

Figure S1: <sup>1</sup>H NMR spectrum of N-Methyldiethanethiolamine ligand in CDCl<sub>3</sub>.

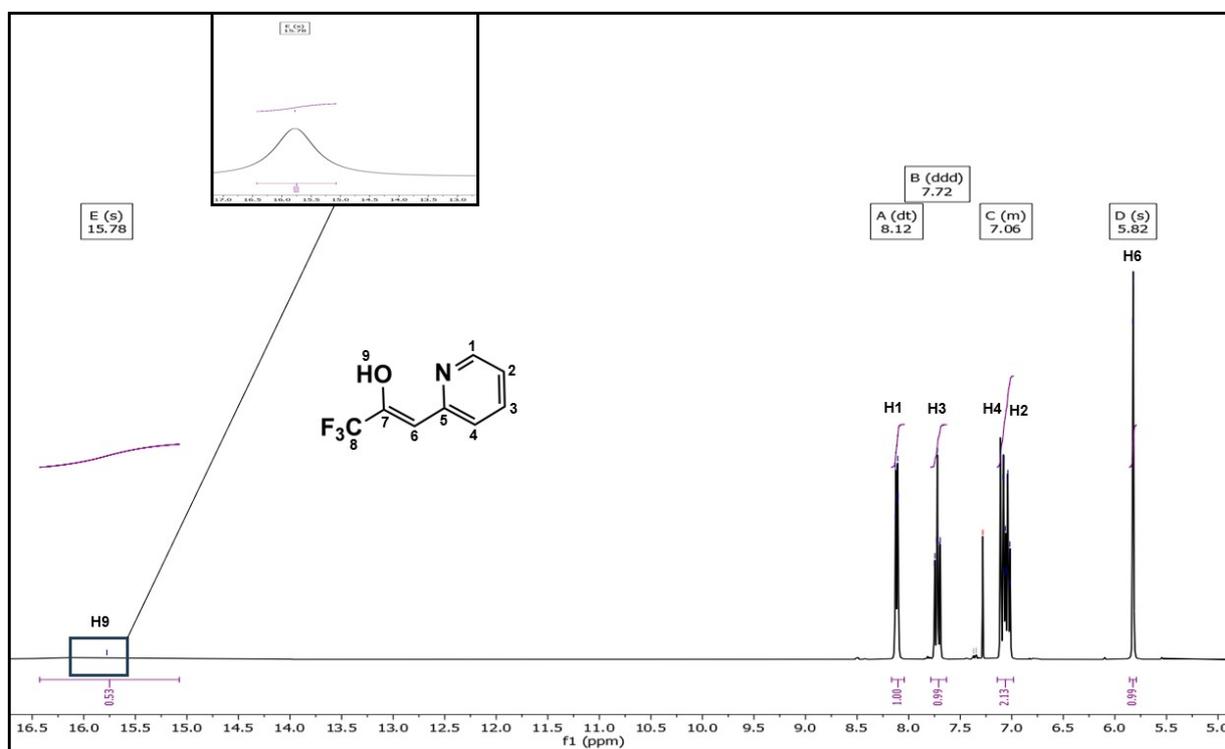
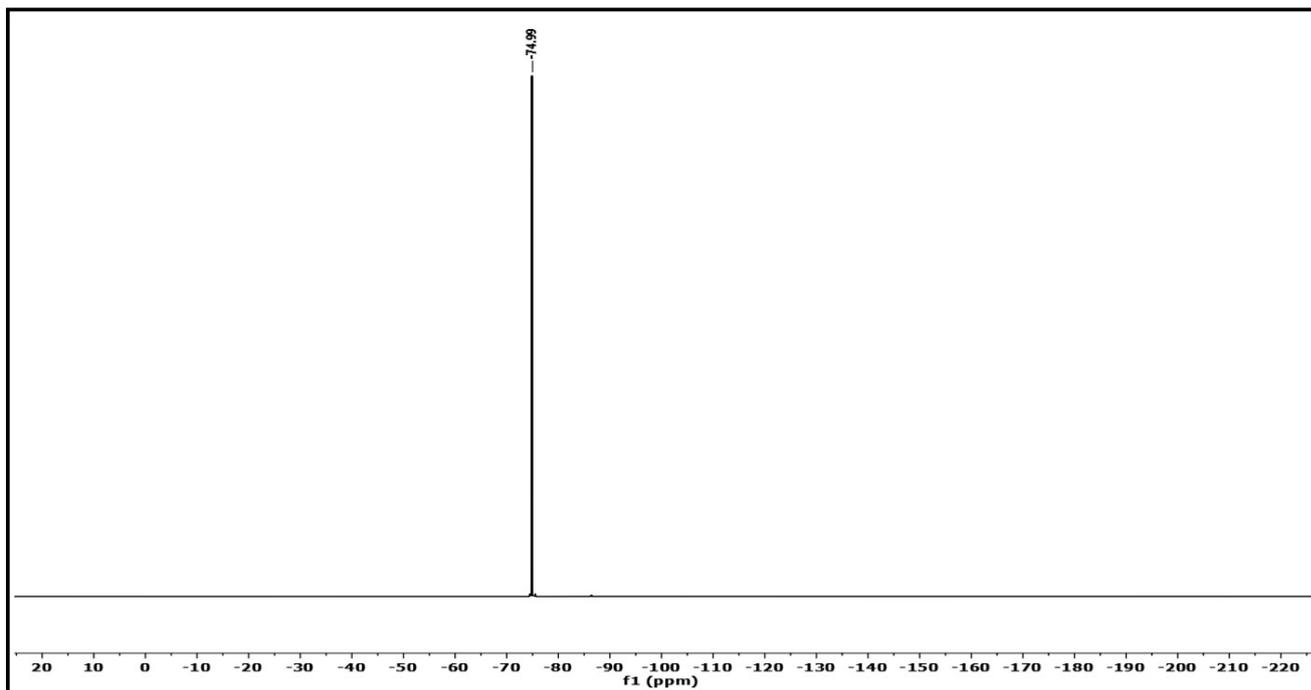
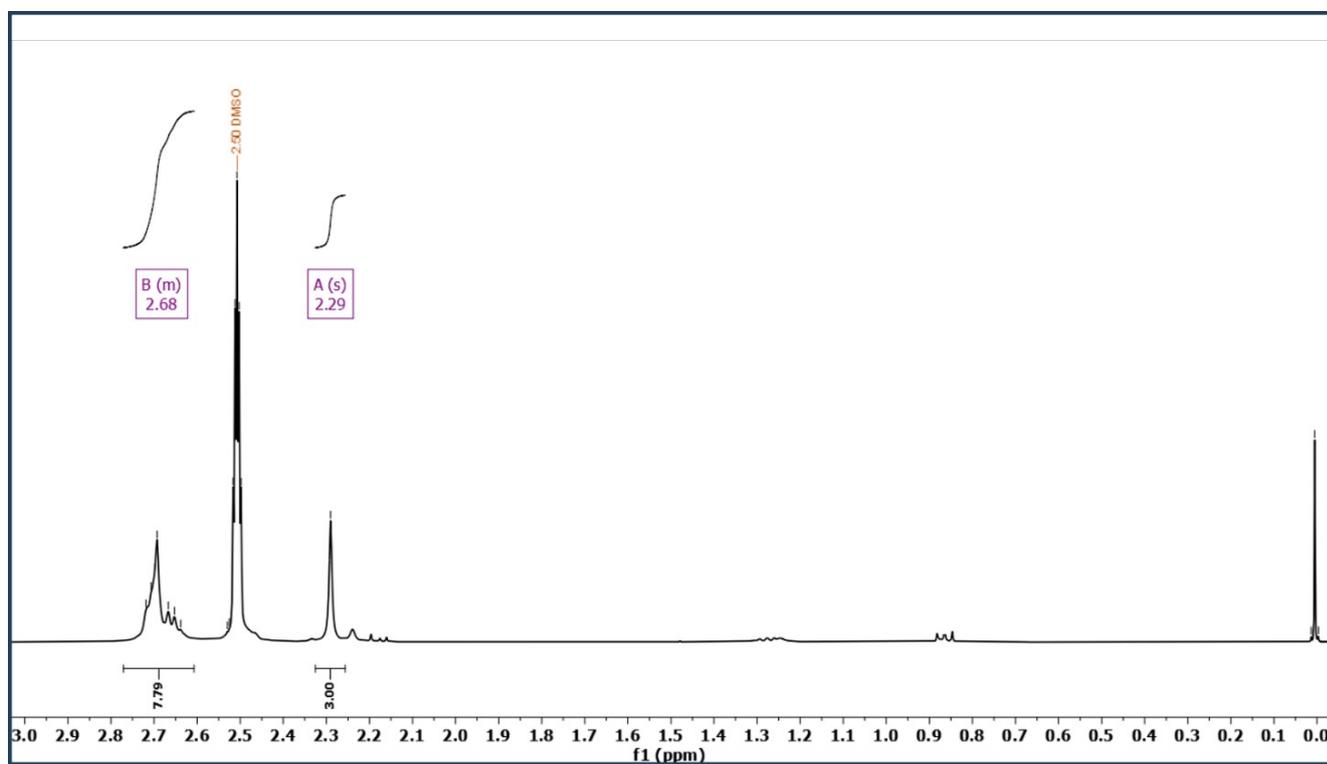


