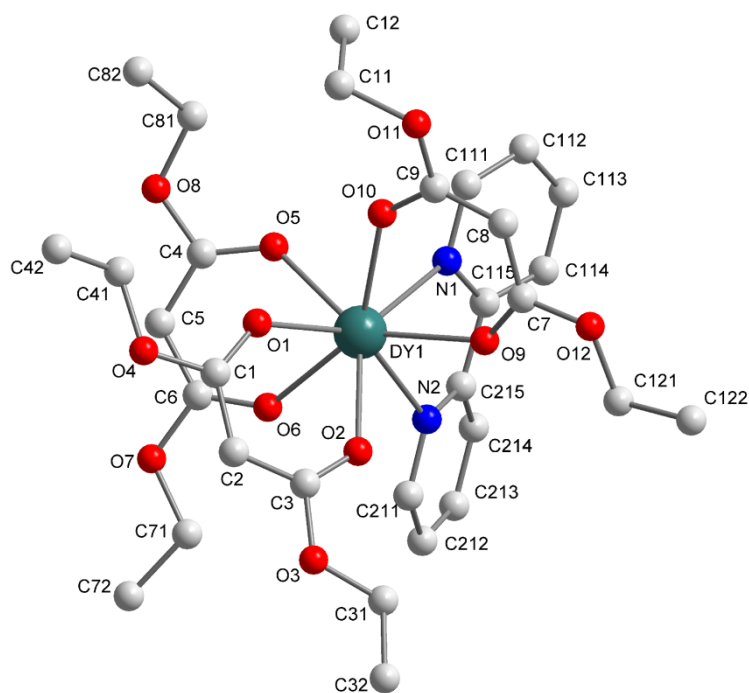**SI 2.** Molecular structures of $[\{Dy(dpml)_3\}_2]$ (**3**) in the solid state (hydrogen atoms are omitted for clarity).

SI 3. Molecular structures of [{Dy(deml)$_3$}$_2$] (**4**) in the solid state (hydrogen atoms are omitted for clarity).

SI 4. ^{1}H-NMR spectra of [{Dy(dbml)$_3$}$_2$] (**4**) at 30 °C and 50 °C, respectively (250 MHz, toluene-d8).

SI 5. ^{1}H-NMR spectra of [{Dy(dsml)$_3$}$_2$] (**5**) at 30 °C and 50 °C, respectively(250 MHz, toluene-d8).

SI 6. Molecular structures of [Dy(deml)$_3$bipy] (**6**) in the solid state (hydrogen atoms are omitted for clarity).

SI 7. Molecular structures of [Dy(dbml)$_3$bipy] (**7**) in the solid state (hydrogen atoms are omitted for clarity).

