Synthesis of Rare-Earth Metal Complexes Based on Quinolinyl-Functionalized Cyclopenta[*b*]Indoles and Their Catalytic Performance in the Polymerization of *Ortho*-Methoxystyrene and Its Derivates

Wentao Chen,[a] Feng-Yi Qiu,[a] Keyue Guo,[a] Yanhong Zhou,[a] Haoran Tian,[a] Hongfan Hu*[b] and Xiaochao Shi*[a]

[a]*Department of polymer Materials, School of Materials Science and Engineering, Shanghai University, Materials Building, Nanchen Street 333, Shanghai 200444, China*.

[b]*Petrochemical Research Institute, PetroChina, Block A42, Science Base Petro China, Shahe Town, Changping District, Beijing 102206, China.*

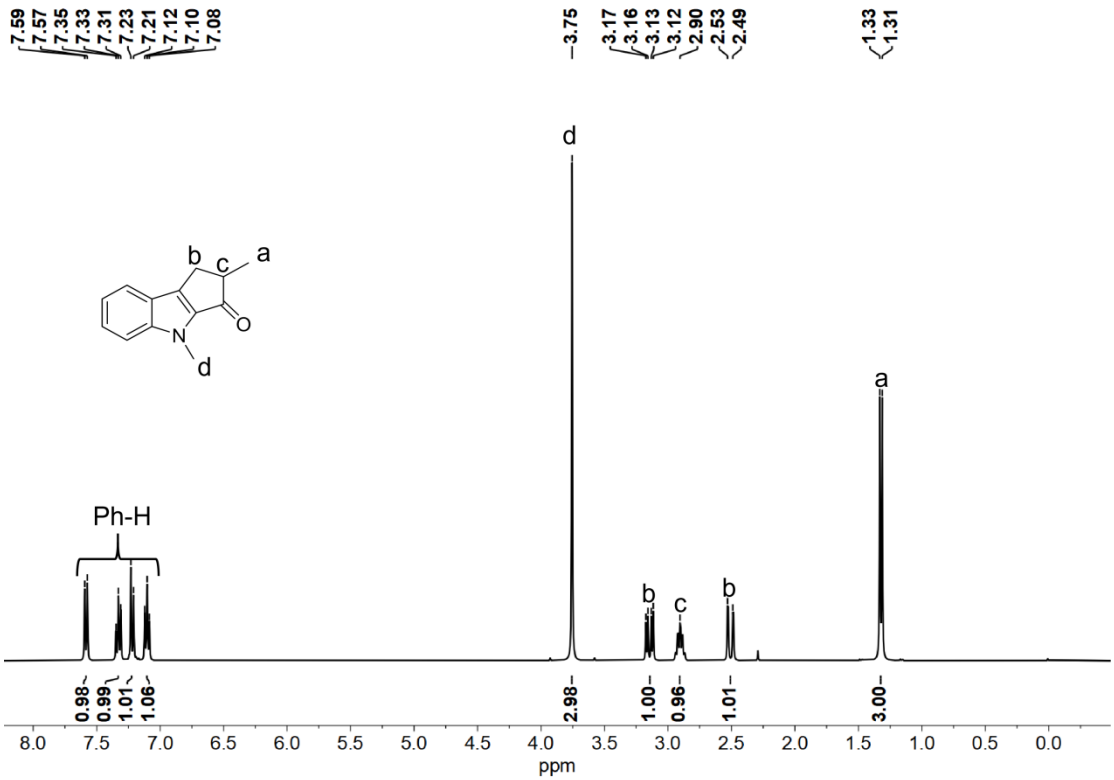


Figure S1 ^{1}H NMR spectrum of 2,4-dimethyl-1,4-dihydrocyclopenta[b]indol-3(2H)-one. (400 MHz, $CDCl_3$, 25 °C)

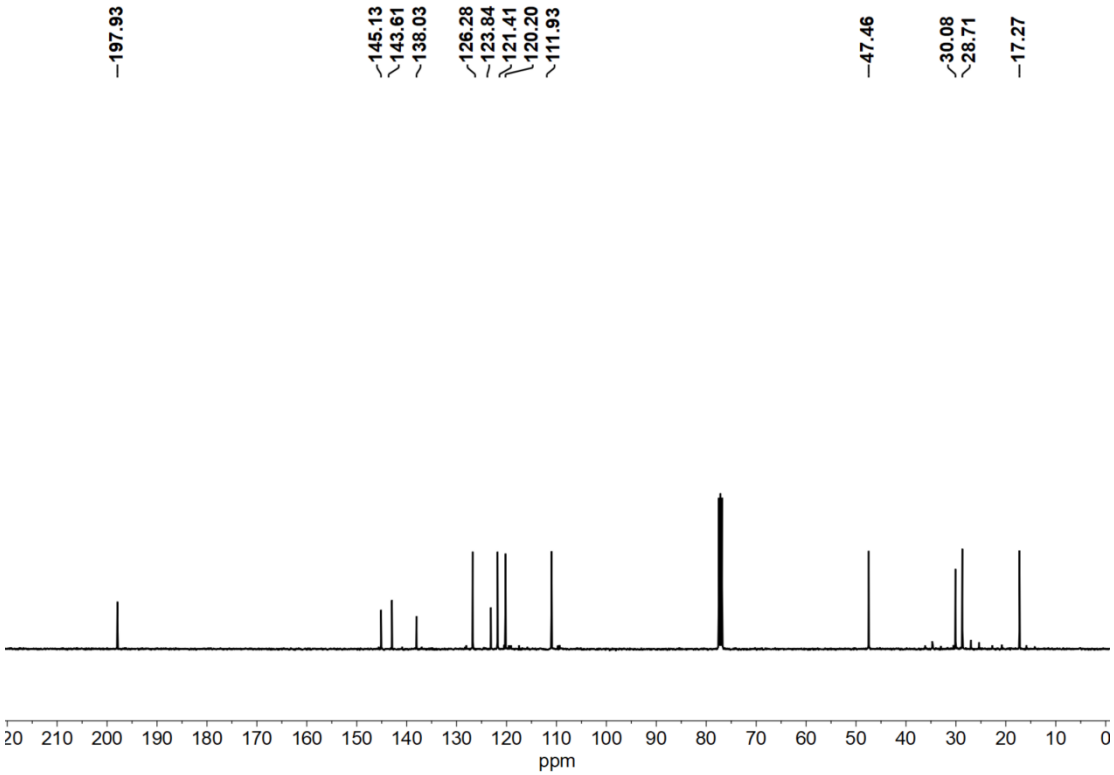


Figure S2 ^{13}C NMR spectrum of 2,4-dimethyl-1,4-dihydrocyclopenta[b]indol-3(2H)-one. (101 MHz, $CDCl_3$, 25 °C)

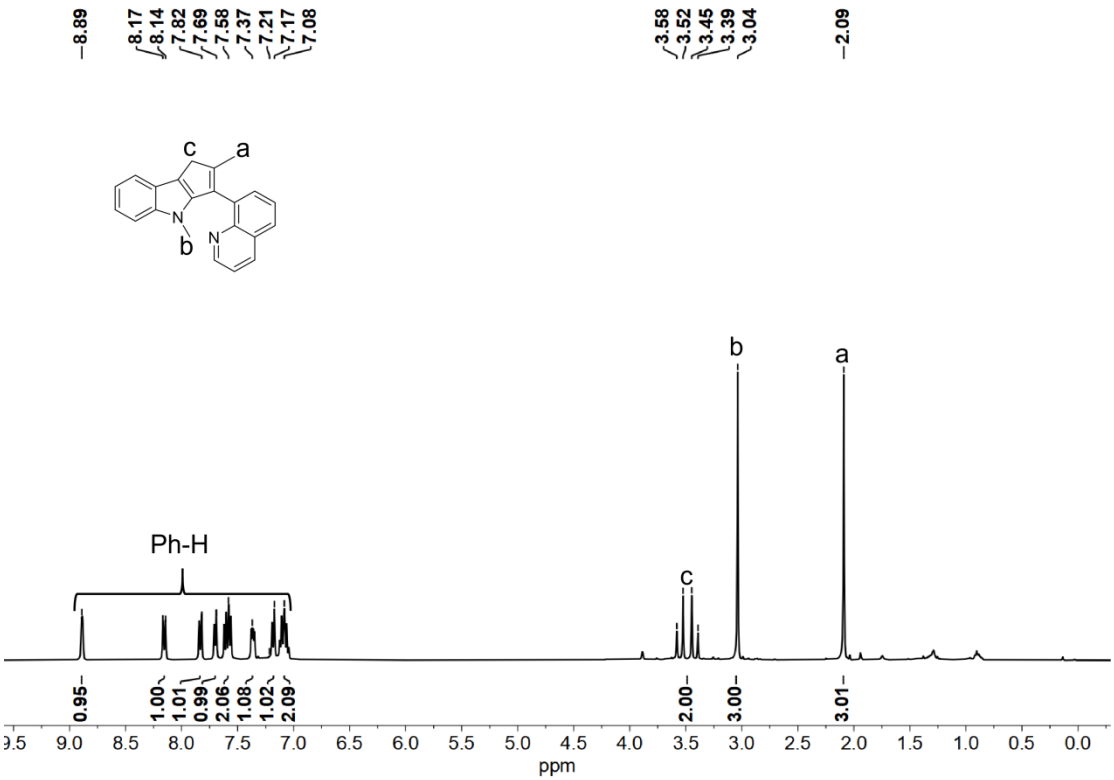


Figure S3 ^{1}H NMR spectrum of **L1H**. (400 MHz, $CDCl_3$, 25 °C)

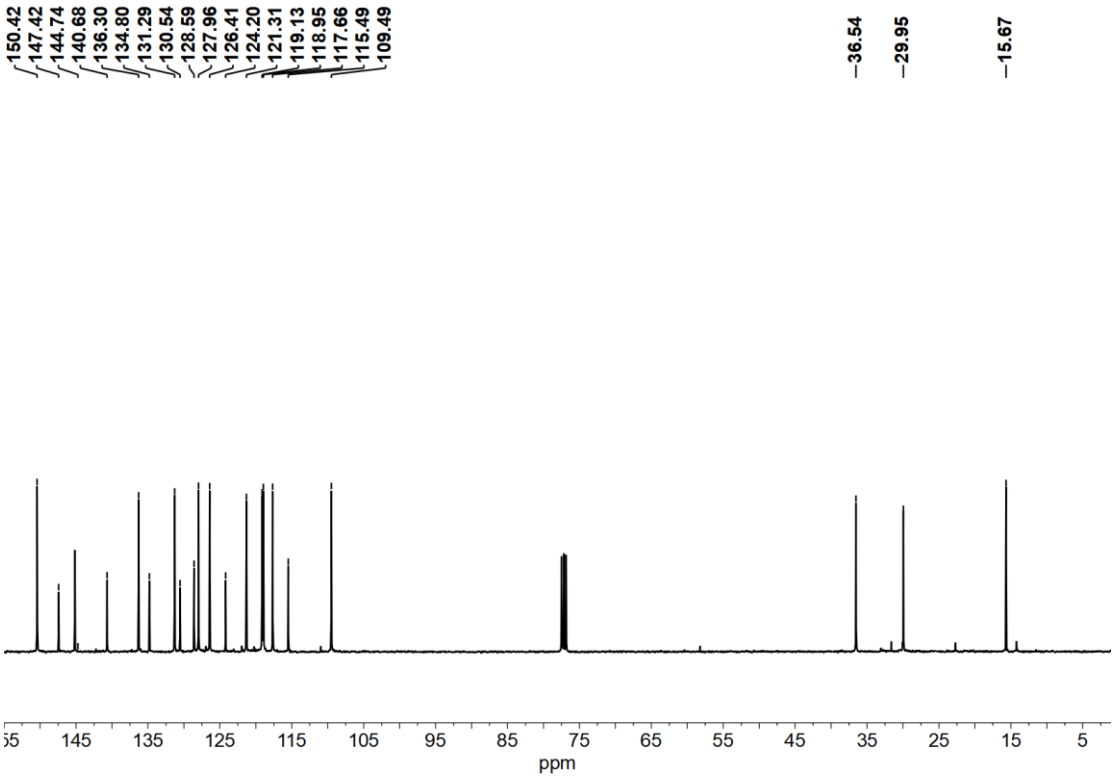


Figure S4 ^{13}C NMR spectrum of **L1H**. (100 MHz, $CDCl_3$, 25 °C)