Figure S2: <sup>1</sup>H NMR spectrum of β-heteroarylalkenol ligand in CDCl<sub>3</sub>.



**Figure S3:**  $^{19}\text{F}$  NMR spectrum of  $\beta$ -heteroarylalkenol ligand in  $\text{CDCl}_3$ .



**Figure S4:**  $^1\text{H}$  NMR spectrum of **[1]** recorded in  $\text{DMSO-d}_6$  (Bruker-600 MHz).

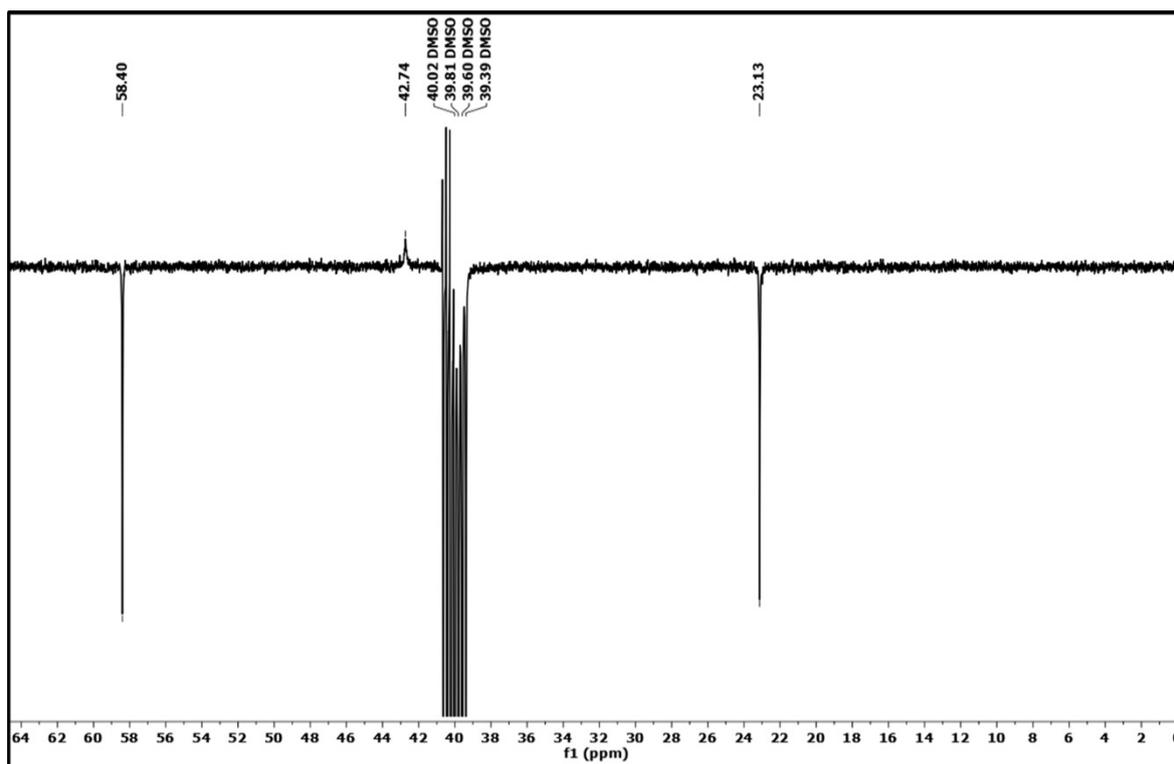


Figure S5:  $^{13}\text{C}$  ( $^1\text{H}$ )DEPTQ-135 spectrum of **[1]** recorded in DMSO- $d_6$  (Bruker-600 MHz).