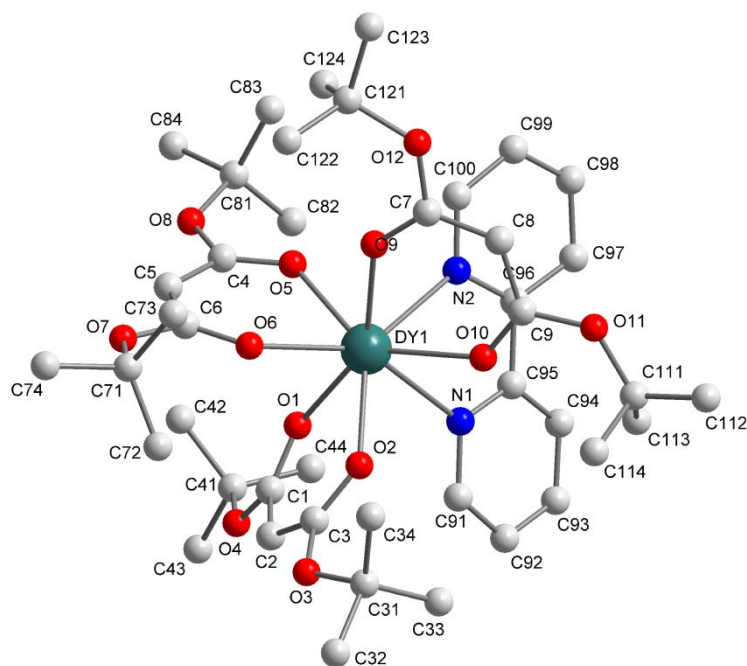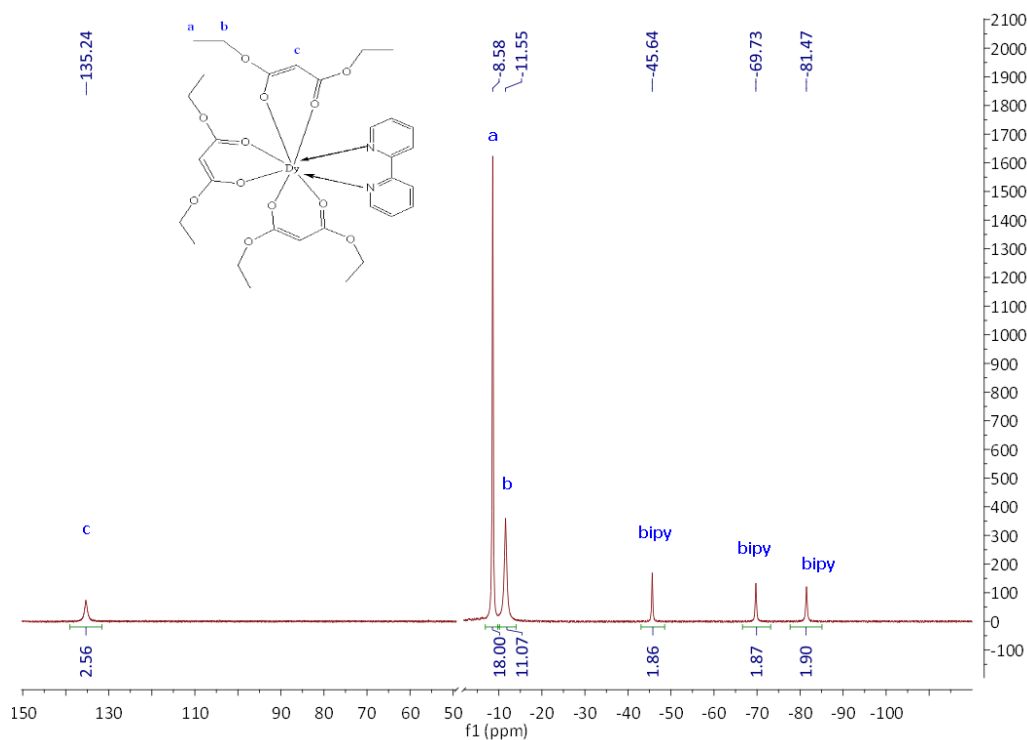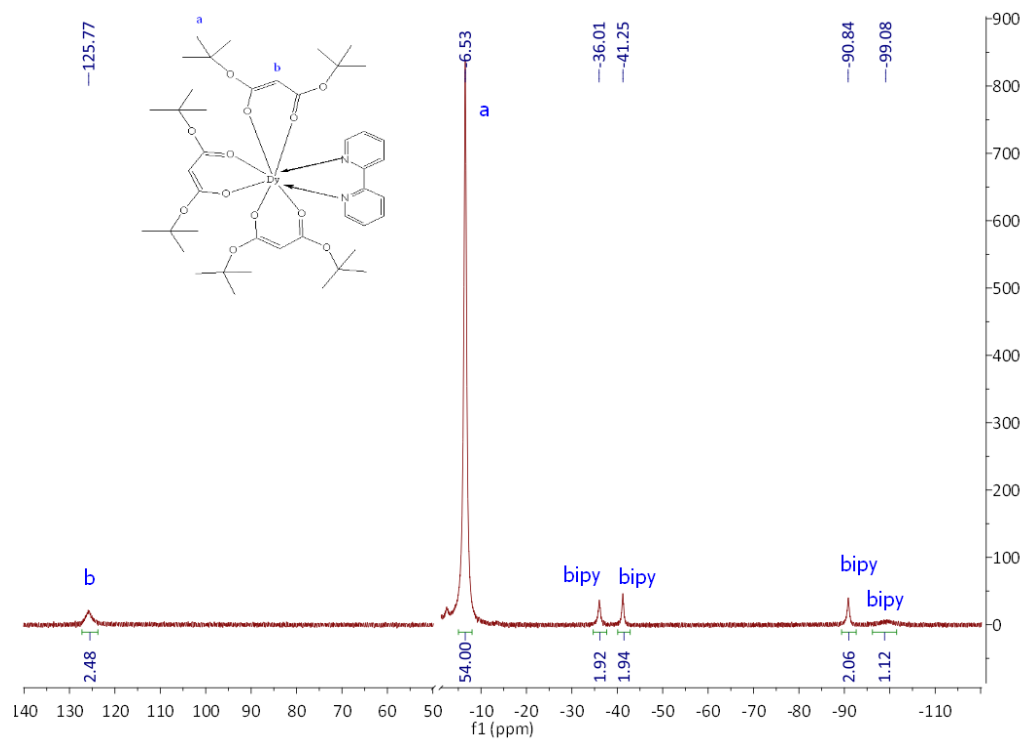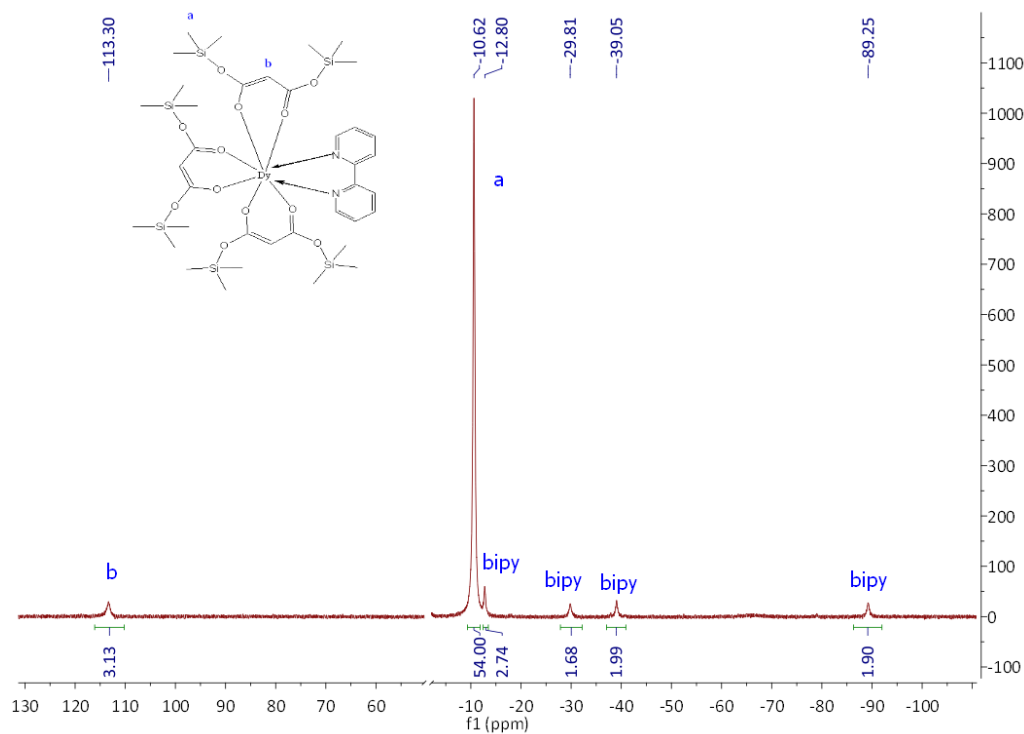