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Electronic Supplementary Information

Propylene Homopolymerization and Copolymerization with Ethylene by Acenaphthene-Based α-Diimine Nickel Complexes to Access EPR-Like Elastomers

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S1. Nickel-catalyzed polypropylenes

S1.1

Table S1 Calculated and observed carbon-13 chemical shifts and assignments for nickel catalyzed polypropylene.

Peak no.	Chemical shift Exptl.	Calcd.	Sequence	carbon	
1	11.26	11.36	E<u>E</u>tE	$1B_2$	
2	13.99	13.86	E<u>L</u>E	$1B_n$	
3	15.17	16.64	P<u>P</u>*P	$1B_1$	$P_{\alpha\gamma}$
4	16.49	17.13	P<u>P</u>P*	$1B_1$	$P_{\alpha\beta}$
5	19.51-20.43	20.61	P<u>P</u>P$_{rr}$	$1B_1$	$P_{\beta\beta}$
	20.10	20.61	PP<u>P</u>PP$_{rrrr}$	$1B_1$	$P_{\beta\beta}$
	19.96	20.61	PP<u>P</u>PP$_{rrrm}$	$1B_1$	$P_{\beta\beta}$
	19.88	20.61	PP<u>P</u>PP$_{mrrm}$	$1B_1$	$P_{\beta\beta}$
		19.63	E<u>P</u>E	$1B_1$	$P_{\delta\delta}$
		19.63	E<u>P</u>*PE+EP*<u>P</u>E	1,4-$1B_1$	$P_{\gamma\delta}$ $P_{\gamma\gamma}$
6	20.43-21.16				
	20.98	20.61	PP<u>P</u>PP$_{mmrr}$	$1B_1$	$P_{\beta\beta}$
	20.78	20.61	PP<u>P</u>PP$_{mrmm+rmrr}$	$1B_1$	$P_{\beta\beta}$
	20.64	20.61	PP<u>P</u>PP$_{mrmr}$	$1B_1$	$P_{\beta\beta}$
		20.12	E<u>P</u>P+P<u>P</u>E	$1B_1$	$P_{\beta\delta}$
			P*<u>P</u>P	1,4-$1B_1$	$P_{\beta\gamma}$
7	21.20-21.82	20.61	P<u>P</u>P$_{mm}$	$1B_1$	$P_{\beta\beta}$
	21.72	20.61	PP<u>P</u>PP$_{mmmm}$	$1B_1$	$P_{\beta\beta}$
	21.53	20.61	PP<u>P</u>PP$_{mmmr}$	$1B_1$	$P_{\beta\beta}$
	21.35	20.61	PP<u>P</u>PP$_{rmmr}$	$1B_1$	$P_{\beta\beta}$
8	22.98-23.82				
	23.49	22.65	E<u>L</u>E	$2B_n$	
	23.26	22.62	E<u>iBu</u>E	$1B_{iBu}$	
	23.15	22.13	E<u>2MH</u>E	$1B_{2ME}$	
9	24.73	24.58	P<u>E</u>P	β'B_1	$S_{\beta\beta}$
10	25.96	25.92	E<u>iBu</u>E	$2B_{iBu}$	
11	27.00-27.50				
	27.34	27.27	P<u>E</u>E+E<u>E</u>P	βB_1	$S_{\beta\delta}$
			PP<u>E</u>E+E<u>E</u>PP$_r$		
			PP<u>E</u>E+<u>E</u>EPP$_m$		
			EP<u>E</u>E+E<u>E</u>PE		
			E<u>iBu</u>E	βB_{iBu}	
		27.52	E<u>L</u>E	βB_n+(n-1)B_n	
		27.77	E<u>E</u>tE	βB_2	
		27.16	E<u>E</u>tE	$2B_2$	
		27.27	E<u>2MH</u>E	$4B_{2ME}$	
12	27.50-27.98				
	27.72	27.52		1,6-β'B_1	$S_{\beta\gamma}$
13	28.18	27.77	E<u>2MH</u>E	$5B_{2ME}$	
14	28.63	28.38	P<u>P</u>P	brB_1	$T_{\beta\gamma}$
15	29.47	29.71	E<u>L</u>E	$4B_n$	
16	29.92	29.96	E<u>E</u>E		$S_{\delta\delta}$
17	30.34	30.21	EE<u>E</u>P	γB_1	$S_{\gamma\delta}$
18	30.63-31.47				
	30.91	30.45	E<u>P</u>P+P<u>P</u>E	brB_1	$T_{\beta\delta}$
		30.45	P*<u>P</u>P		$T_{\beta\gamma}$
		30.21	E<u>L</u>E	γB_n+(n-2)B_n	
		30.21	E<u>2MH</u>E	γB_{2MH}	
		30.21	E<u>iBu</u>E	γB_{iBu}	

		30.21	E<u>Et</u>E	γB_{Et}	
19	33.22	32.52	E<u>P</u>E	brB_1	$T_{\delta\delta}$
20	33.66	32.52	E<u>P</u>*PE+EP*<u>P</u>E	1,4-brB_1	$T_{\gamma\delta}$ $T_{\gamma\gamma}$
21	34.66	34.47	P*<u>P</u>*PP+P*P*<u>P</u>P	1,4-α'B_1	$S_{\gamma\alpha\beta\delta}$
22	35.10	34.47	E<u>L</u>E	αB_n+nB_n	
		34.47	E<u>2MH</u>E	$\alpha B_{2MH}+6B_{2MH}$	
		34.47	E<u>iBu</u>E	αB_{iBu}	
		34.47	E<u>Et</u>E	αB_{Et}	
		34.22	E<u>P</u>*PE+EP*<u>P</u>E		$S_{\delta\alpha\beta\delta}$
23	35.61	34.98	E<u>iBu</u>E	brB_{iBu}	
		34.99	P<u>P</u>P*	1,2-brB_1	$T_{\alpha\beta}$
24	35.92	34.72	P<u>P</u>*PP	1,4-α'B1	$S_{\gamma\alpha\beta\delta}$
25	37.10-37.99				
		36.91	E<u>P</u>E+EP<u>E</u>E	αB_1	$S_{\alpha\delta}$
		37.16	PP<u>E</u>E+EE<u>P</u>P+EP<u>E</u>P	αB_1	$S_{\alpha\delta}$
		37.41	PP<u>E</u>P*mm*+PE<u>P</u>P*mm*	$\alpha\gamma B_1$	$S_{\alpha\gamma}$
		37.06	P<u>P</u>*P	1,2-brB_1	$T_{\alpha\gamma}$
		37.05	E<u>L</u>E+E<u>2MH</u>E	brB_n+brB_{2MH}	
26	38.36	37.16	P<u>E</u>PE*r*	α'B_1	$S_{\alpha\gamma}$
			EE<u>P</u>P*r*	α'B_1	$S_{\alpha\gamma}$
27	38.51	37.41	P<u>E</u>PP+PP<u>E</u>P*mr*+*rm*	α'B_1	$S_{\alpha\gamma}$
			P<u>E</u>PP+PP<u>E</u>P*rr*		
			PE<u>P</u>P*mr*+*rm*		
			P<u>E</u>PP*rr*		
28	39.43	39.35	E<u>2MH</u>E	$3B_{2ME}$, brB_2	
29	44.01	43.86	E<u>iBu</u>E	$3B_{iBu}$	
30	45.32-48.13			ααB$_1$	
		41.17	P*P<u>P</u>P*		$S_{\delta\alpha\alpha\beta}$
		41.42	PP<u>P</u>P*		$S_{\gamma\alpha\alpha\beta}$
		43.86	EP<u>P</u>E		$S_{\alpha\alpha}$
		44.11	PP<u>P</u>E		
		44.36	P<u>P</u>P*rr*		

S1.2

Equations for quantitatie analysis:

$[PPP] = k\ (I_{14})$

$[PPE+EPP] = k\ (I_{18} - 3\ I_2 - 2\ I_{28} - 2\ I_{29} - 2\ I_1)$

$[EPE] = k\ (I_{19})$

$[EEE] = k\ (I_{16}/2)$

$[PEE+EEP] = k\ (I_{11} – I_{28} - 3I_1 - 3I_2 – 2I_{29})$

$[PEP] = k\ (I_9)$

$[PP*P] = k\ (I_3)$

$[PPP*] = k\ (I_4)$

$[PP*PP] = k\ (I_{24})$

$[P*P*PP] = k\ ((I_{21})\ /2)$

$[1,4\text{-}B_1] = k\ ((I_{20})\ /2)$

$[1,6\text{-}\beta B_1] = k\,((I_{12})/2)$

$[ELE] = k\,(I_2)$

$[EEtE] = k\,(I_1)$

$[EiBuE] = k\,((I_{10} + I_{29})/2)$

$[E2MHE] = k\,(I_{28})/2$

where k is the normalization constant.