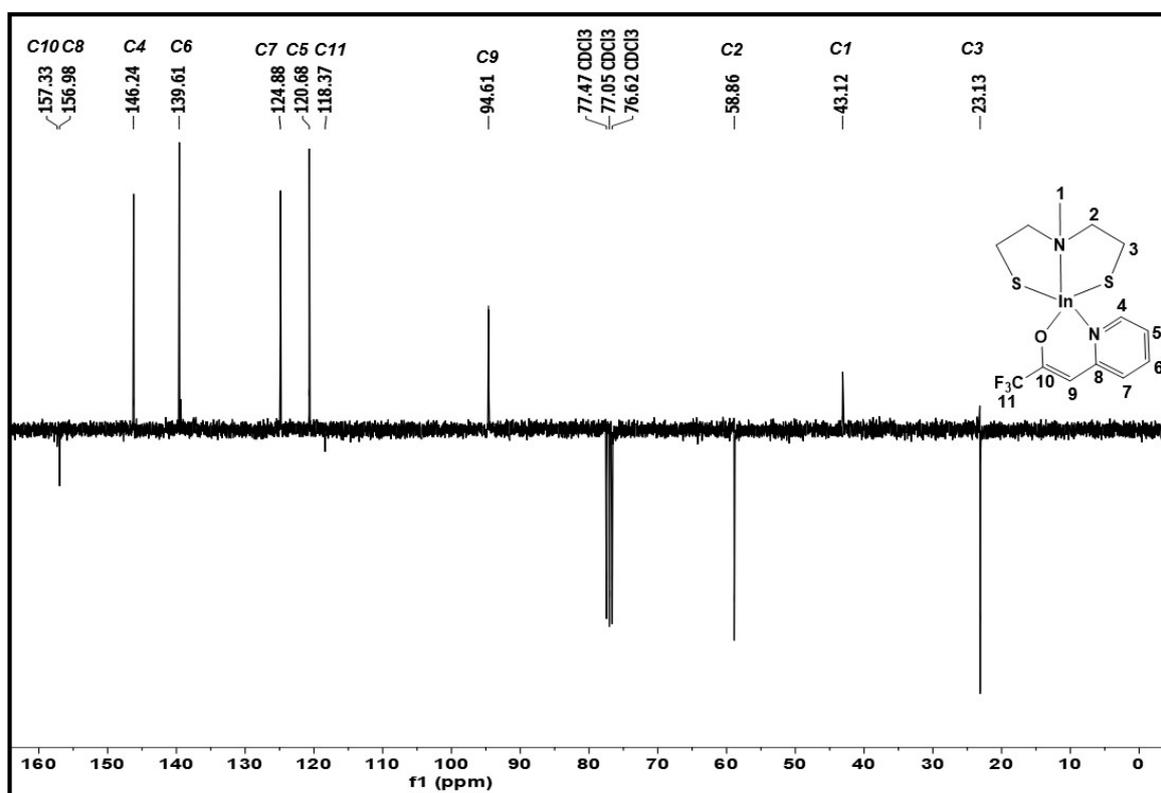
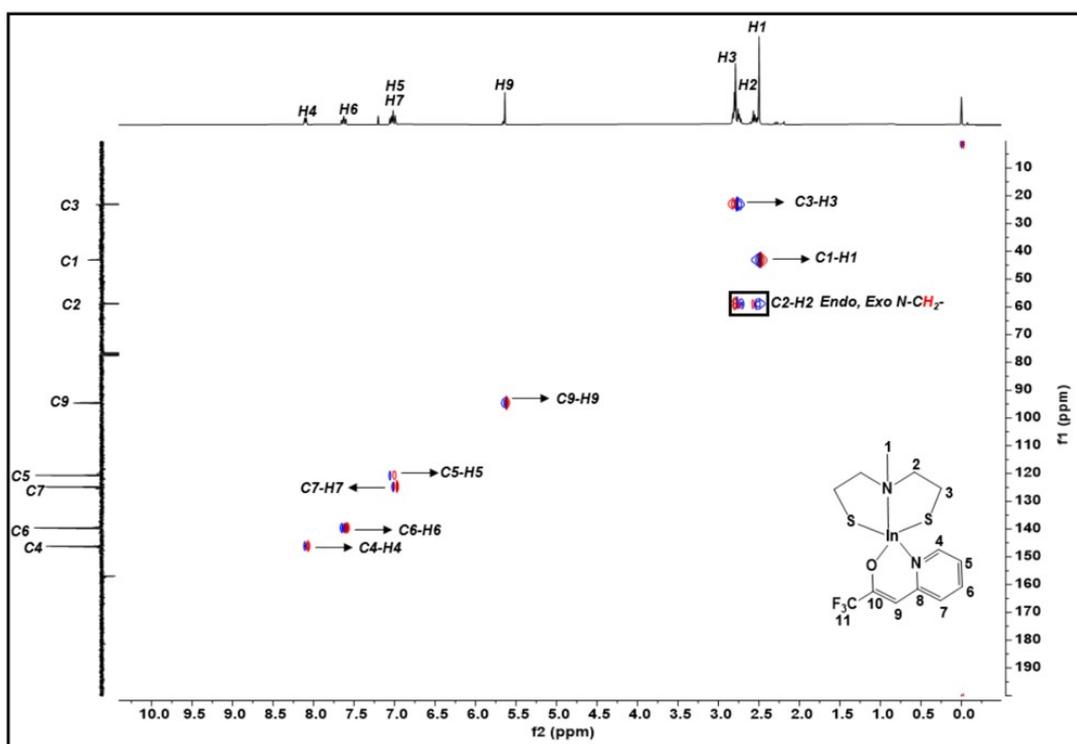
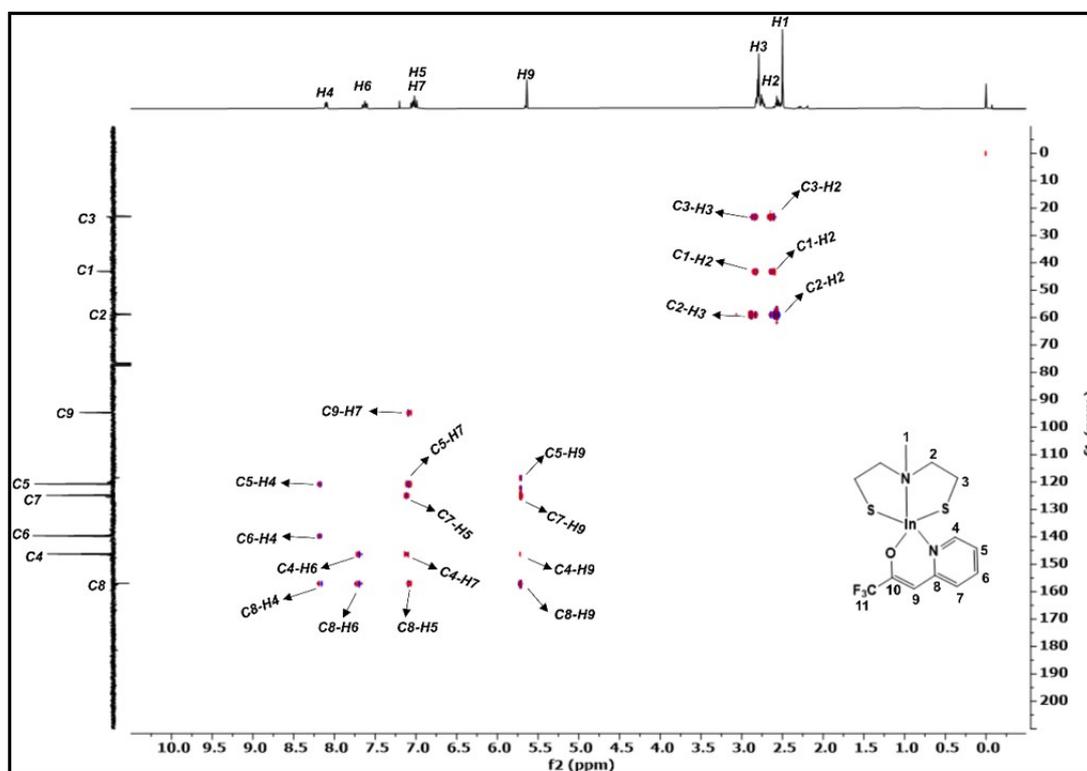


Figure S6:  $^{13}\text{C}$  ( $^1\text{H}$ )DEPTQ-135 NMR spectrum of **[2]** recorded in  $\text{CDCl}_3$ .