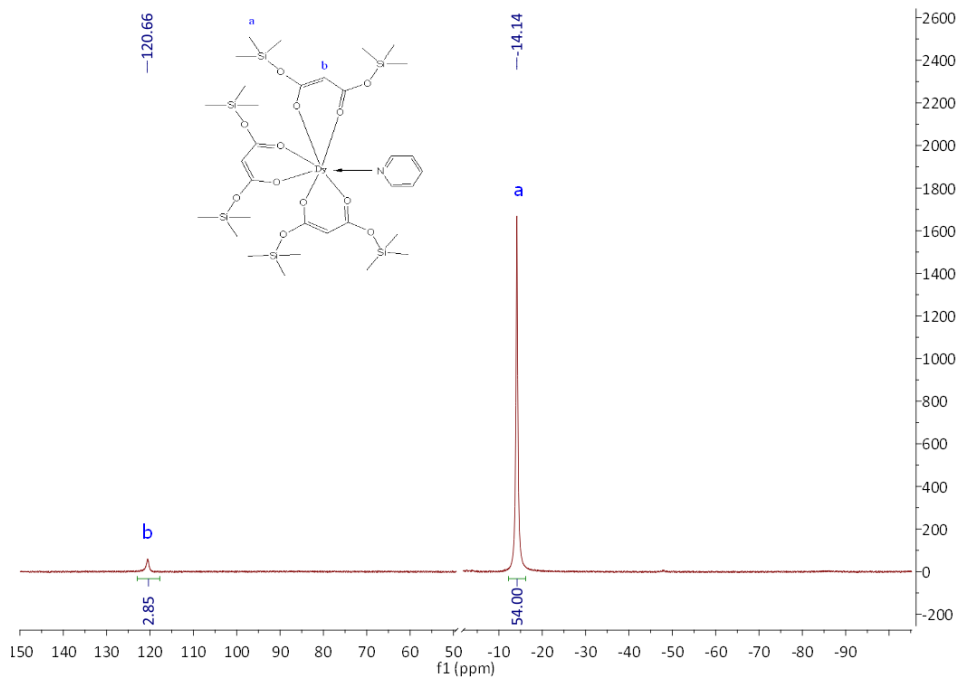**SI 8.** ^{1}H-NMR spectra of [Dy(deml)$_3$bipy] (**6**) (250 MHz, toluene-d8, RT).