S2. Nickel catalyzed copolymerization of ethylene and propylene

S2.1 Kinetic studies of *rac*-Ni2 catalyzed copolymerization of ethylene and propylene.

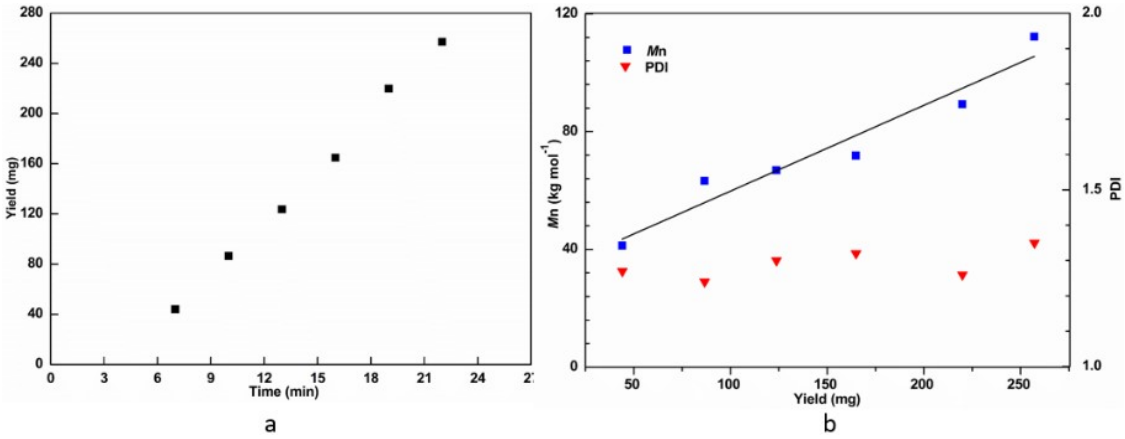


Figure S1. Plots of M_n (■) and M_w/M_n (▲) versus polymerization time for propylene and ethylene copolymerization

S2.1

Table S2. Carbon-13 chemical shifts in previous and present researches and their assignments for nickel catalyzed ethylene/propylene copolymer.

Peak no.	Chemical shift (ppm)		Sequence	Carbon type	Carbon type
	Exptl.	Calcd.			
1	11.27	11.36	EEtE	$1B_2$	
2	13.99	13.86	ELE	$1B_n$	
3	14.46	14.35	EPrE	$1B_3$	
4	19.65	19.63	EPE	$1B_1$	
5	20.07	19.63	EP*PE+EP*PE	$1B_1$	$P_{\delta\delta}$
	20.49	20.12	EPP+PPE	$1B_1$	$P_{\beta\delta}$
		20.21	EPrE	$2B_3$	
6	22.51	22.65	ELE	$2B_n$	
7	23.12	23.13	E2MHE	$1B_{2MH}$	
8	23.24	22.62	EiBuE	$1B_{iBu}$	
9	24.78	24.58	PEP	$\beta'B_1$	$S_{\beta\beta}$
10	26.00	25.92	EiBuE	$2B_{iBu}$	
11	27.06	27.52	ELE	$\beta B_n+(n-1)B_n$	

12	27.18-28.15				
	27.40	27.27	PEE+EEP	βB_1	$S_{\beta\delta}$
			EPEE+EEPE		
			PPEE+EEPP		
			EiBuE	βB_{iBu}	
		27.77	EEtE	βB_2	
		27.16	EEtE	$2B_2$	
		27.27	E2MHE	$4B_{2MH}$	
13	27.80	27.52		1,6-β'B_1	$S_{\beta\gamma}$
14	28.20	27.77	E2MHE	$5B_{2MH}$	
15	29.50	29.71	ELE	$4B_n$	
16	29.95	29.96	EEE		$S_{\delta\delta}$
17	30.22-30.67				
		30.45	EPP+PPE	brB_1	$T_{\beta\delta}$
		30.21	ELE	$\gamma B_n+(n-2)B_n$	
		30.21	E2MHE	γB_{2MH}	
		30.21	EiBuE	γB_{iBu}	
		30.21	EEtE	γB_{Et}	
18	31.71-32.27				
	33.25	32.40	ELE	$3B_n$	
19	33.31	32.52	EPE	brB_1	$T_{\delta\delta}$
20	33.69	32.52	EP*PE+EP*PE	1,4-brB_1	$T_{\gamma\delta}$, $T_{\gamma\gamma}$
21	34.06-35.59				
		34.22	EP*PE+EP*PE		$S_{\alpha\beta}$
		34.47	ELE	αB_n+nB_n	
		34.47	E2MHE	$\alpha B_{2MH}+6B_{2MH}$	
		34.47	EiBuE	αB_{iBu}	
		34.47	EEtE	αB_{Et}	
		34.98	EiBuE	brB_{iBu}	
22	37.00	36.91	EPrE	$3B_3$	
23	37.41-38.14				
	37.55	36.91	EPE	αB_1, 1,4-αB_1	$S_{\alpha\delta}$
		37.05	ELE+ E2MHE	brB_n+brB_{2MH}	
		37.05	EPrE	brB_3	
24	38.25-38.82	37.16	PEPE	α'B_1	$S_{\alpha\gamma}$
			EEPP	α'B_1	$S_{\alpha\gamma}$
25	39.50	39.35	E2MHE	$3B_{2ME}$	
		39.12	EEtE	brB_2	
26	44.00	43.86	EiBuE	$3B_{iBu}$	
27	45.30-46.44	43.86	EPPE		$S_{\alpha\alpha}$

S2.3 Equations for quantitatie analysis:

[PPP] triad, not observed

[PPE+EPP] = k (I_{27})

[EPE] = k (I_{19})

[EEE] = k (I_{16}/2)

[PEE+EEP] = k(I_{12} - 3I_1 - 2I_8 - 2I_7)

[PEP] = k (I_9)

[EP*PE] = k (I_{20}) /2)

[1,6-β'B_1] = k ((I_{13})/2)

[ELE] = k (I_2)

[EEtE] = k (I_1)

[EPrE] = k (I_3)

[EiBuE] = k (I_8)

[E2MHE] = k (I_7)

where k is the normalization constant.

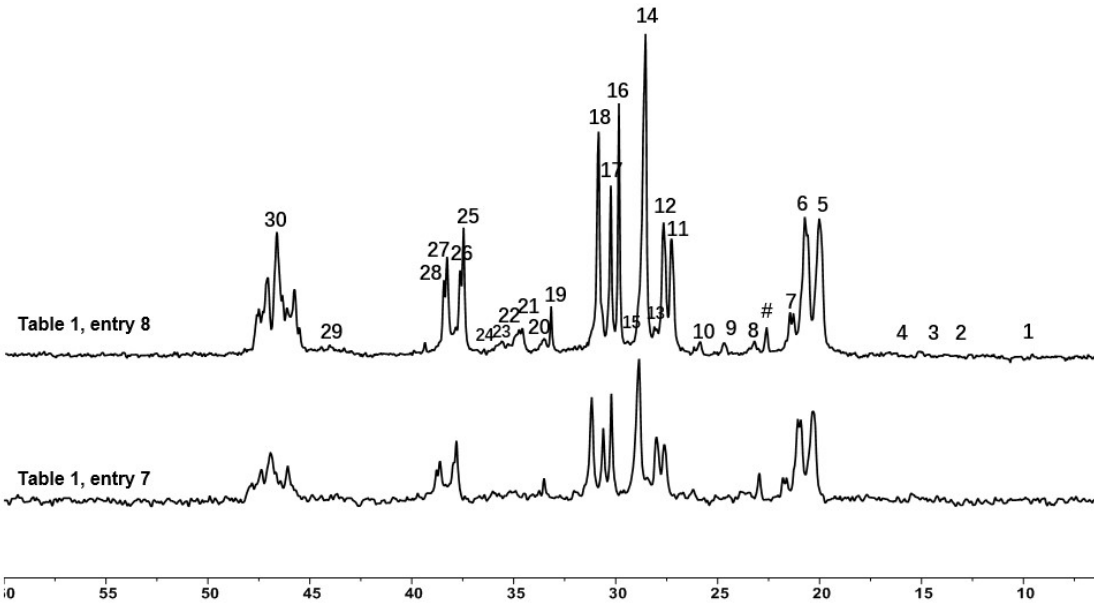


Figure S2. ^{13}C NMR spectra of nickel-catalyzed polypropylenes. (carbon assignments can be found in Table S1)