**Figure S7:**  $^1\text{H}$ - $^{13}\text{C}$  Heteronuclear multiple quantum coherence (HMQC) spectrum of **[2]** at room temperature in  $\text{CDCl}_3$ .



**Figure S8:**  $^1\text{H}$ - $^{13}\text{C}$  heteronuclear multiple bond correlation (HMBC) spectrum of **[2]** at room temperature recorded in  $\text{CDCl}_3$ .

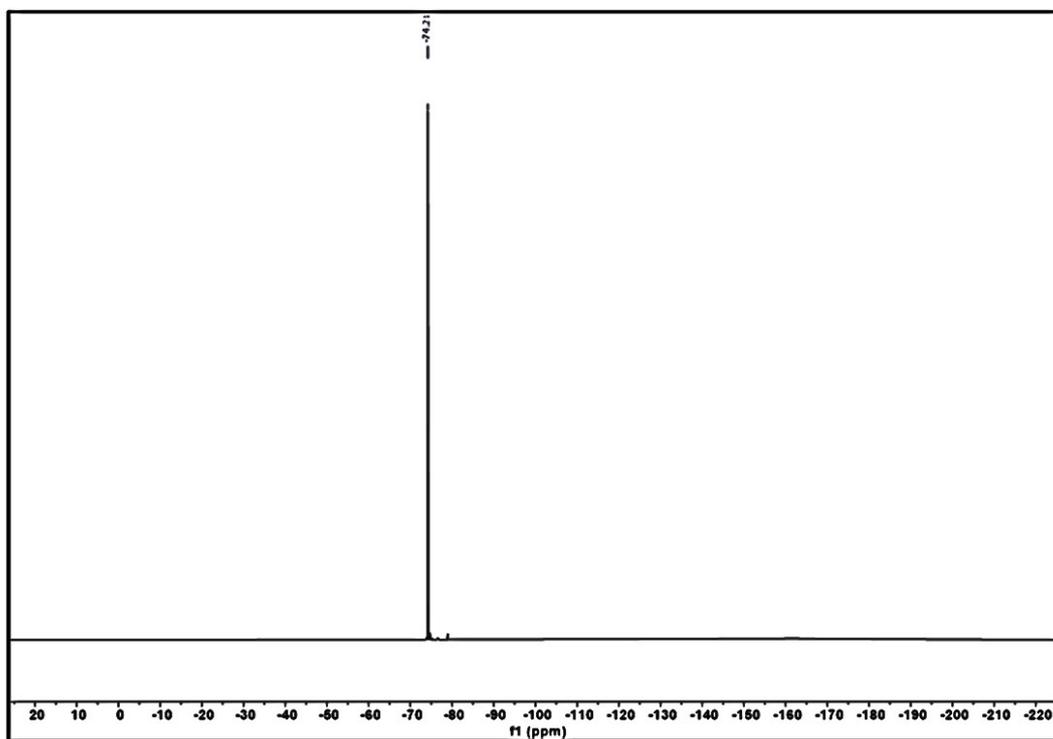


Figure S9:  $^{19}\text{F}$  NMR spectrum of **[2]** recorded in  $\text{CDCl}_3$ .

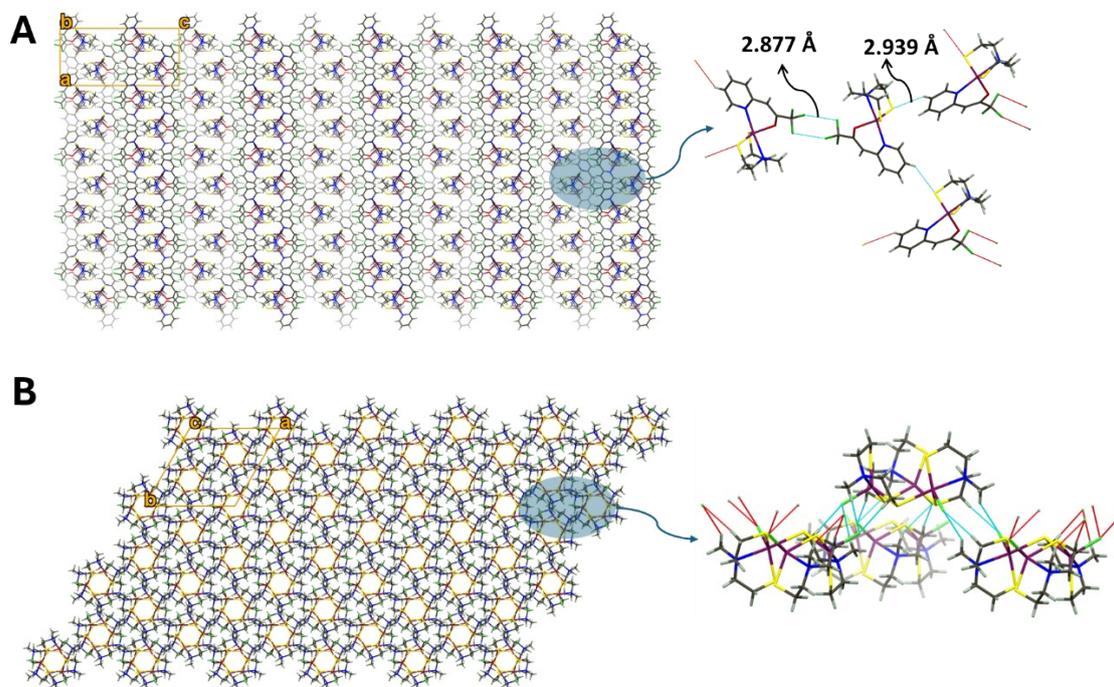


Figure S10: A) Packing of **[2]** along the crystallographic b axis, and B) Packing of **[1]** along the c axis.