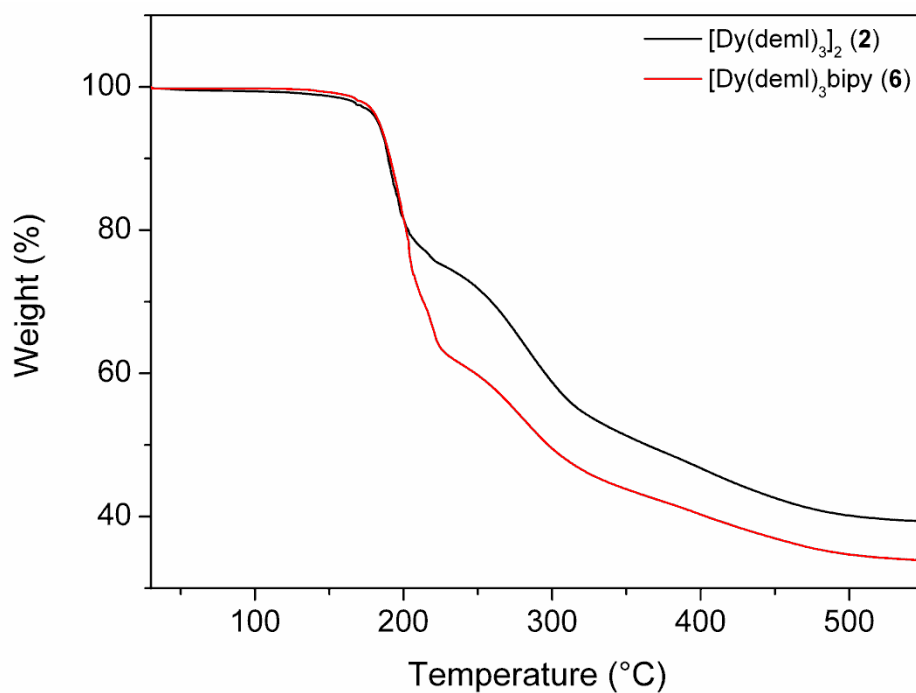
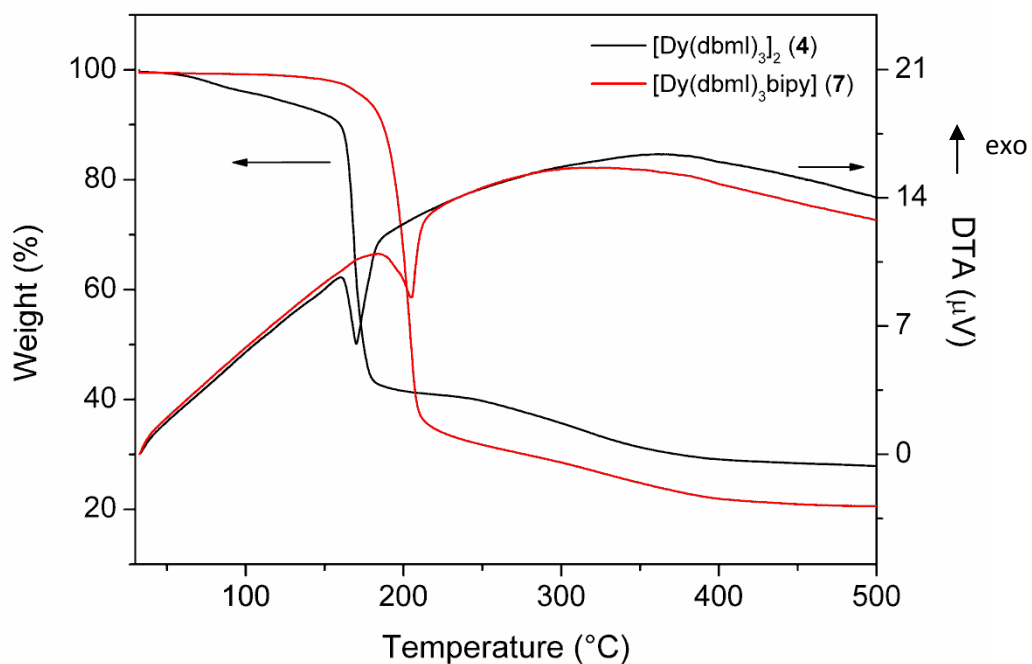**SI 9.** ^{1}H-NMR spectra of [Dy(dbml)$_3$bipy] (**7**) (250 MHz, toluene-d8, RT).