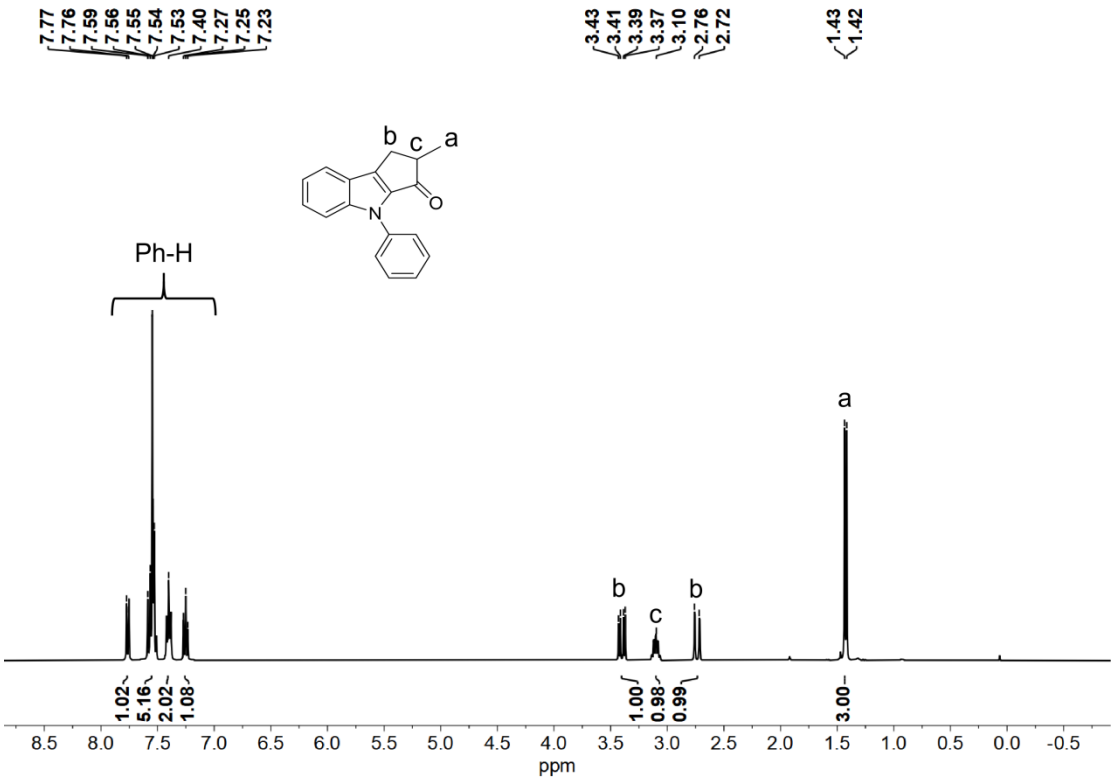


Figure S5 ^{1}H NMR spectrum of 2-methyl-4-phenyl-1,4-dihydrocyclopenta[b]indol-3(2H)-one. (400 MHz, $CDCl_3$, 25 °C)

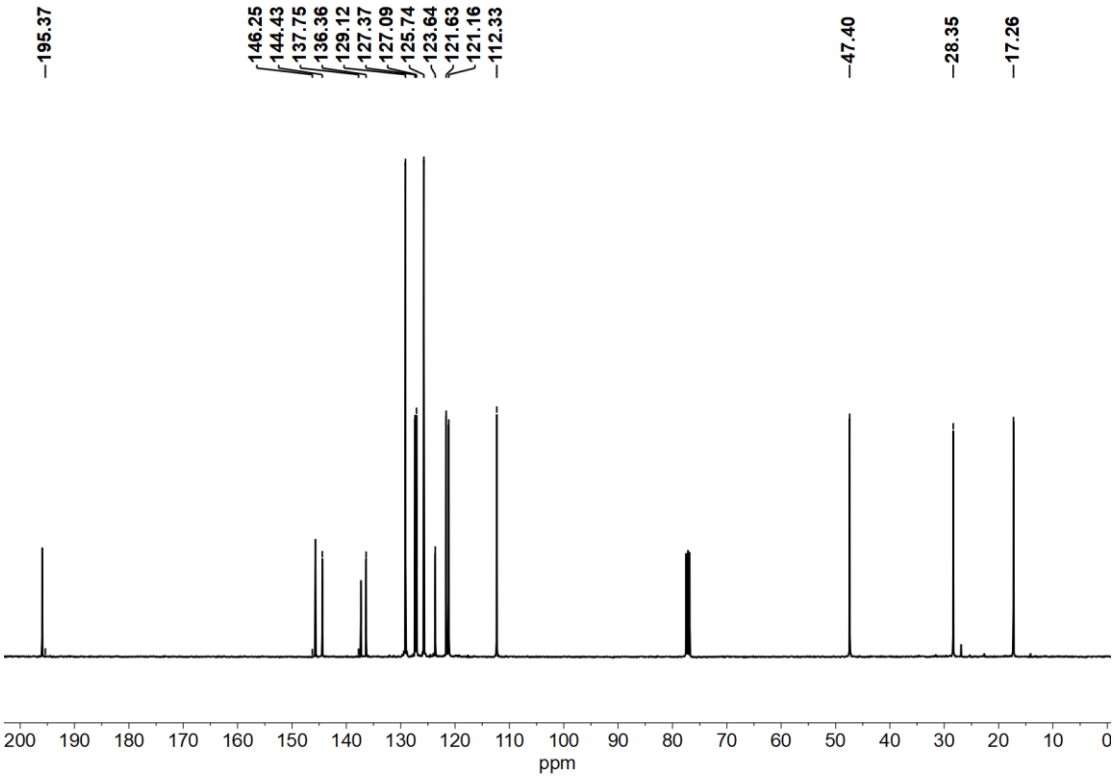


Figure S6 ^{13}C NMR spectrum of 2-methyl-4-phenyl-1,4-dihydrocyclopenta[b]indol-3(2H)-one . (101 MHz, $CDCl_3$, 25 °C)

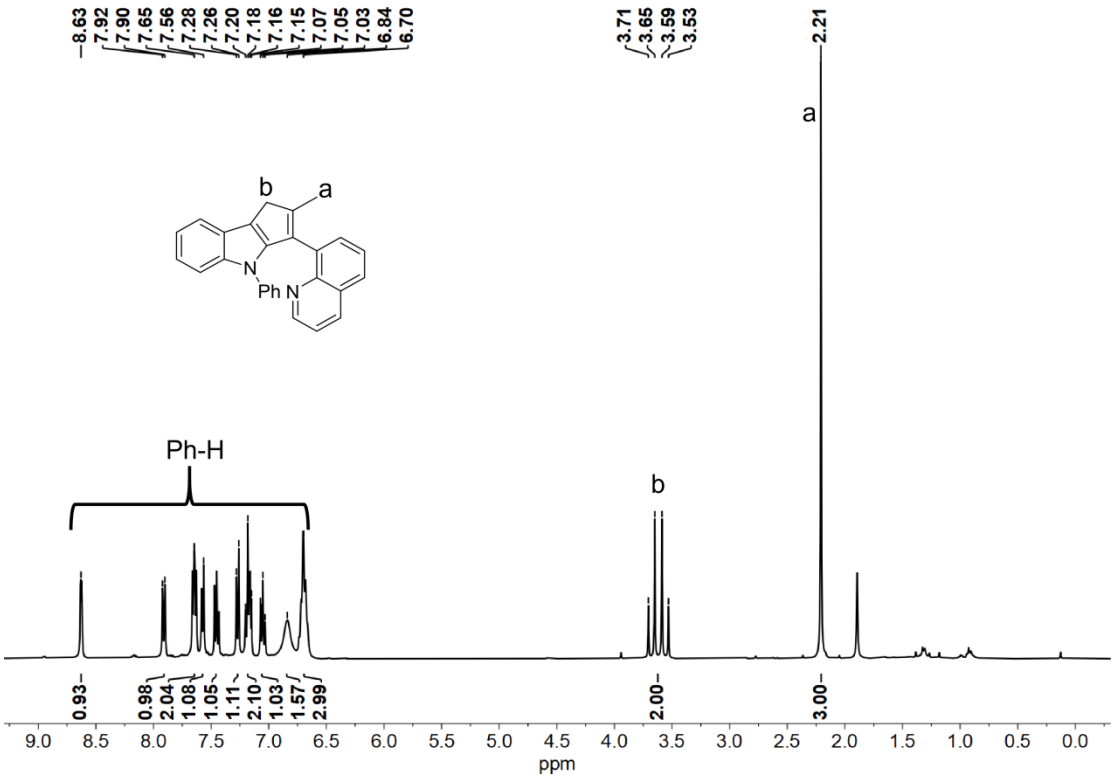


Figure S7 ^{1}H NMR spectrum of **L2H**. (400 MHz, $CDCl_3$, 25 °C)