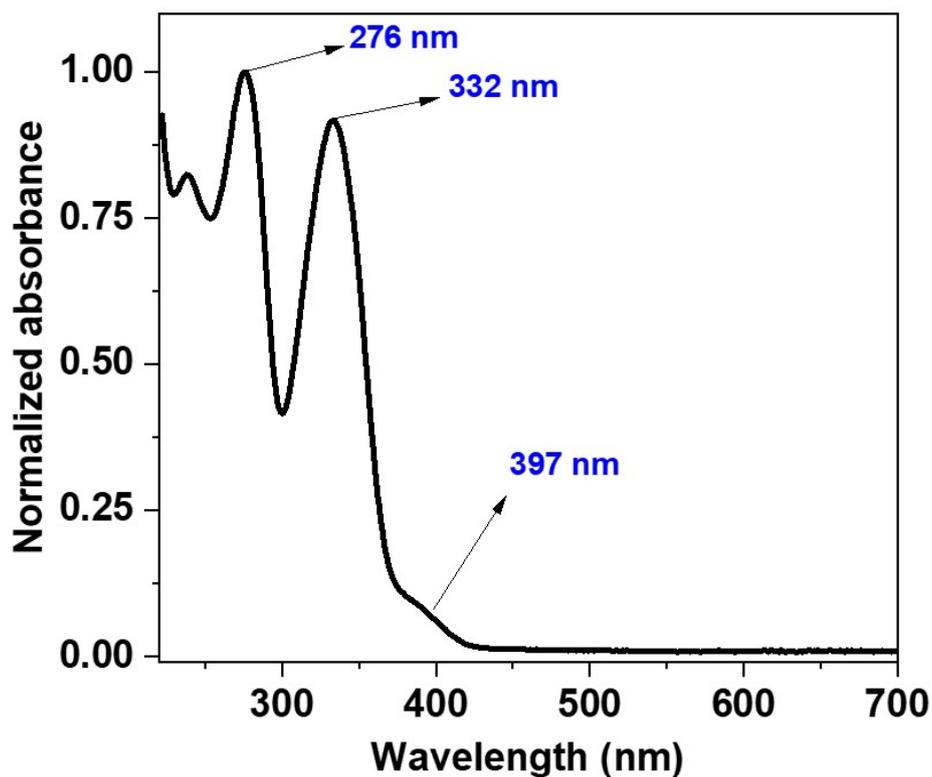


Figure S11: Absorption spectrum of complex [2] in CH<sub>3</sub>CN as solvent at room temperature.