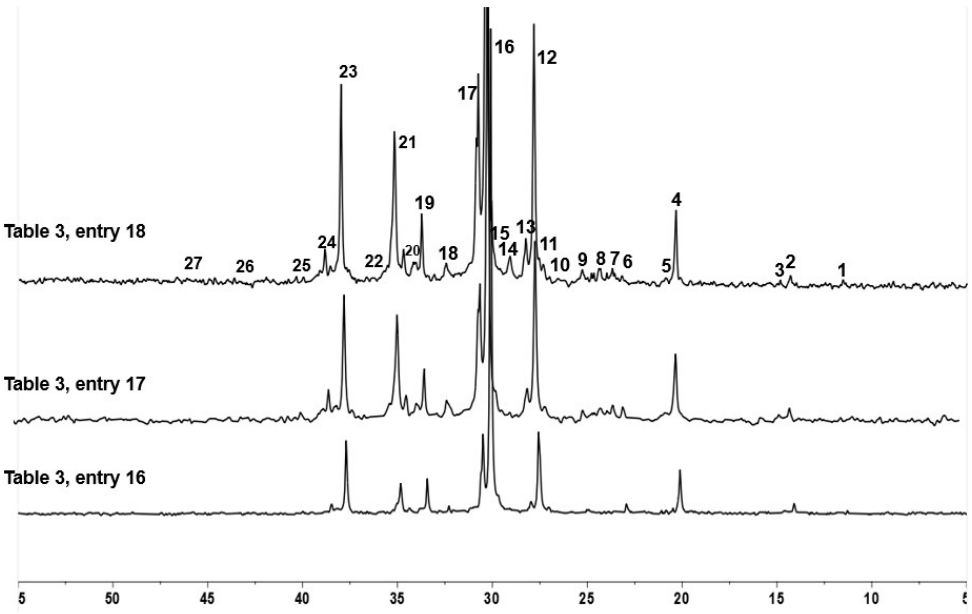


Figure S3. ^{13}C NMR spectra of *rac*-**Ni5**-catalysed ethylene/propylene copolymers. (carbon assignments can be found in Table S1)

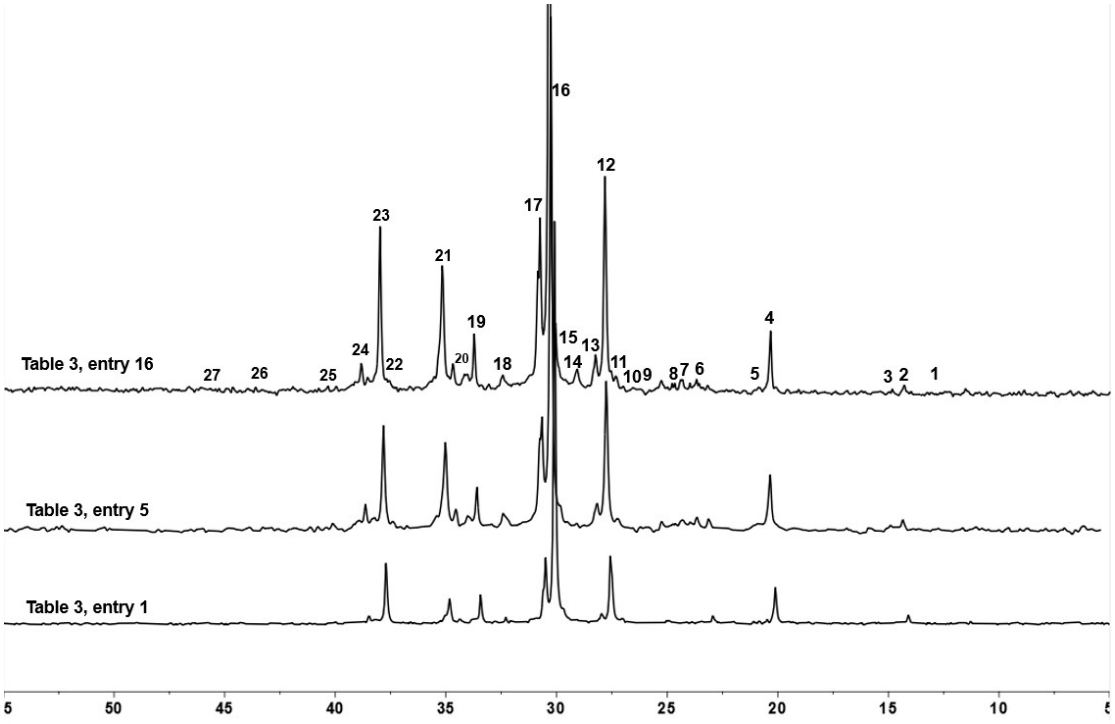
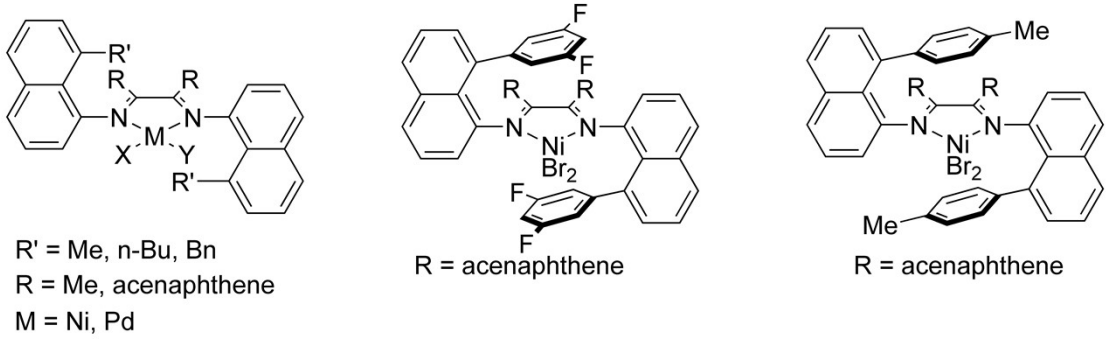


Figure S4. ^{13}C NMR spectra of entry 1, entry 5 and entry 16 in Table 3. (carbon assignments can be found in Table S1)

Table S3. Quantitative analysis of nickel-catalyzed ethylene/propylene

copolymer.

Sequence	Entry 1	Entry 5	Entry 16	Entry 17	Entry 18
0	0	0	0	0	0
PPE+EPP	0	0	0	0	0
EPE	6.3	9.9	7.4	4.0	5.0
EEE	50.2	54.6	60.2	59.4	53.9
PEE+EEP	27.3	21.8	23.3	29.8	32.2
PEP	2.8	3.3	1.0	0.8	0.7
EP*PE	2.0	1.4	2.0	1.4	2.2
1,6-β'B_1	13.7	6.1	3.9	3.1	5.4
long branch	2.7	2.6	1.6	0.8	0.3
ethyl	0.3	0.1	0	0.2	0
propyl	0.1	0	0	0.1	0
iso-butyl	0.1	0	0	0.2	0.1
2-methyl hexyl	0.1	0.2	0	0.2	0.1



I II III

Scheme S1. Reported 8-(R)-Naphthyl α-diimine nickel(II) catalysts.