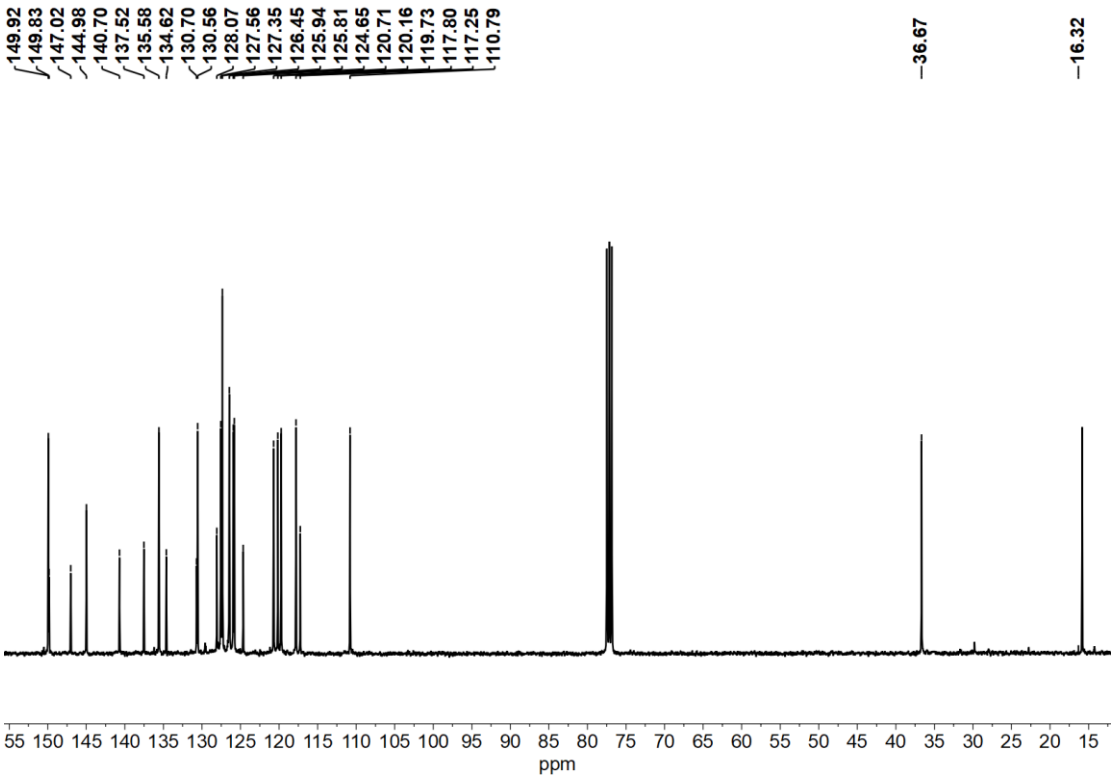


Figure S8 ^{13}C NMR spectrum of **L2H**. (100 MHz, $CDCl_3$, 25 °C)

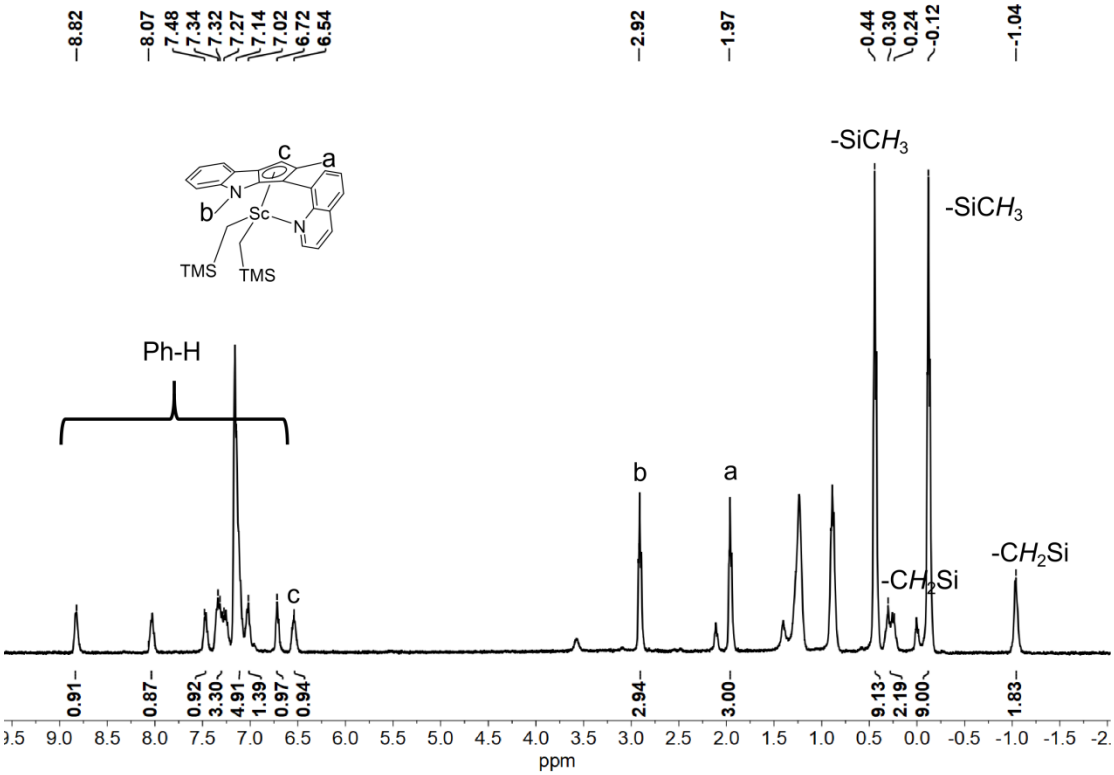


Figure S9 ^{1}H NMR spectrum of **1-Sc**. (400 MHz, C_6D_6, 25 °C)

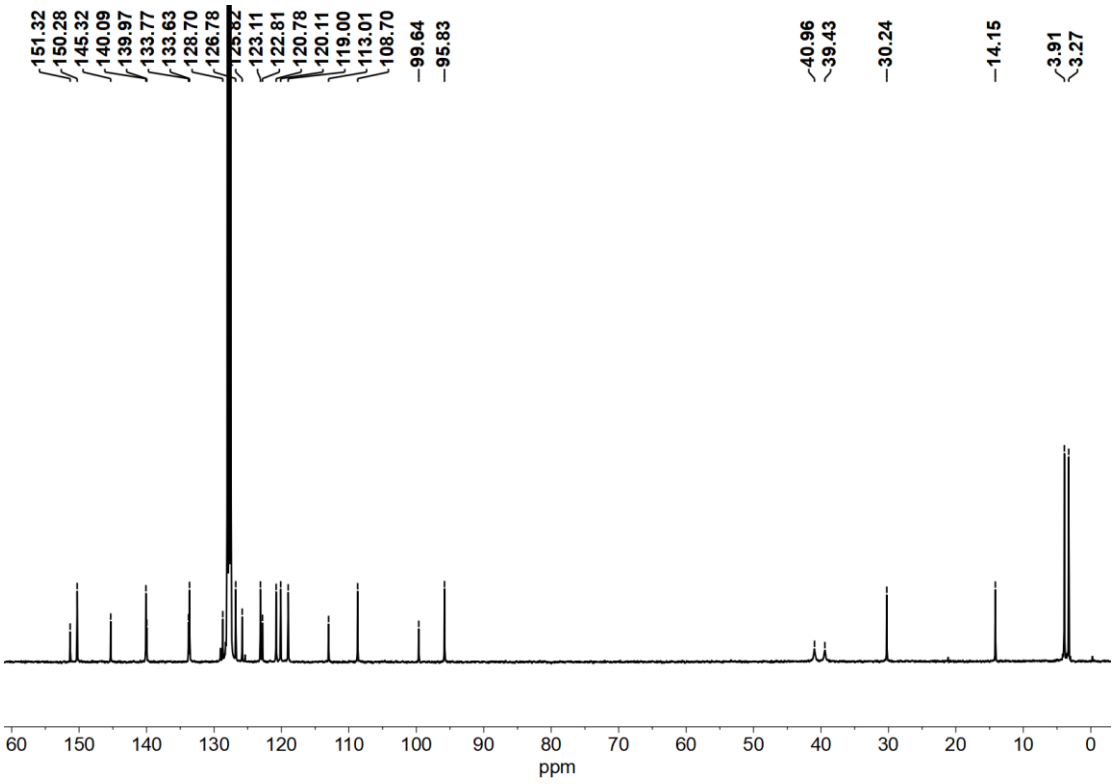


Figure S10 ^{13}C NMR spectrum of **1-Sc**. (100 MHz, C_6D_6, 25 °C)

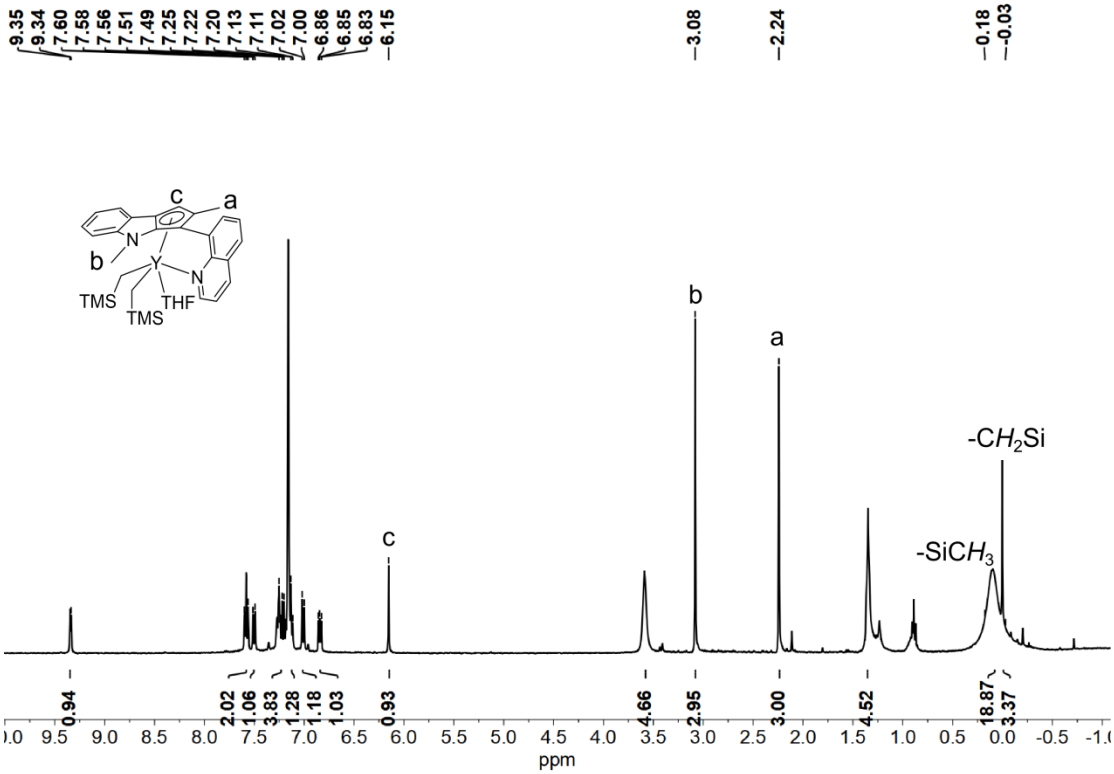


Figure S11 ^{1}H NMR spectrum of **1-Y**. (400 MHz, C_6D_6, 25 °C)