SI 10. ^{1}H-NMR spectra of [Dy(dsml)$_3$bipy] (**8**) (250 MHz, toluene-d8, RT).
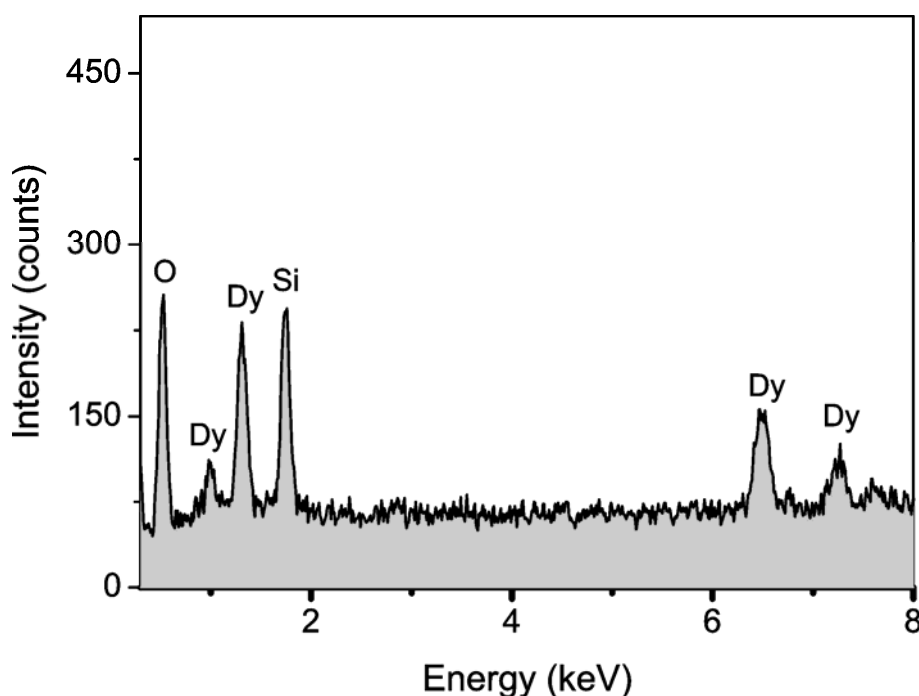
SI 11. ^{1}H-NMR spectra of [Dy(dsml)$_3$py] (**9**) (250 MHz, toluene-d8, RT).

SI 12. TGA curves of compounds **2** and **6** (heating rate = 5 °C/min; N$_2$ fow = 300 ml/min).

SI 13. TGA/DTA curves of compounds **4** and **7** (heating rate = 5 °C/min; N_2 fow = 300 ml/min). The DTA peaks at 165 °C and 205 °C correspond to the onset of decomposition of compounds **4** and **7**, respectively.

SI 14. EDX spectrum of $Dy_xSi_yO_z$ film deposited by LI-MOCVD at 600 °C using [Dy(dsml)$_3$bipy] (**8**) as precursor.