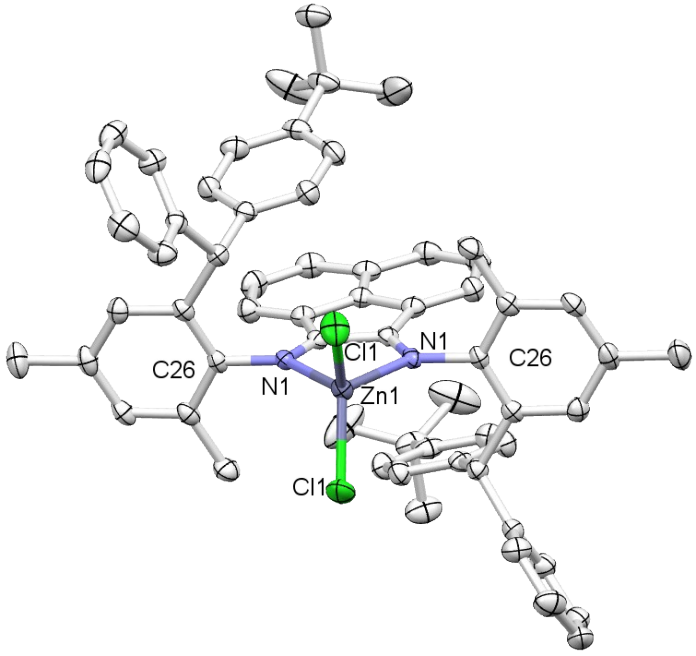
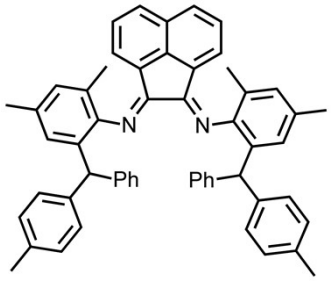


Figure S5. Single crystal structure of *rac*-**L4**·**ZnCl$_2$**.

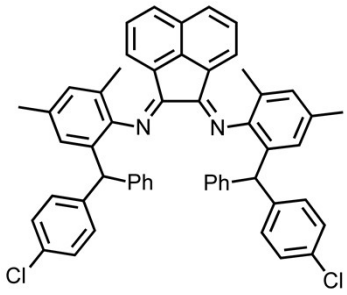
1. Experimental sections

Procedure for the Synthesis of Ligand *rac*-L1-L5

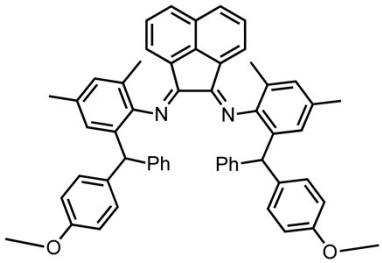


Step 1: In a 100 ml round-bottom flask, $ZnCl_2$ (204 mg, 1.5 mmol) and acenaphthenequinone (274 mg, 1.5 mmol) was added. Then glacial acetic acid (5 mL) and 2,4-dimethyl-6-(phenyl(p-tolyl)methyl)benzenamine (904 mg, 3.0 mmol) was also added and the reaction mixture was refluxed under stirring overnight. After the reaction finished, the mixture was cooled to room temperature and a red solid precipitated. The solid was filtered and washed with diethyl ether (3 x 10 mL). Then drying under vacuum, a bright red solid was obtained. Step 2: The products of the previous step was dissolved in dichloromethane (40 mL) and a solution of potassium oxalate (0.553 g, 3 mmol) in water (3 mL) was added. The reaction mixture was stirred vigorously overnight. Until the reaction finished, the organic phase was separated and washed with water (3 x 10 mL), then the organic phase was dried with $MgSO_4$. Then the solvent was removed under vacuum to afford the product as an orange powder (Yield: 643 mg, 54.6%).^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.57 (d, 2H), 7.23 – 6.93 (m, 14H), 6.88 – 6.79 (m, 2H), 6.70 (d, 3H), 6.31 (t, 4H), 6.08 (m, 3H), 5.65 (d, 2H), 2.32 (d, 6H), 2.29 (d, 6H), 2.25 (d, 6H).^{13}C NMR (101 MHz, Chloroform-*d*) δ 163.15, 162.92, 146.51, 143.67, 141.98, 140.64, 140.63, 139.78, 138.59, 135.39, 134.18, 133.17, 133.13, 132.67,

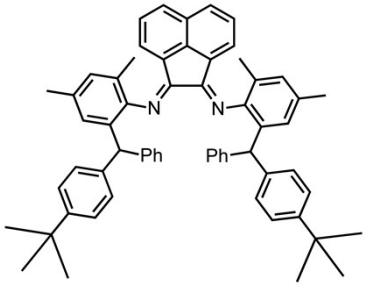
132.64, 129.84, 129.80, 129.64, 129.60, 129.52, 129.19, 129.15, 129.07, 129.04, 128.99, 128.88, 128.72, 128.03, 128.00, 127.91, 127.88, 127.57, 127.51, 127.18, 127.14, 127.01, 126.93, 125.89, 125.04, 125.02, 124.97, 124.75, 124.71, 122.55, 122.52, 122.39, 122.36, 52.20, 52.16, 21.28, 21.01, 20.09, 17.91, 17.87, 17.83.



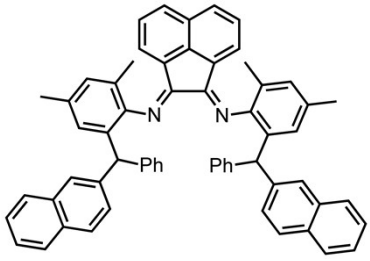
The procedure was similar to the synthesis of *rac*-**L1** except that 2-((4-chlorophenyl)(phenyl)methyl)-4,6-dimethylbenzenamine (966 mg, 3.0 mmol) was used. The product was obtained as a red powder (Yield: 770 mg, 76.1%).^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.60 (ddd, 2H), 7.20 – 6.89 (m, 14H), 6.75 (ddd, 2H), 6.70 – 6.63 (m, 2H), 6.57 (t, 2H), 6.23 (m, 3H), 6.13 (m, 2H), 6.03 (m, 1H), 5.58 (s, 2H), 2.26 (d, 6H), 2.19 (dd, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 163.36, 163.28, 163.09, 163.01, 146.40, 146.38, 146.33, 146.31, 142.90, 142.87, 142.15, 142.11, 141.35, 140.29, 140.28, 139.71, 133.01, 132.96, 132.92, 132.53, 132.51, 132.47, 131.83, 131.16, 130.96, 130.73, 130.00, 129.81, 129.68, 129.50, 129.44, 129.42, 128.96, 128.86, 128.67, 128.47, 128.44, 128.14, 127.94, 127.91, 127.86, 127.41, 127.36, 127.08, 126.99, 126.96, 126.88, 126.20, 125.22, 125.14, 125.10, 125.08, 125.05, 122.54, 122.50, 122.42, 122.37, 58.49, 51.93, 51.87, 21.25, 18.45, 17.87, 17.83.



The procedure was similar to the synthesis of *rac*-**L1** except that 2-((4-methoxyphenyl)(phenyl)methyl)-4,6-dimethylbenzenamine (952 mg, 3.0 mmol) was used. The product was obtained as an orange powder (Yield: 756 mg, 61.7%).^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.93 – 7.53 (m, 2H), 7.34 – 6.87 (m, 14H), 6.81 (m, 4H), 6.74 (m, 2H), 6.56 – 6.39 (m, 3H), 6.23 (m, 2H), 5.93 (s, 1H), 5.82 – 5.59 (m, 2H), 3.77 (d, 6H), 3.00 (d, 6H), 2.55 – 2.16 (m, 12H).^{13}C NMR (101 MHz, Chloroform-*d*) δ 166.12, 165.83, 158.01, 156.56, 143.50, 142.31, 142.28, 142.14, 142.12, 142.09, 140.04, 139.90, 137.12, 136.75, 136.53, 134.38, 134.35, 133.86, 133.83, 133.28, 133.22, 131.46, 131.42, 131.29, 131.25, 130.84, 130.74, 130.55, 130.23, 130.17, 129.81, 129.74, 129.59, 129.40, 129.18, 129.10, 129.07, 129.03, 128.99, 128.89, 128.85, 128.75, 128.71, 128.15, 128.04, 127.98, 127.91, 127.45, 127.20, 127.05, 126.94, 126.23, 125.91, 125.79, 125.63, 125.07, 124.98, 124.93, 124.89, 124.78, 122.54, 122.39, 113.60, 113.41, 112.80, 112.61, 55.23, 54.42, 54.35, 51.68, 51.01, 50.88, 21.41, 21.39, 21.29, 21.27, 18.34, 18.27, 17.89.