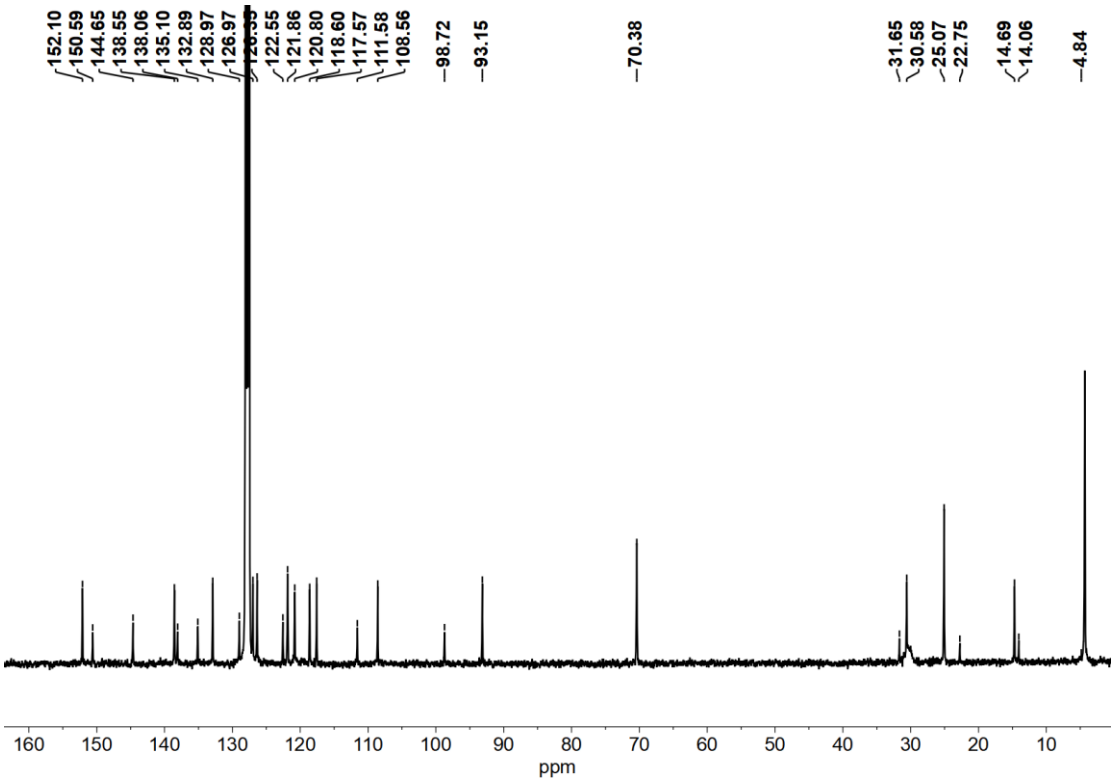


Figure S12 ^{13}C NMR spectrum of **1-Y**. (100 MHz, C_6D_6, 25 °C)

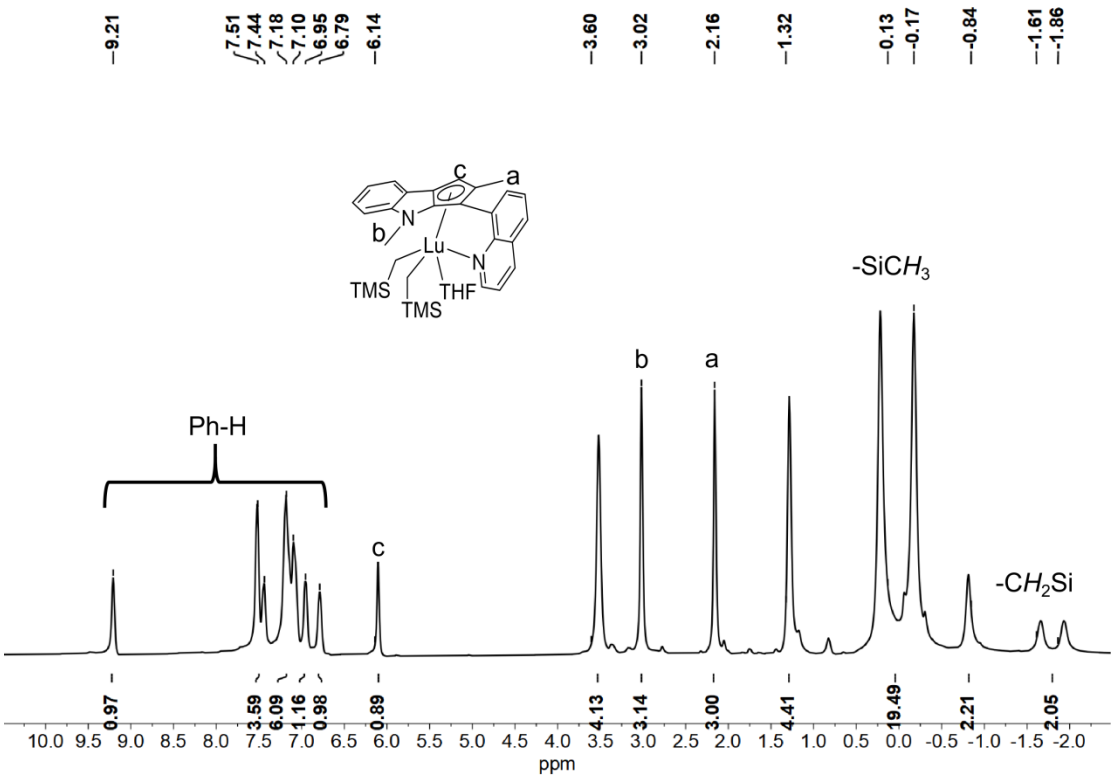


Figure S13 ^{1}H NMR spectrum of **1-Lu**. (400 MHz, C_6D_6, 25 °C)

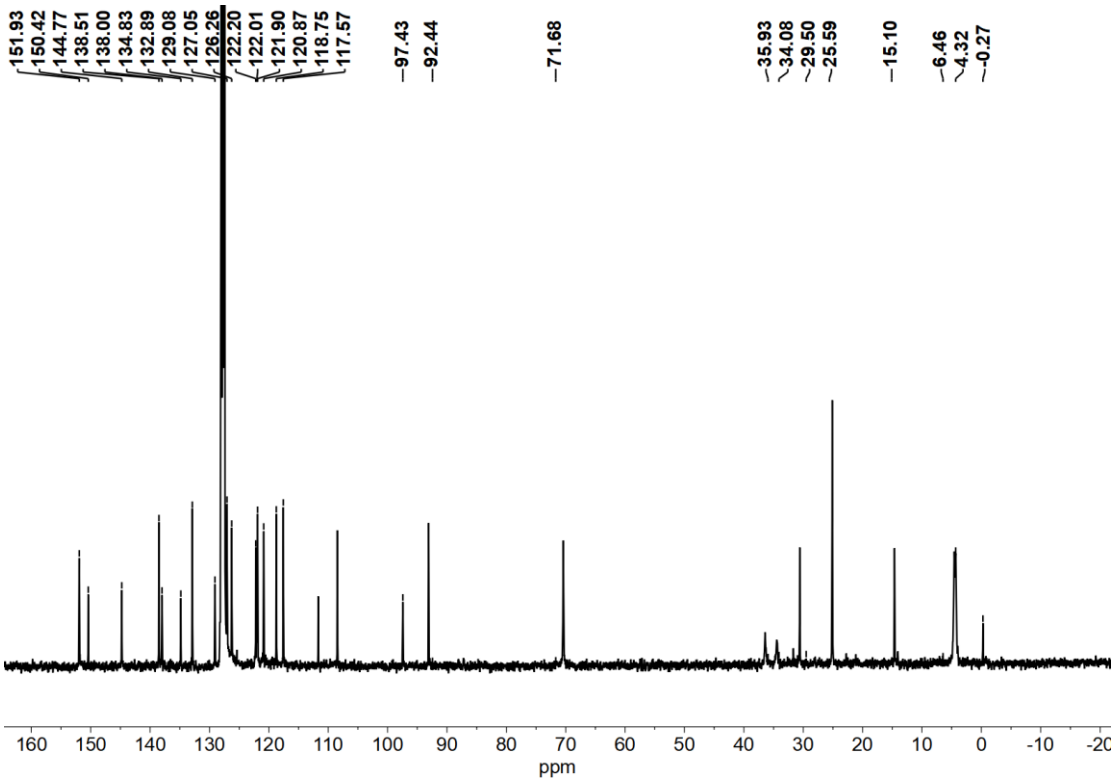


Figure S14 ^{13}C NMR spectrum of **1-Lu**. (100 MHz, C_6D_6, 25 °C)

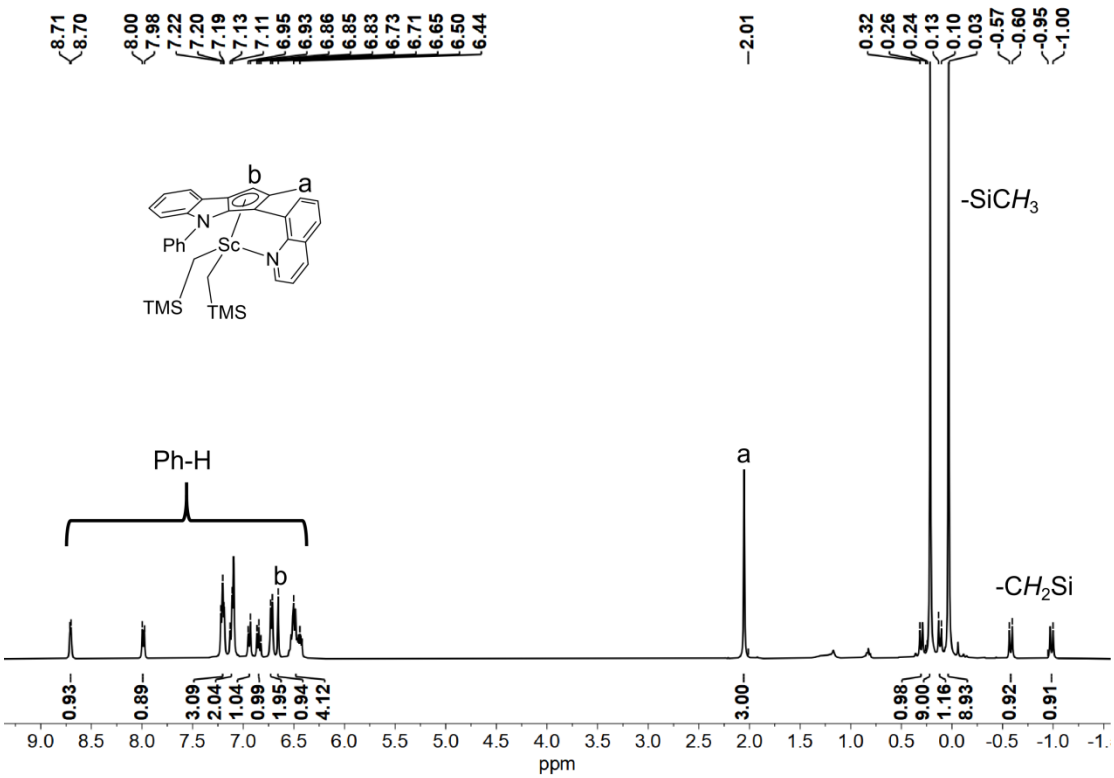


Figure S15 ^{1}H NMR spectrum of **2-Sc**. (400 MHz, C_6D_6, 25 °C)