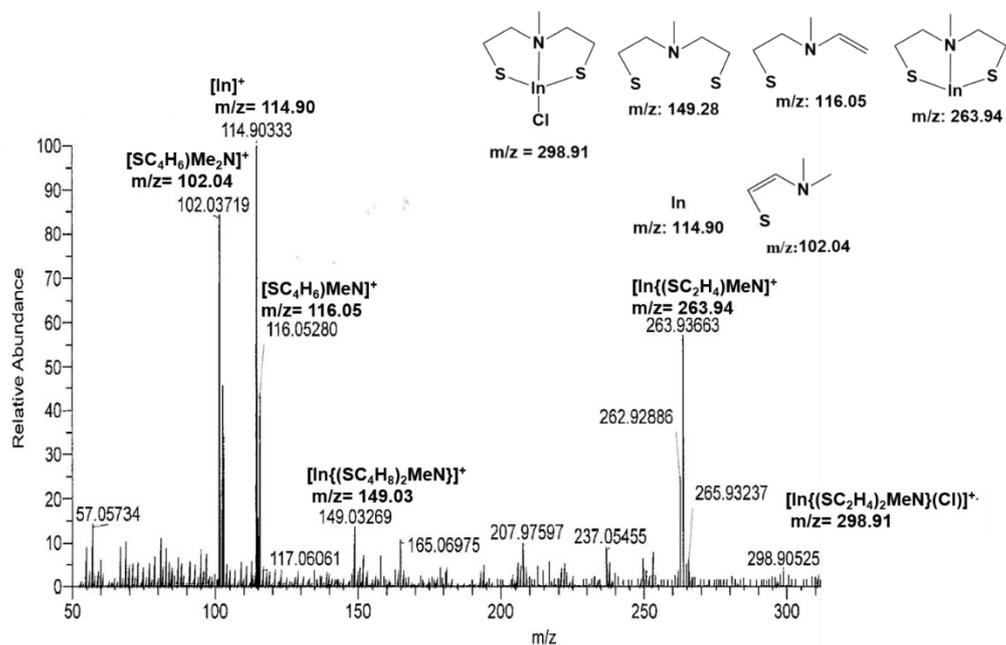
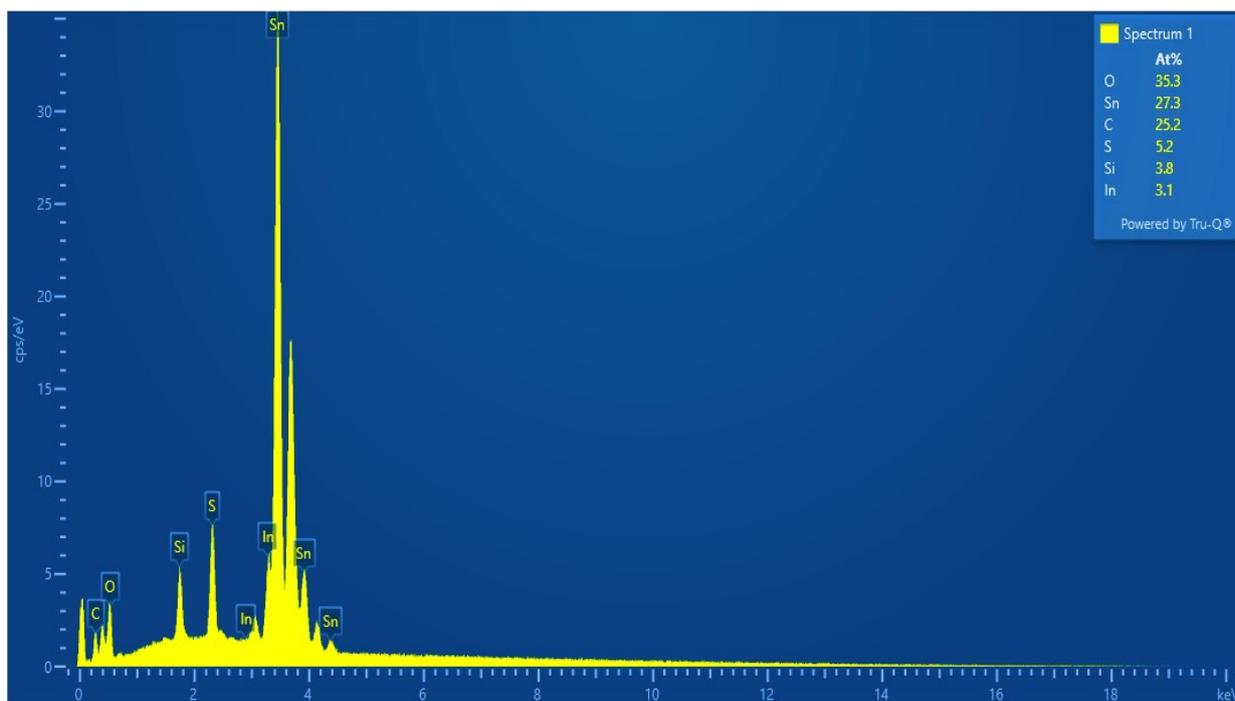
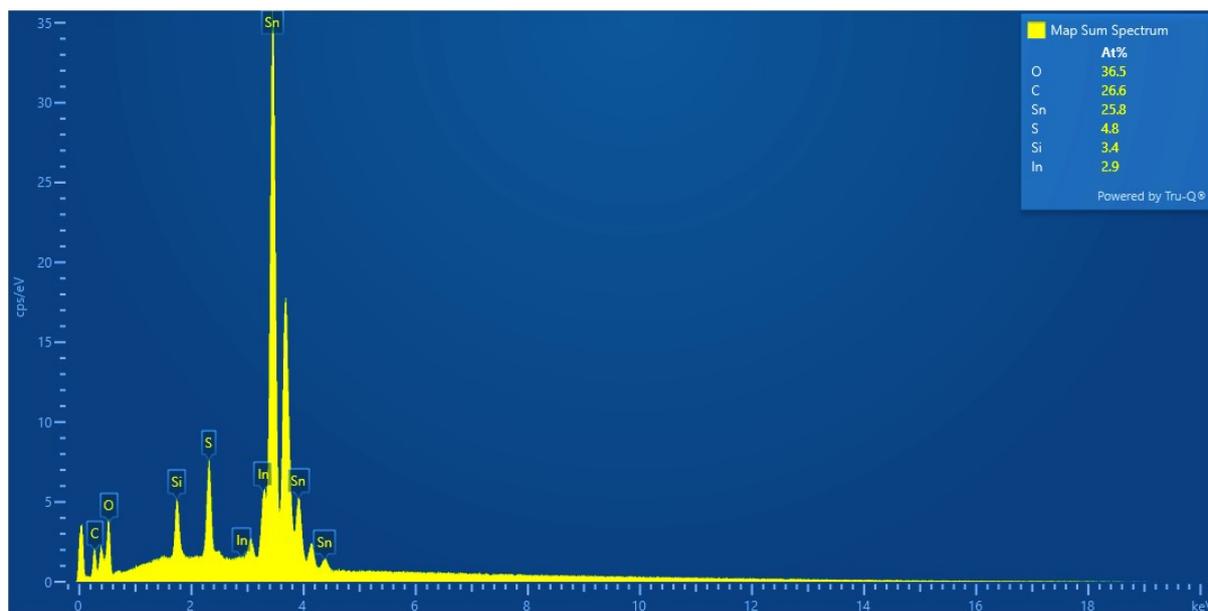


Figure S12: EI mass spectrum (70eV) of heteroleptic complex [1].