The procedure was similar to the synthesis of *rac*-**L1** except that 2-((4-tert-butylphenyl)(phenyl)methyl)-4,6-dimethylbenzenamine (1031 mg, 3.0 mmol) was used. The product was obtained as an orange powder (Yield: 513 mg, 39.3%).^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.53 – 7.42 (m, 2H), 7.17 (m, 14H), 6.83 – 6.71 (m, 4H), 6.65 (d, 2H), 6.32 (dd, 3H), 6.29 – 6.20 (m, 3H), 6.15 (d, 1H), 6.03 (d, 1H), 5.64 (d, 2H), 2.25 (d, 6H), 2.13 (d, 6H), 1.22 (s, 9H), 0.54 (s, 9H).^{13}C NMR (101 MHz, Chloroform-*d*) δ 162.82, 162.74, 162.63, 148.58, 147.62, 147.60, 146.55, 144.09, 142.00, 140.54, 139.72, 138.73, 133.53, 133.50, 133.18, 132.69, 132.65, 129.82, 129.73, 129.65, 129.44, 129.20, 129.04, 129.00, 128.98, 128.19, 128.14, 128.12, 128.02, 127.93, 127.19, 127.15, 126.94, 126.91, 125.84, 124.93, 124.88, 124.86, 124.81, 124.78, 124.03, 122.53, 122.48, 122.43, 52.07, 52.02, 34.34, 33.47, 31.40, 30.74, 21.29, 21.28, 18.03, 17.97, 17.89.



The procedure was similar to the synthesis of *rac*-**L1** except that 2,4-dimethyl-6-(naphthalen-2-yl(phenyl)methyl)benzenamine (1012 mg, 3.0 mmol) was used. The product was obtained as an orange powder (Yield: 555 mg, 43.2%).^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.99 (dd, 1H), 7.89 (dd, 1H), 7.80 – 7.61 (m, 4H), 7.57 – 7.42 (m, 2H), 7.36 – 7.22 (m, 4H), 7.17 – 6.88 (m, 14H), 6.88 – 6.77 (m, 4H), 6.74 – 6.62 (m, 2H), 6.44 – 6.37 (m, 2H), 6.21 – 6.14 (m, 2H), 5.64 (d, 2H), 2.23 (d, 6H), 1.94 (d, 6H).^{13}C NMR (101 MHz, Chloroform-*d*) δ 163.30, 163.25, 163.19, 146.62, 143.51, 142.84, 142.04, 141.53, 141.49, 140.08, 139.32, 139.26, 133.40, 133.23, 132.97, 132.87, 132.82, 132.77, 132.73, 132.55, 132.46, 132.31, 132.09, 132.01, 131.87, 131.03, 130.93, 130.63, 130.42, 129.98, 129.90, 129.78, 129.73, 129.66, 129.43, 129.36, 129.34, 129.22, 129.13, 128.75, 128.62, 128.58, 128.54, 128.52, 128.48, 128.30, 128.24, 128.20, 128.14, 128.10, 128.05, 127.94, 127.91, 127.83, 127.74, 127.70, 127.60, 127.50, 127.45, 127.42, 127.36, 127.25, 127.20, 127.01, 126.73, 126.66, 126.64, 126.59, 126.57, 126.45, 126.05, 125.99, 125.79, 125.71, 125.45, 125.37, 125.25, 125.14, 125.10, 125.05, 125.01, 124.90, 124.74, 124.55, 124.44, 122.49, 122.35, 122.12, 121.75, 121.65, 121.46, 56.06, 52.71, 52.63, 52.51, 51.90, 51.29, 21.35, 21.32, 21.25, 18.24, 17.93, 17.55.

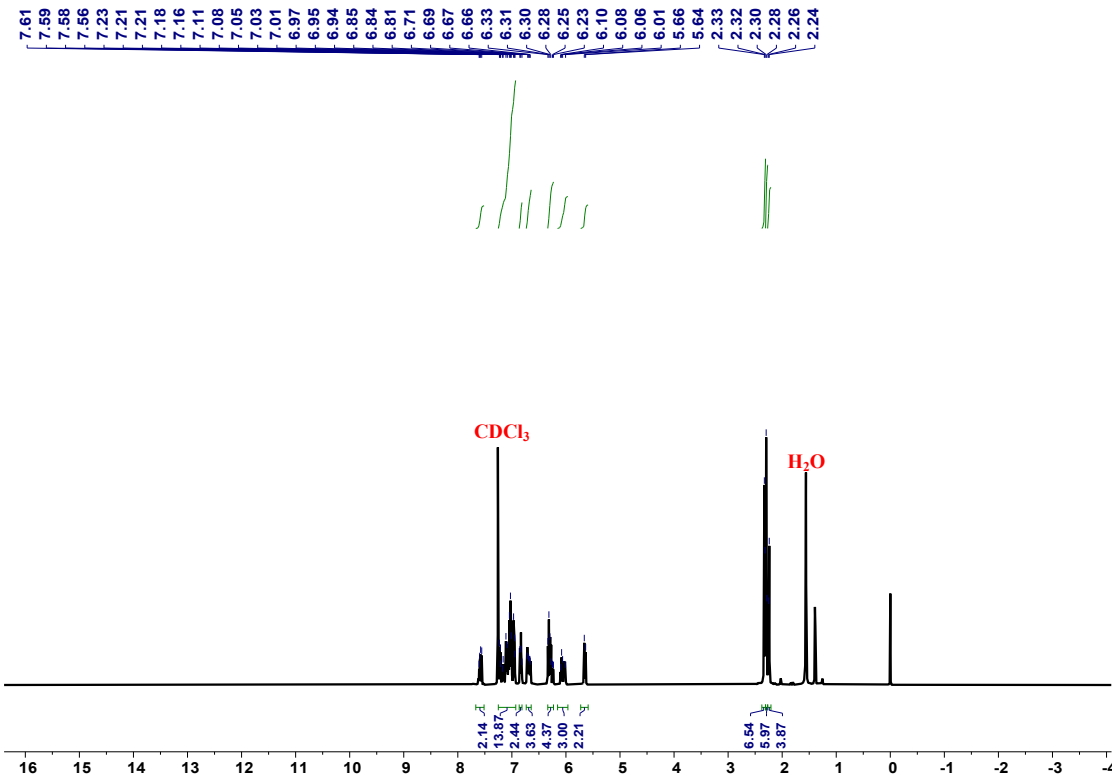


Figure S6. [1]H NMR of complex *rac*-**L1**.