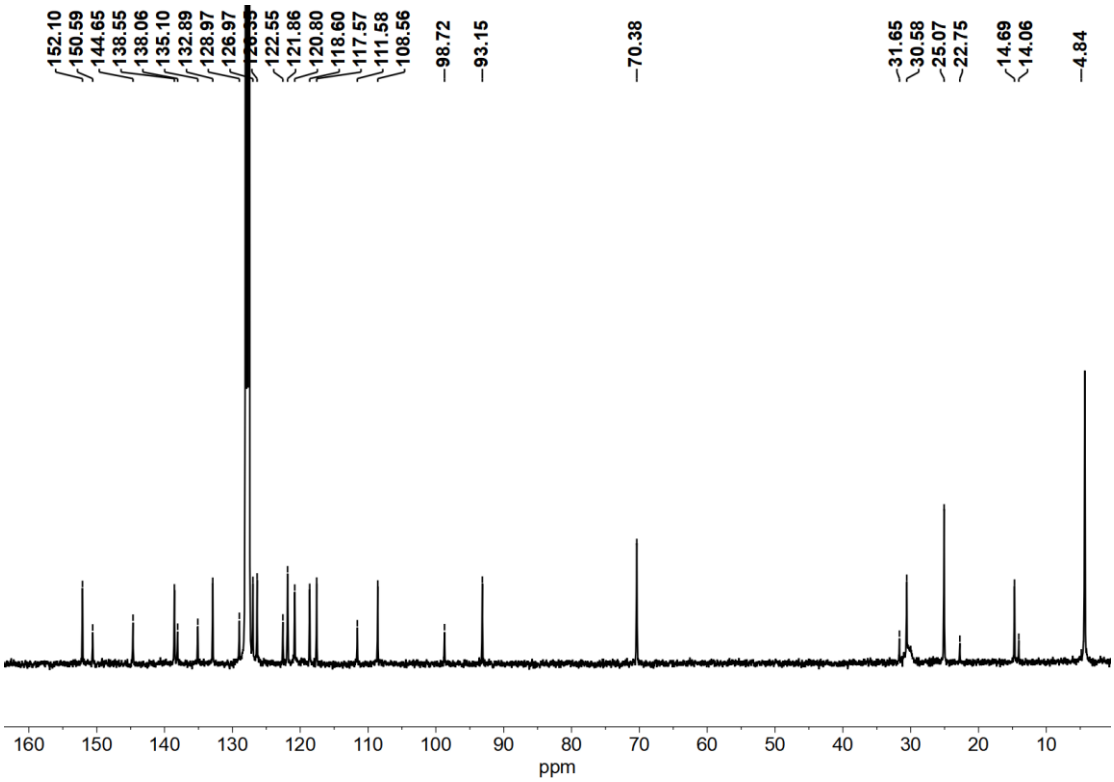


Figure S16 ^{13}C NMR spectrum of 2-**Sc**. (100 MHz, C_6D_6, 25 °C)

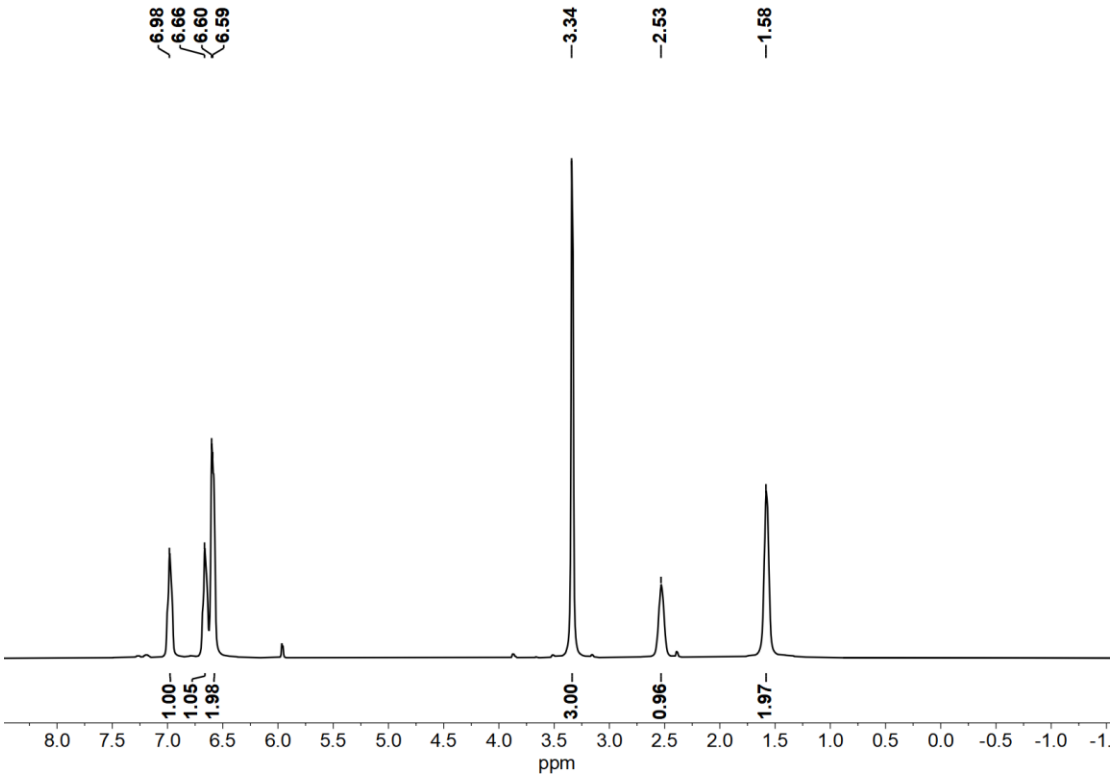


Figure S17 ^{1}H NMR spectrum of poly *o*MOS. (400 MHz, $C_2D_2Cl_4$, 120 °C)

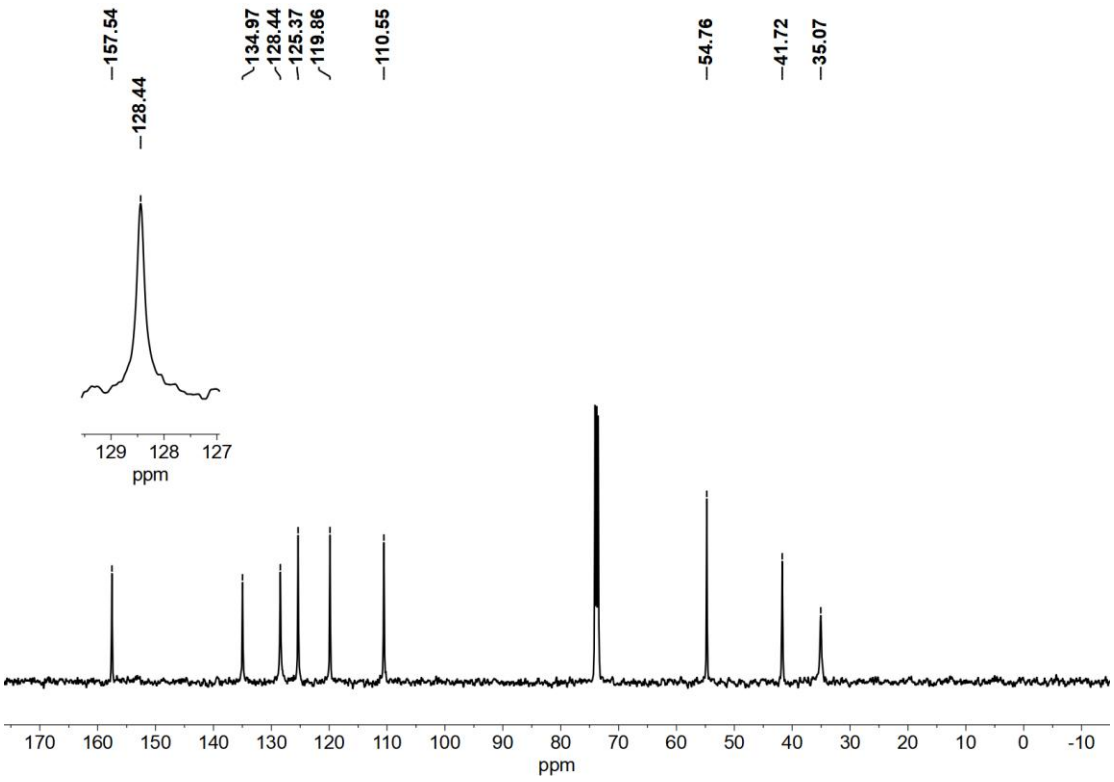


Figure S18 ^{13}C NMR spectrum of poly *o*MOS. (100 MHz, $C_2D_2Cl_4$, 120 °C)

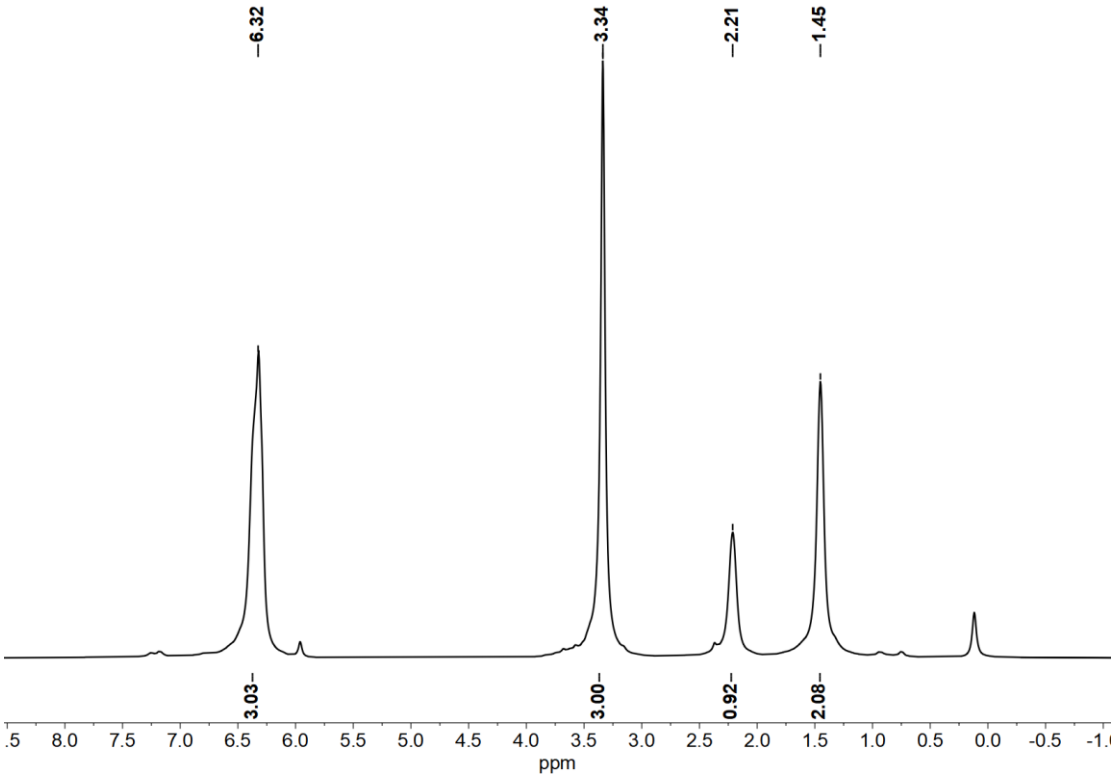


Figure S19 ^{1}H NMR spectrum of poly(4 - FMOS). (400 MHz, $C_2D_2Cl_4$, 120 °C)