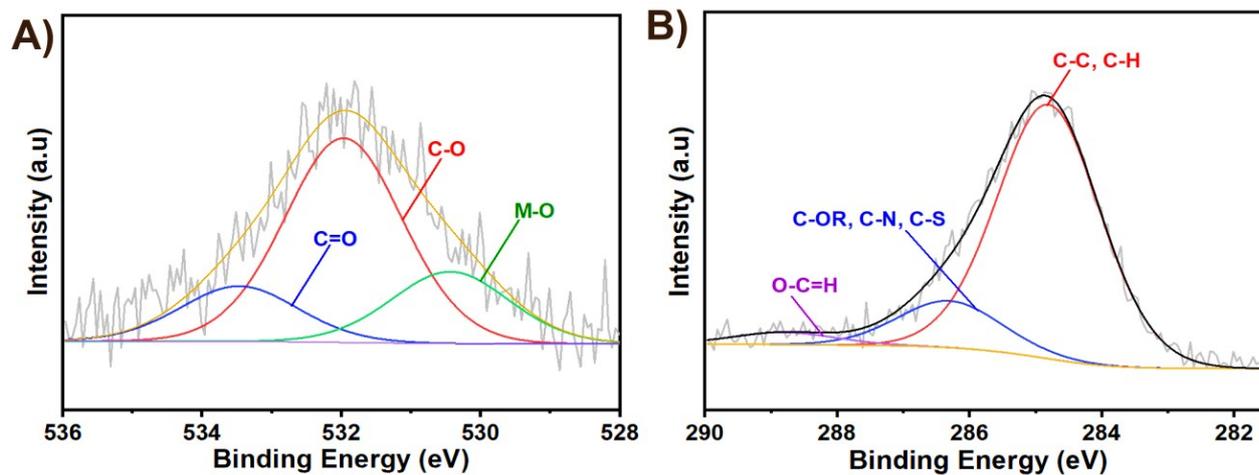




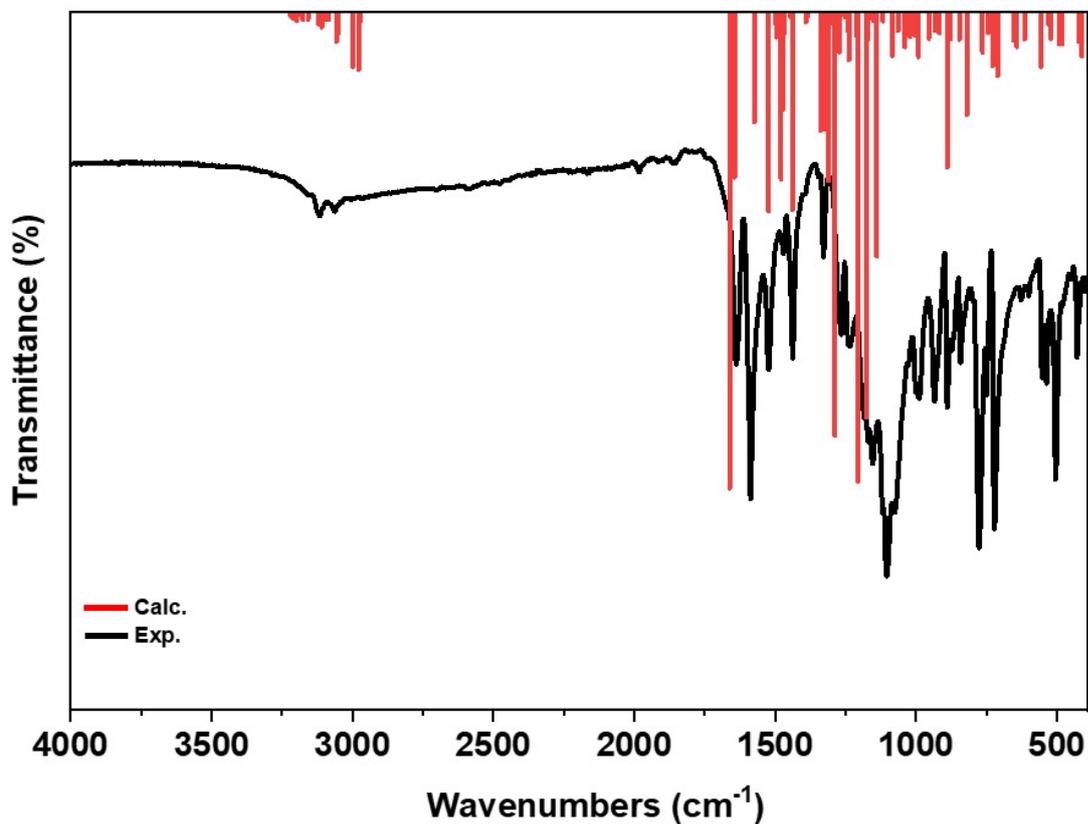
**Figure S16.** EDS mapping of the obtained  $\text{In}_2\text{S}_3$  CVD film from compound **[2]** (The stoichiometric ratio of In:S = 2:3.35).



**Figure S17.** Map sum spectrum of the obtained  $\text{In}_2\text{S}_3$  CVD film from compound **[2]** (stoichiometric ratio of In:S = 2:3.31).



**Figure S18.** High-resolution X-ray photoelectron spectra A) O 1s region B) C 1s region of CVD film from compound [2].



**Figure S19.** FT-IR spectra of [2] showing the experimental (black) and calculated (red).