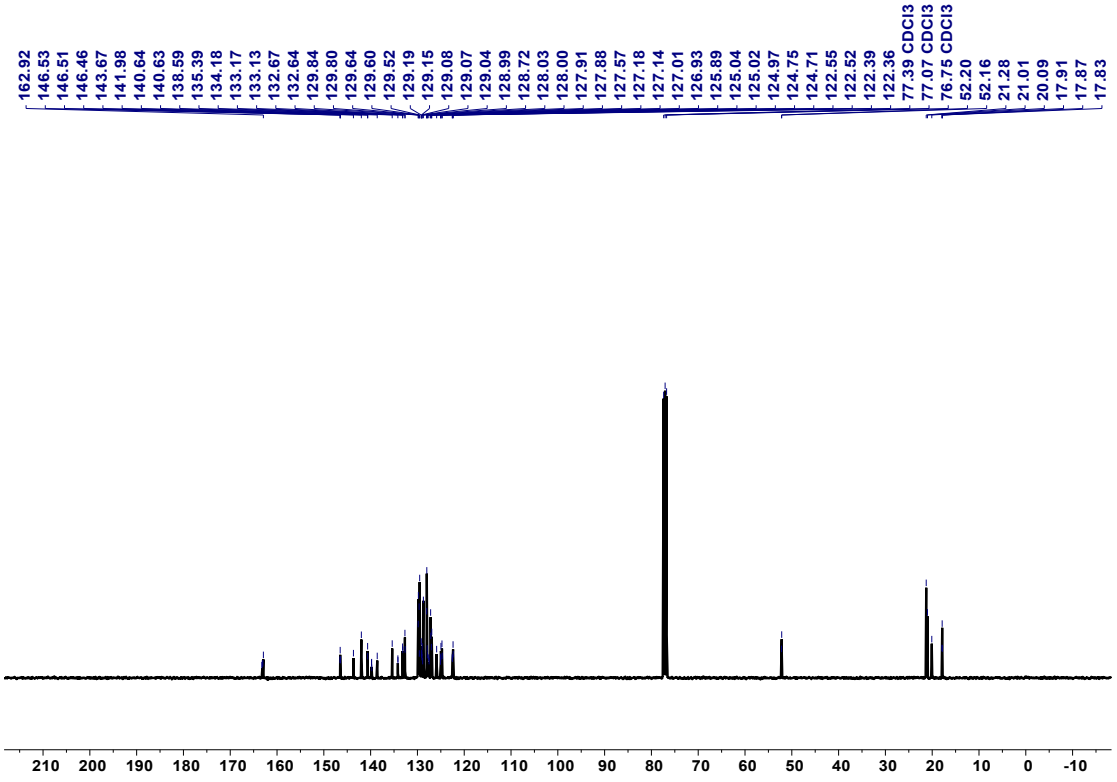


Figure S7. [13]C NMR of complex *rac*-**L1**.

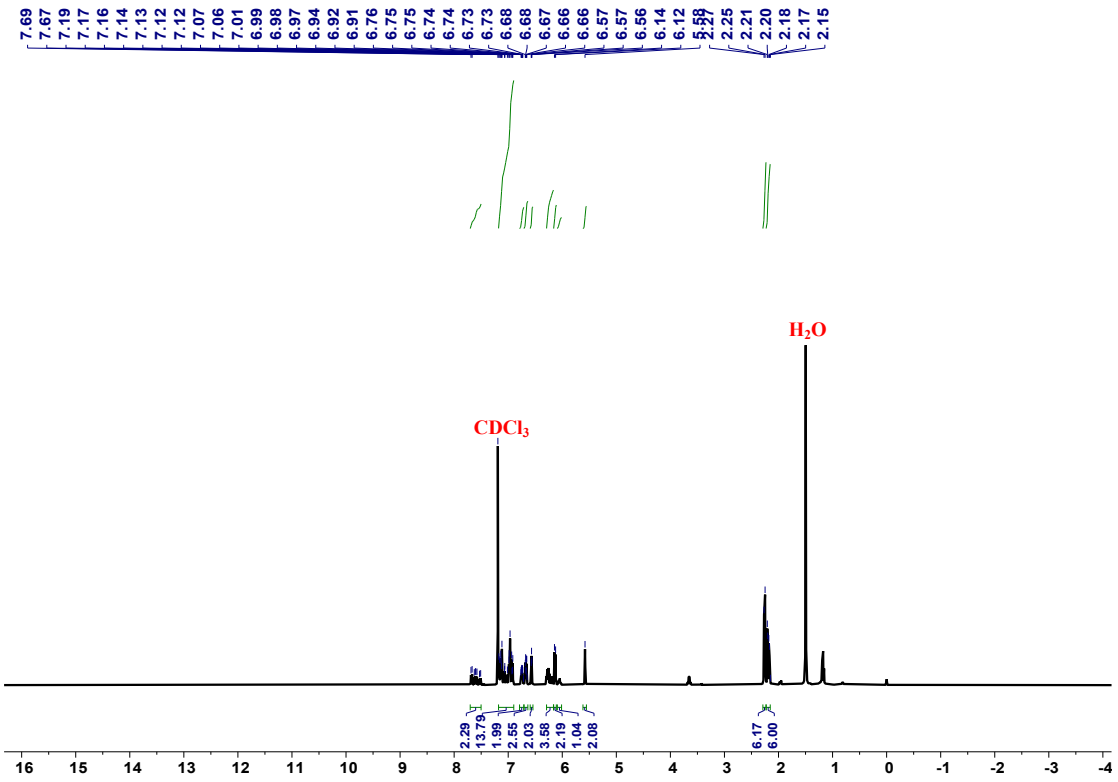


Figure S8. [1]H NMR of complex *rac*-**L2**.

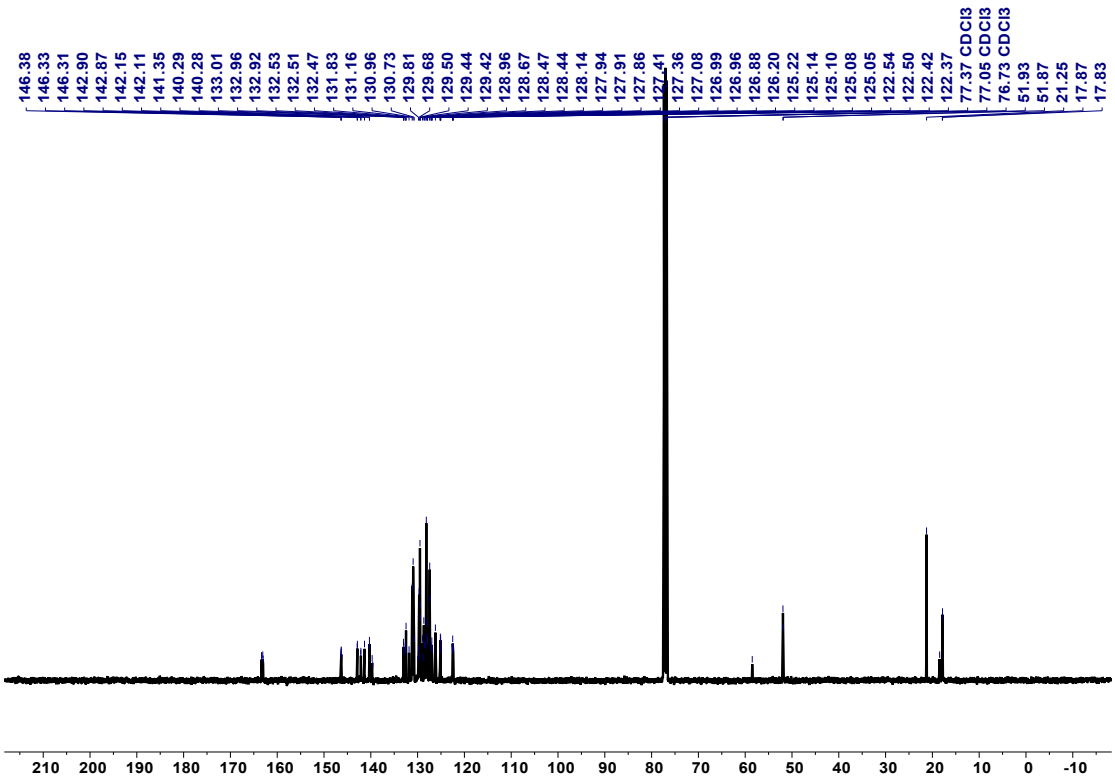


Figure S9. [13]C NMR of complex *rac*-**L2**.