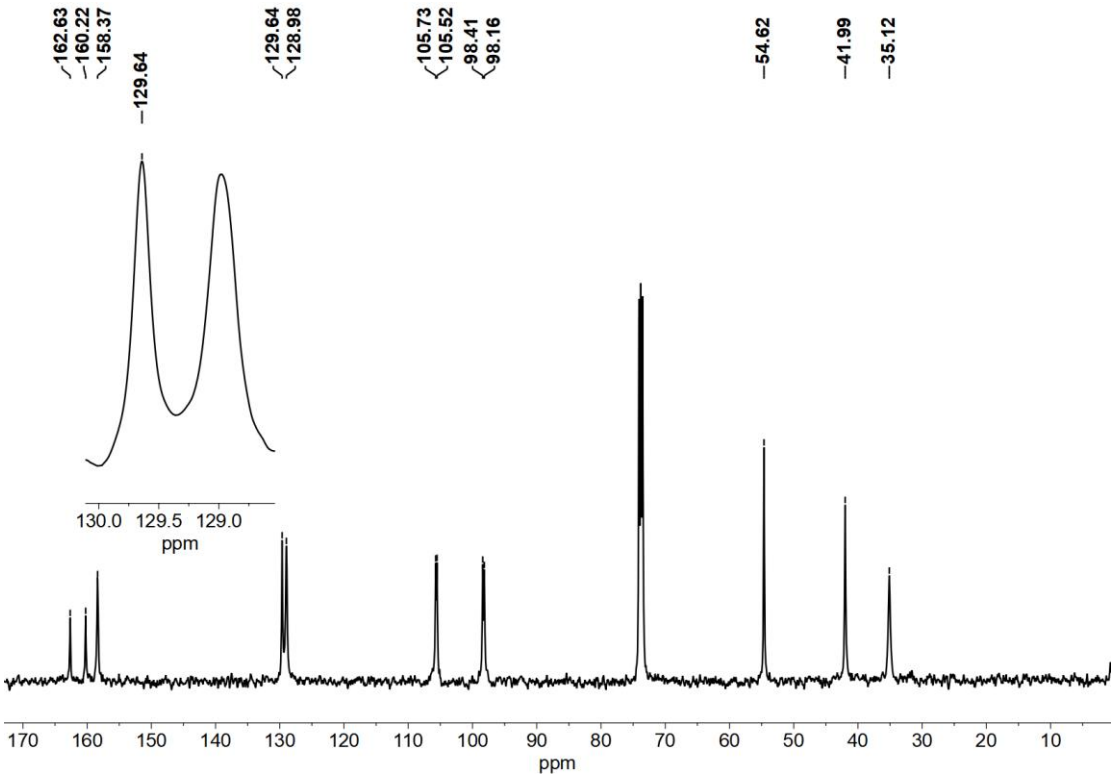


Figure S20 ^{13}C NMR spectrum of poly(4 - FMOS). (100 MHz, $C_2D_2Cl_4$, 120 °C)

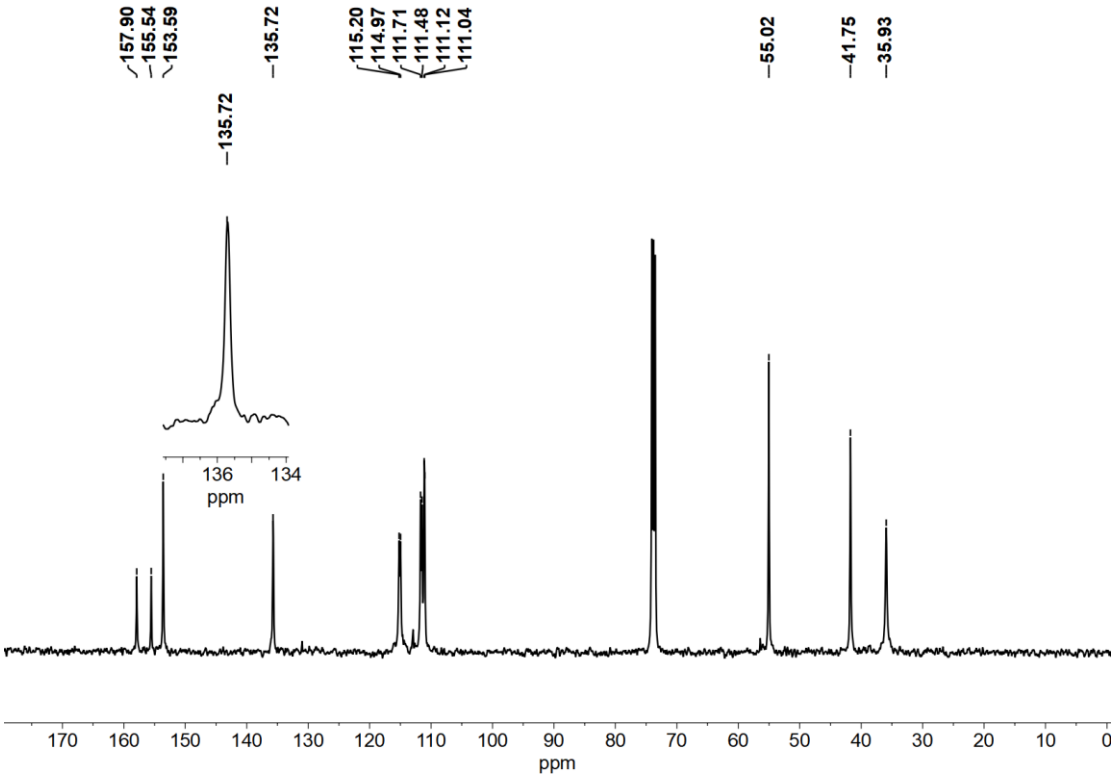


Figure S21 ^{13}C NMR spectrum of poly(5-FMOS). (100 MHz, $C_2D_2Cl_4$, 120 °C)

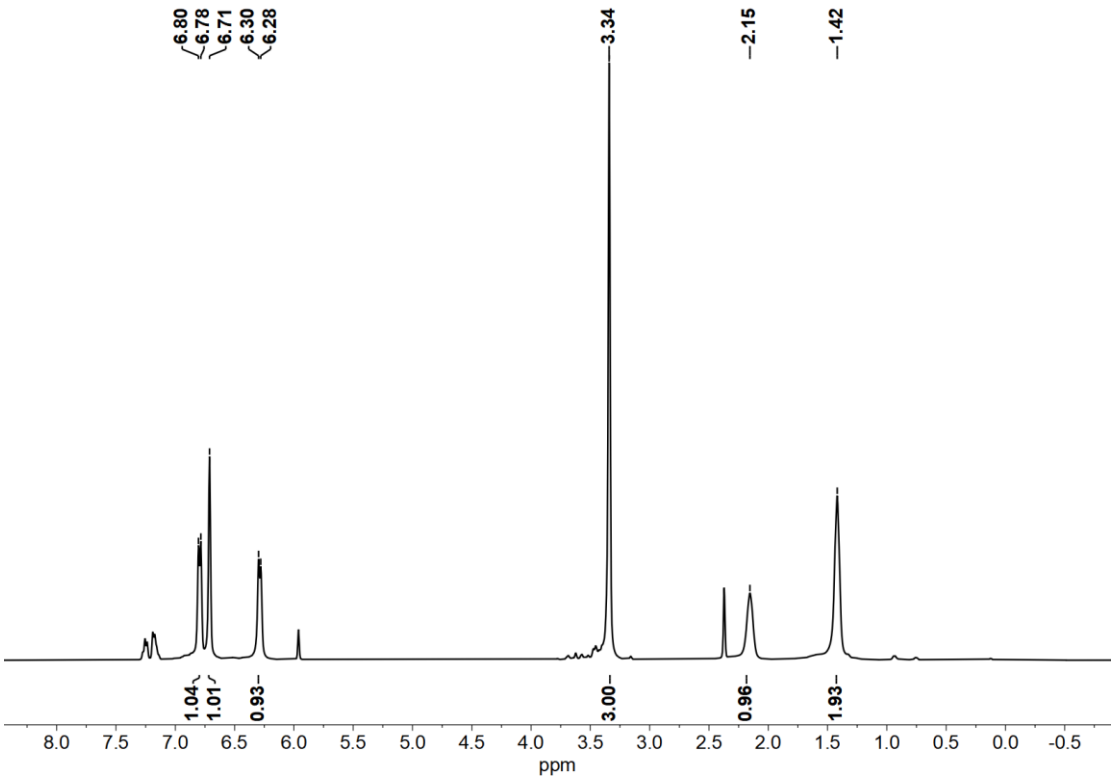


Figure S22 ^{1}H NMR spectrum of poly(4 - BrMOS). (400 MHz, $C_2D_2Cl_4$, 120 °C)

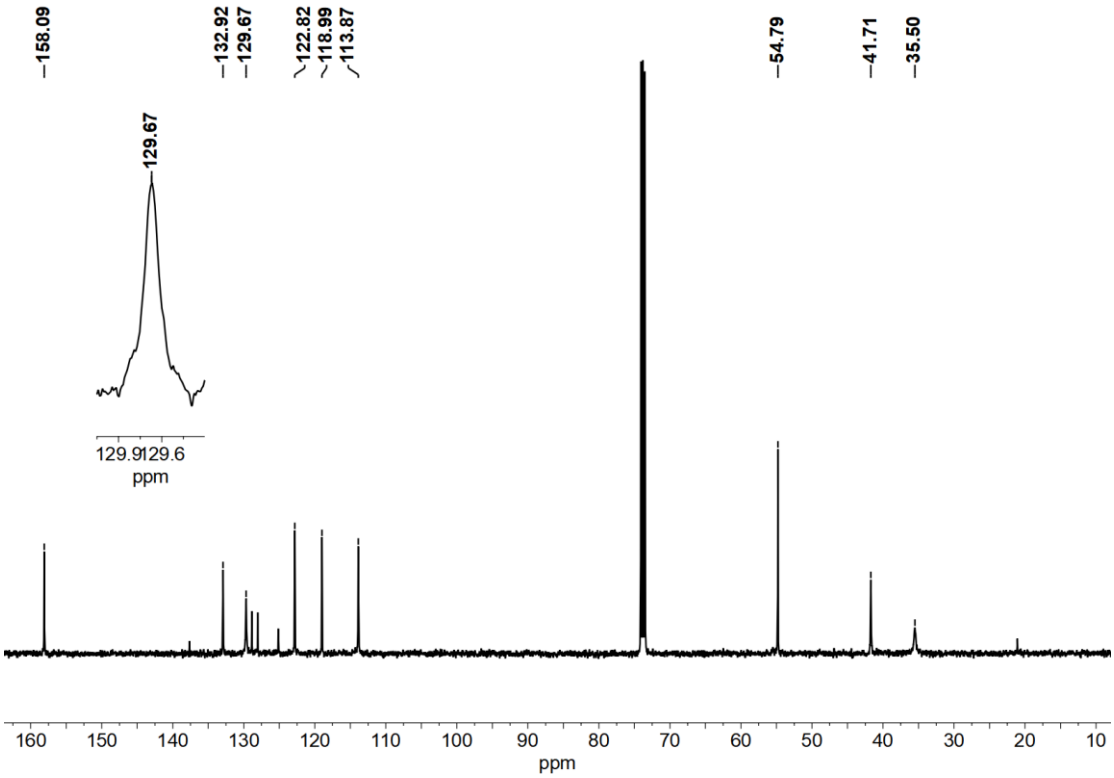


Figure S23 ^{13}C NMR spectrum of poly(4-BrMOS). (100 MHz, $C_2D_2Cl_4$, 120 °C)

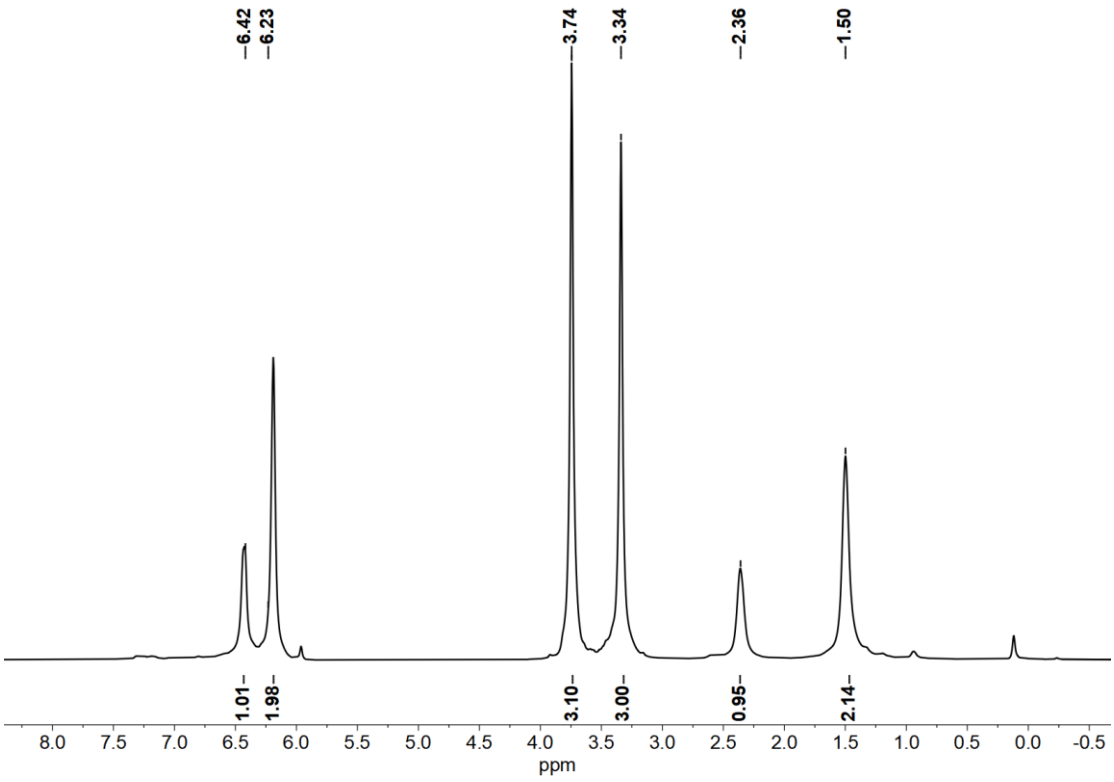


Figure S24 ^{1}H NMR spectrum of poly(4 - MeOMOS). (400 MHz, $C_2D_2Cl_4$, 120 °C)

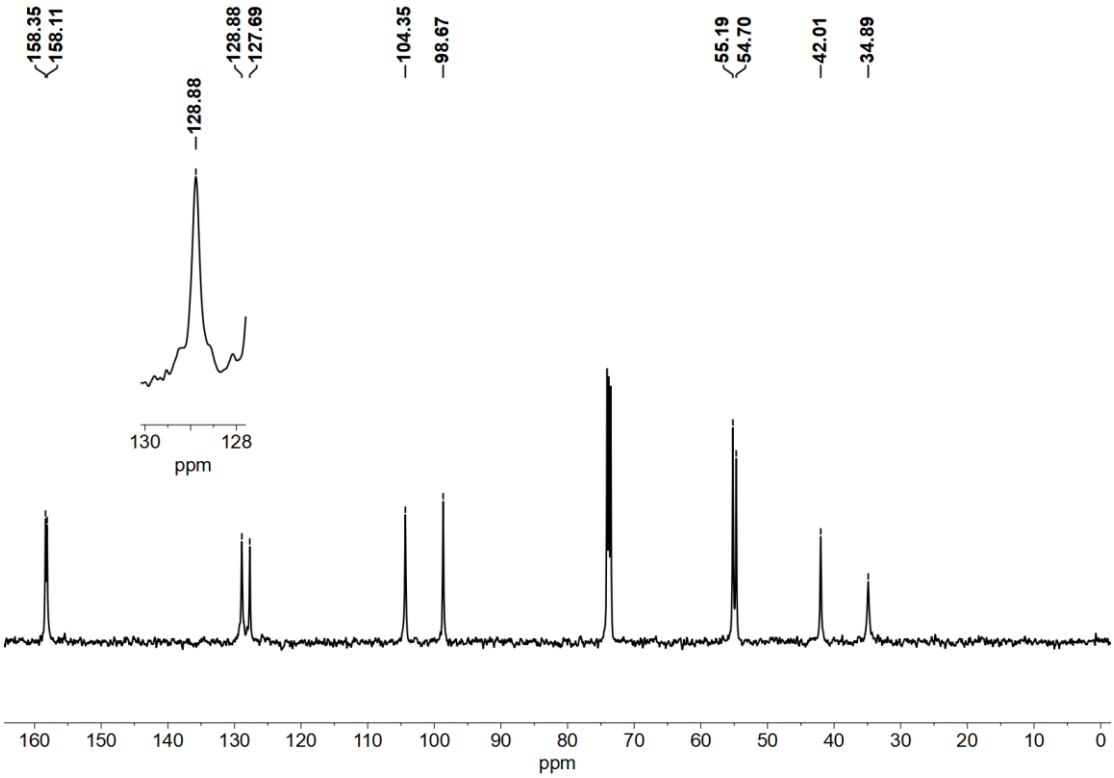
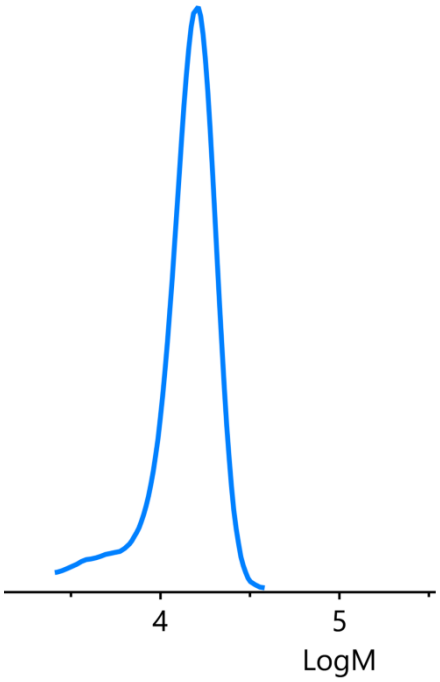


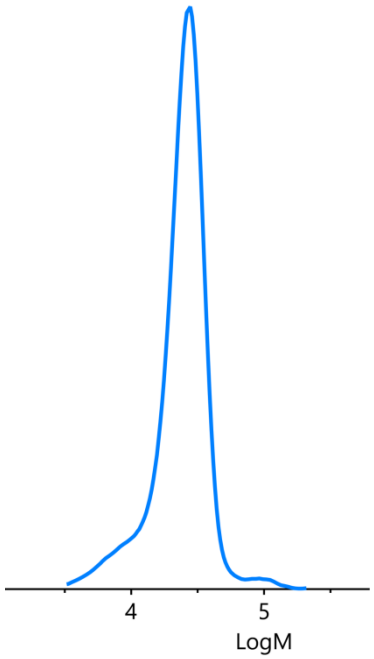
Figure S25 ^{13}C NMR spectrum of poly(4-MeOMOS). (100 MHz, $C_2D_2Cl_4$, 120 °C)



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	15930	12268	14871	16674	14570	1.21

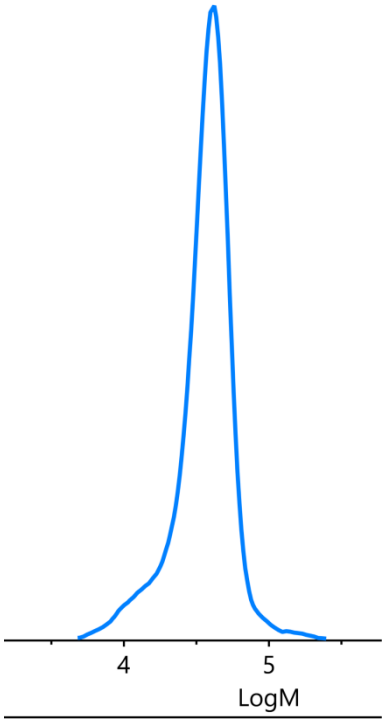
Figure S26 GPC curve of poly (*o*MOS) in Table 1, Entry 1.



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	90089	20126	27685	40525	26430	1.38

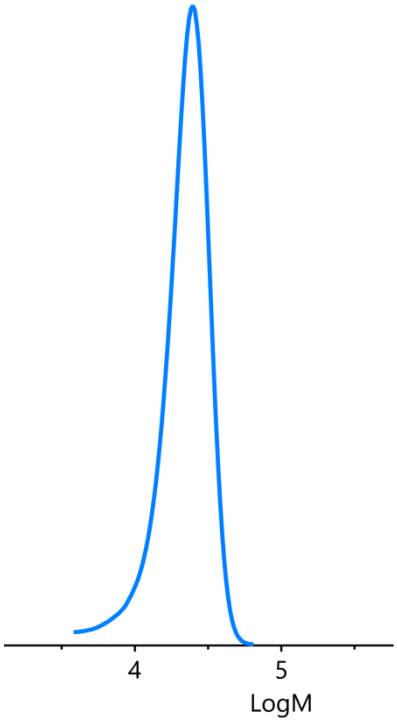
Figure S27 GPC curve of poly (*o*MOS) in Table 1, Entry 2**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	41155	30168	41300	57266	39557	1.37

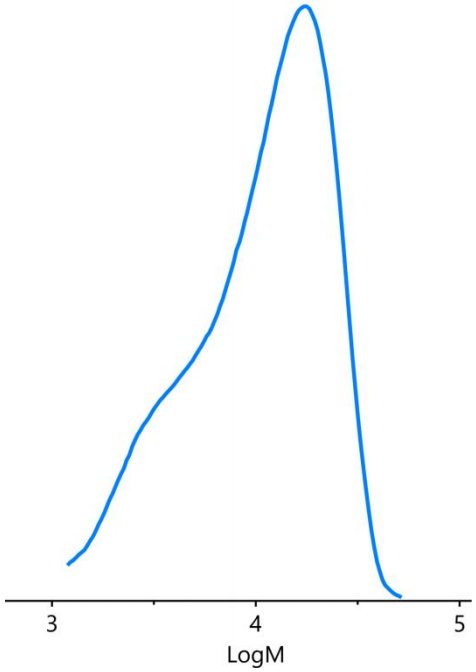
Figure S28 GPC curve of poly (*o*MOS) in Table 1, Entry 3**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	24768	19464	23149	25941	22699	1.19