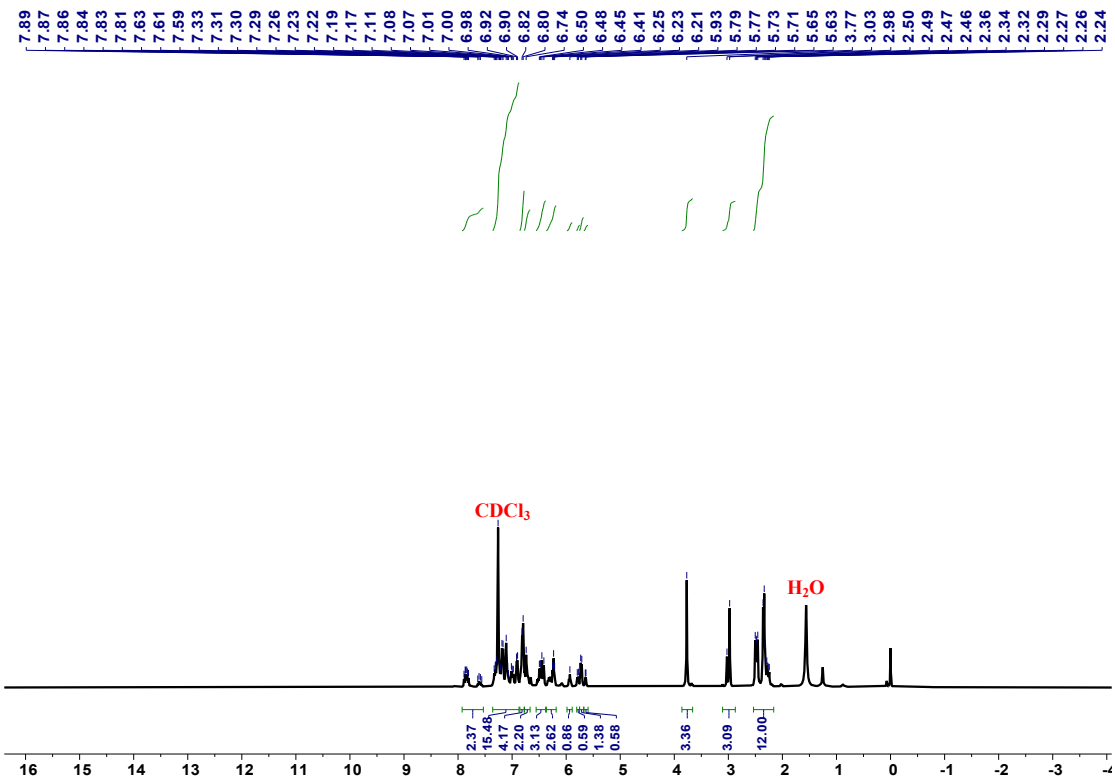


Figure S10. [1]H NMR of complex *rac*-**L3**.

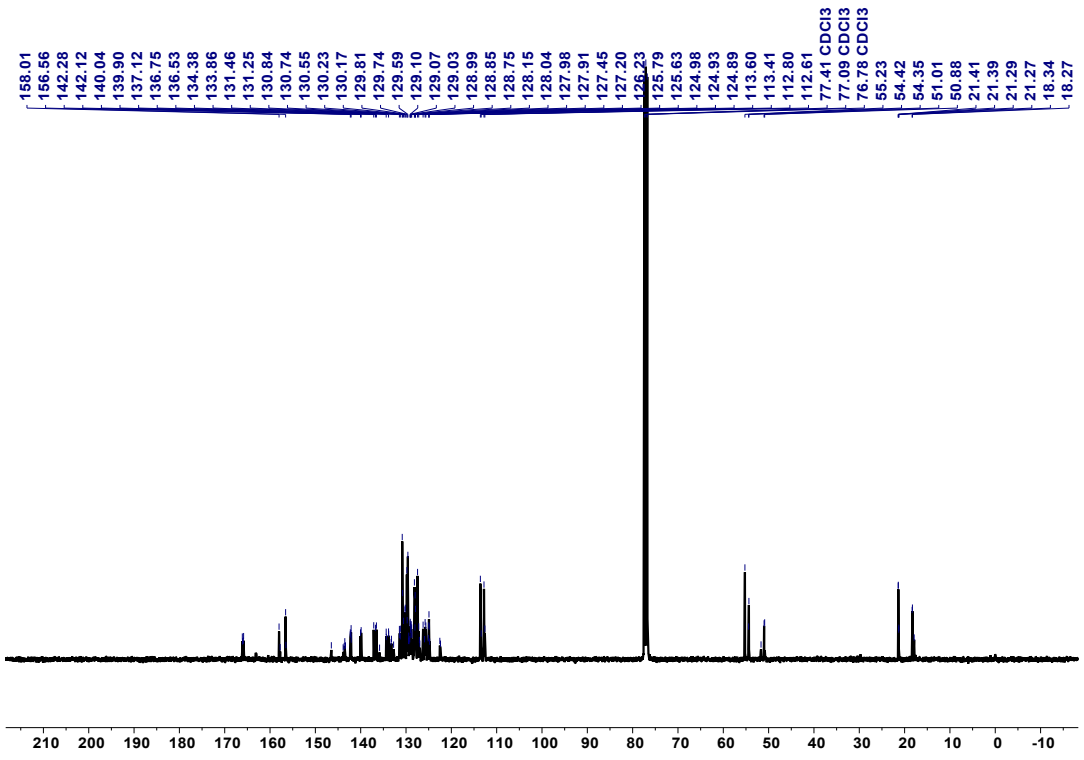


Figure S11. [13]C NMR of complex *rac*-**L3**.

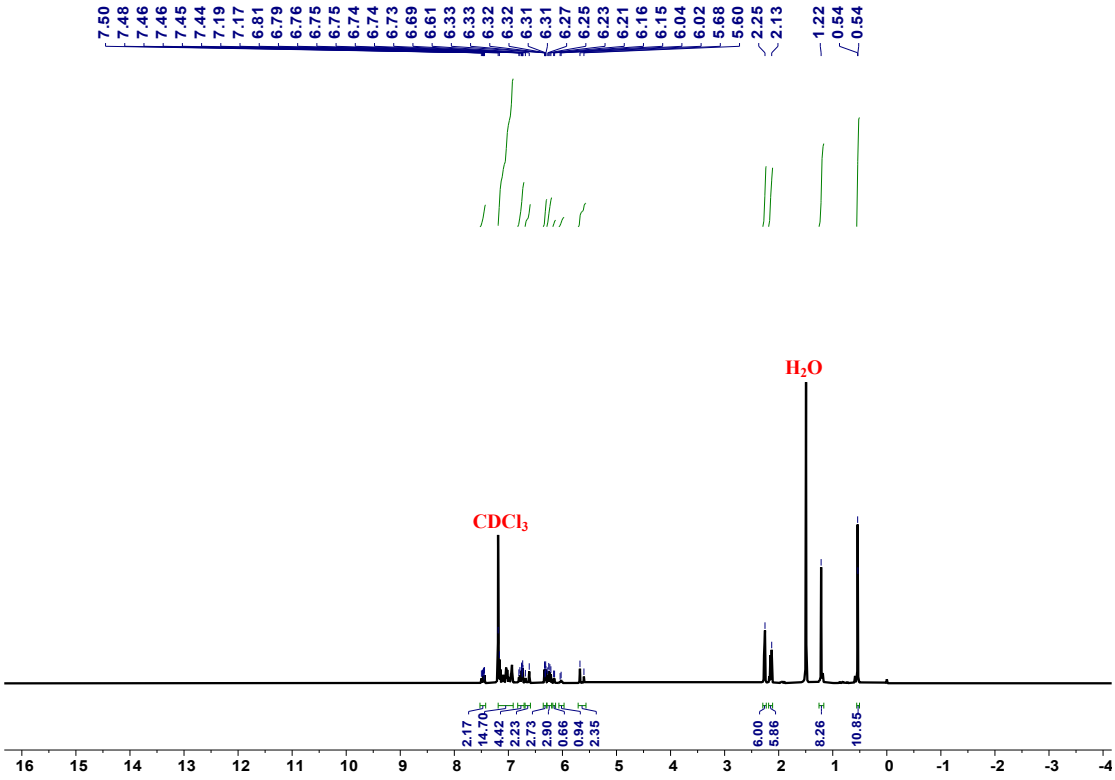


Figure S12. [1]H NMR of complex *rac*-**L4**.