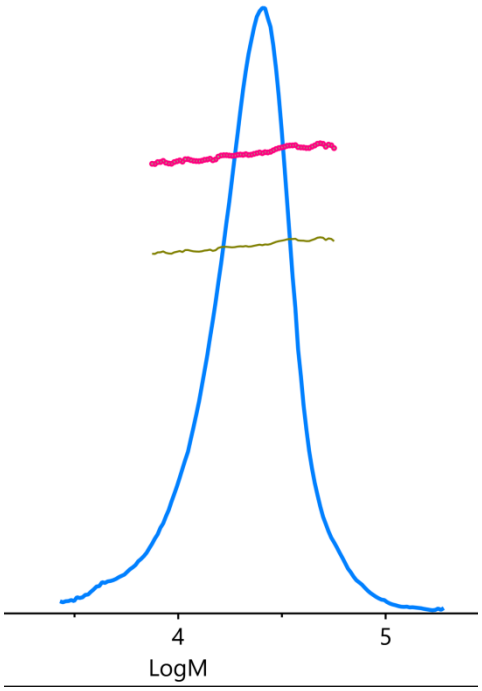
Figure S29 GPC curve of poly (*o*MOS) in Table 1, Entry 4**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	17326	7299	13120	18383	12293	1.80

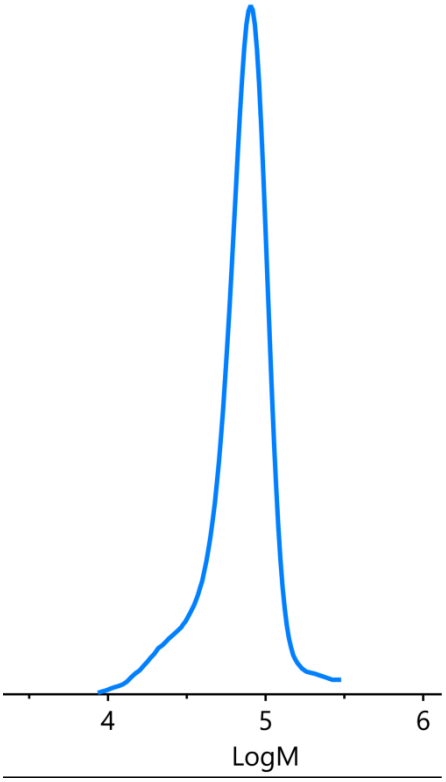
Figure S30 GPC curve of poly (*o*MOS) in Table 1, Entry 5**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	25437	16568	28055	49861	25920	1.69

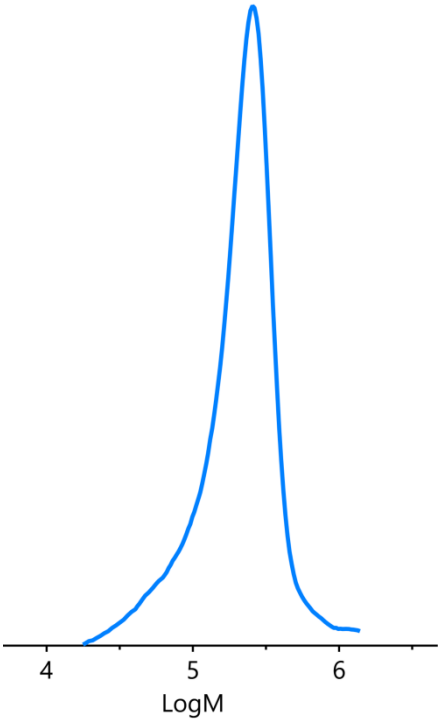
Figure S31 GPC curve of poly (*o*MOS) in Table 1, Entry 6**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	80310	57238	77030	96545	74373	1.35

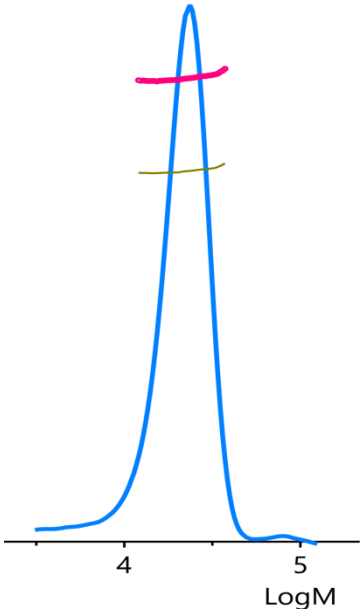
Figure S32 GPC curve of poly (*o*MOS) in Table 1, Entry 7**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	256875	150428	250116	379378	235035	1.66

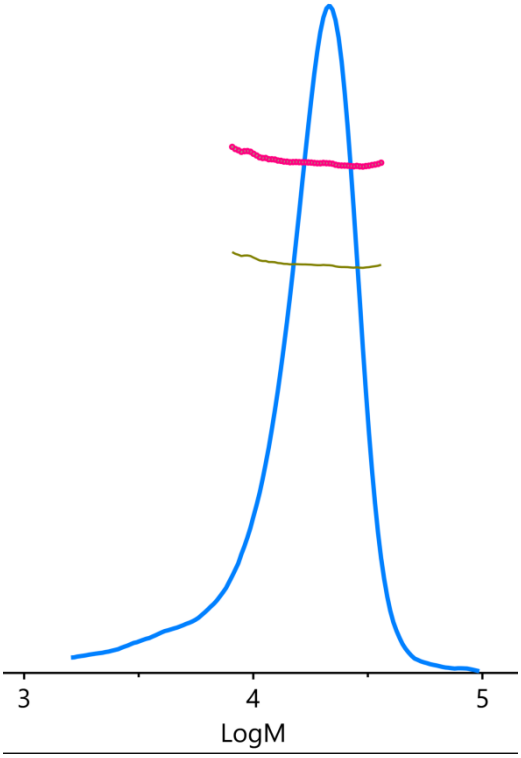
Figure S33 GPC curve of poly (*o*MOS) in Table 1, Entry 8**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	79186	18451	22243	25363	21787	1.21

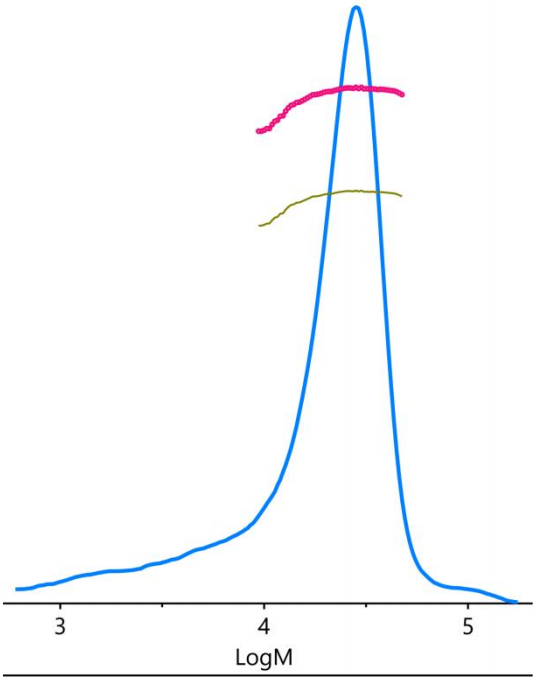
Figure S34 GPC curve of poly (*o*MOS) in Table 1, Entry 11**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	77137	12983	19424	24730	18653	1.50

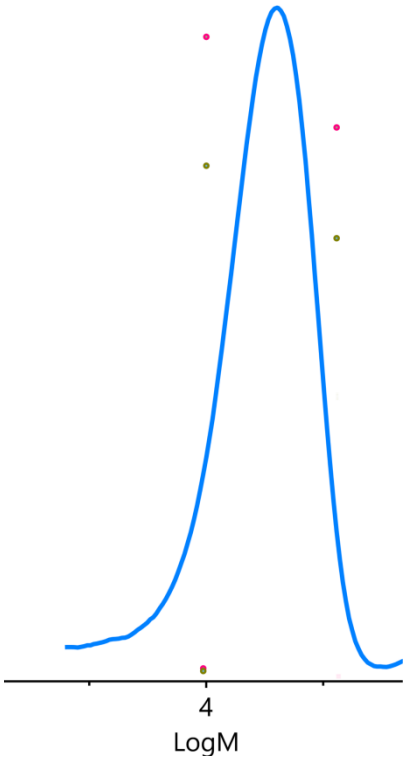
Figure S35 GPC curve of poly (*o*MOS) in Table 1, Entry 12**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	28263	9299	24311	39390	22636	2.61

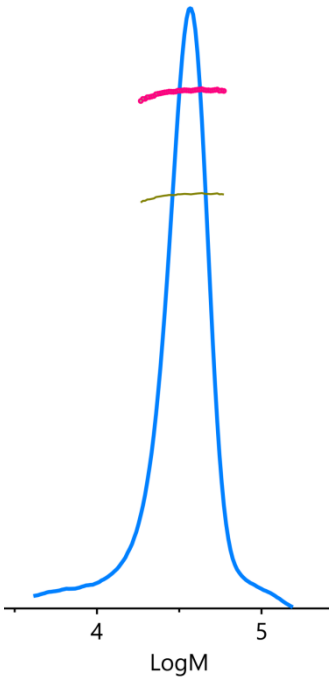
Figure S36 GPC curve of poly (4-FMOS) in Table 2, Entry 3**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	100646	14491	21107	34151	19907	1.46

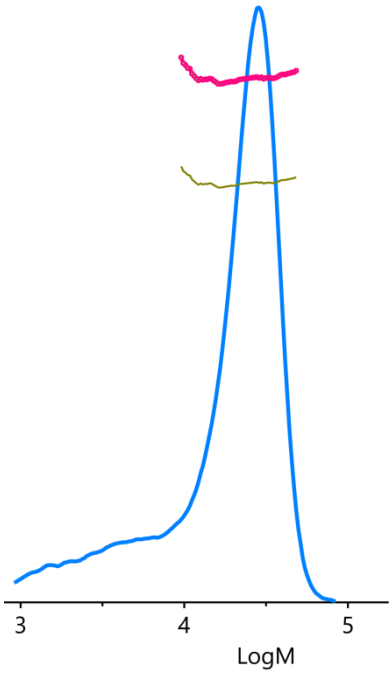
Figure S37 GPC curve of poly (5-FMOS) in Table 2, Entry 4**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	36893	27551	36046	43856	34965	1.31

Figure S38 GPC curve of poly (4-BrMOS) in Table 2, Entry 5**.**



GPC Results

Peak No	Mp	Mn	Mw	Mz	Mv	PD
1	28457	9373	22414	30014	21034	2.39

Figure S39 GPC curve of poly (4-MeOMOS) in Table 2, Entry 6**.**