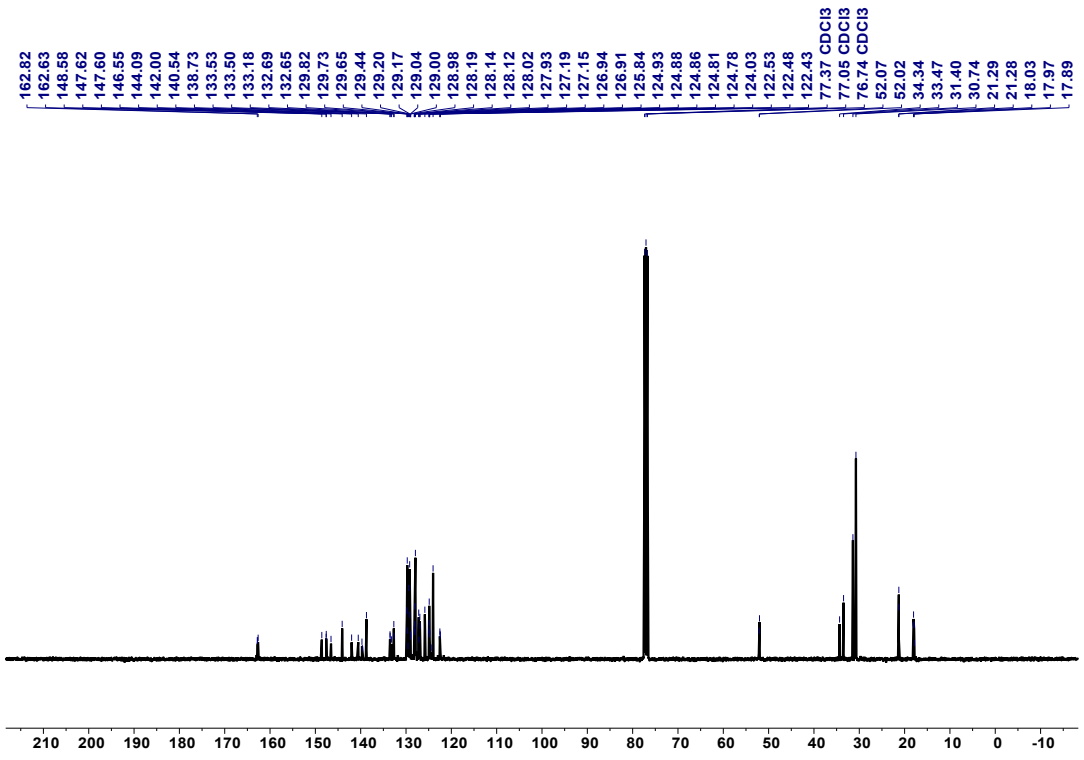


Figure S13. [13]C NMR of complex *rac*-**L4**.

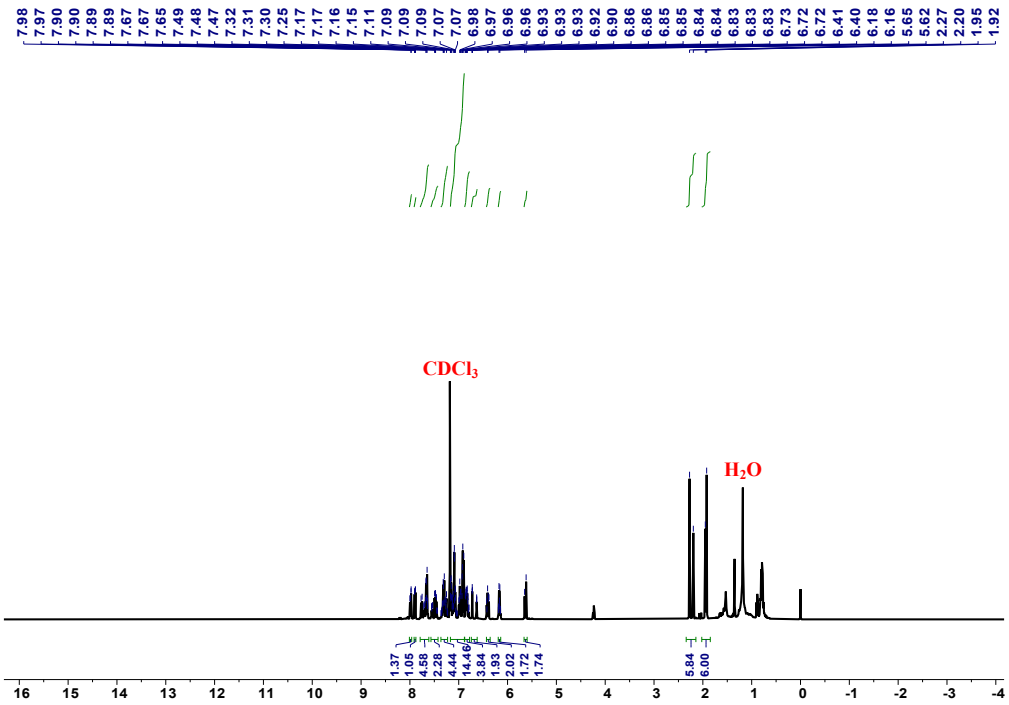


Figure S14. ^{1}H NMR of complex *rac*-**L5**.

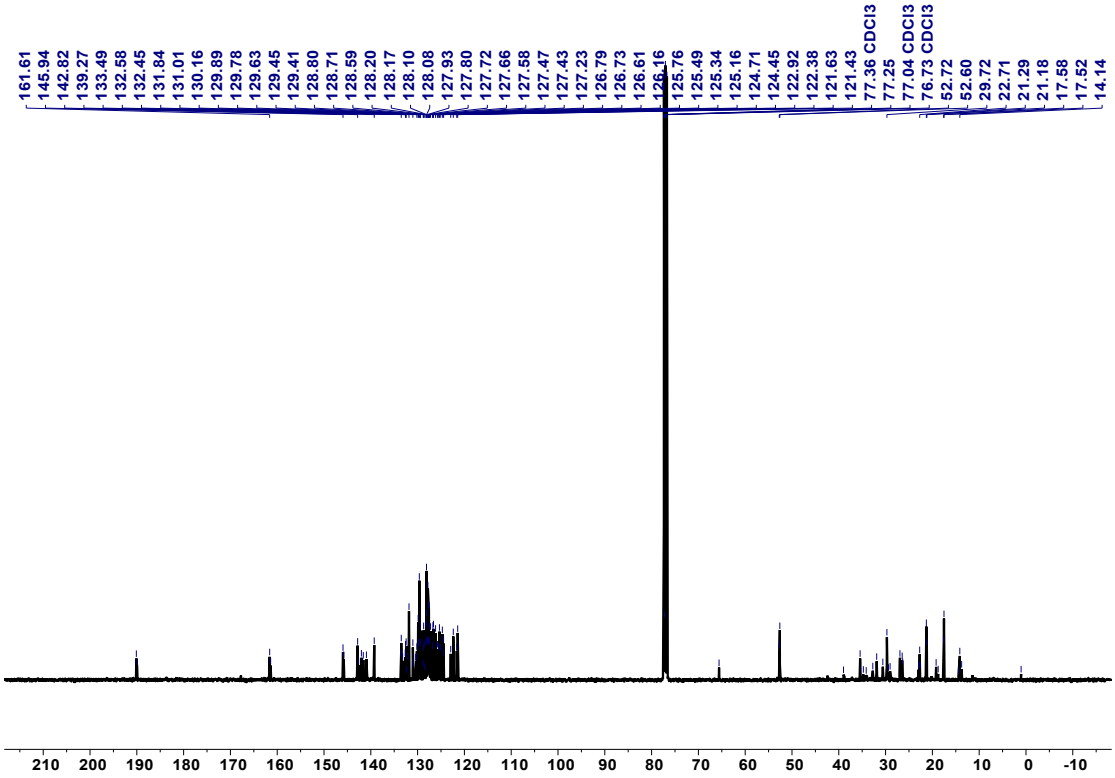


Figure S15. ^{13}C NMR of complex *rac*-**L5**.