

Figure S1: A typical GC showing the formation of 1-butene in ethylene oligomerisation reaction catalysed by pre-catalyst **1-4**

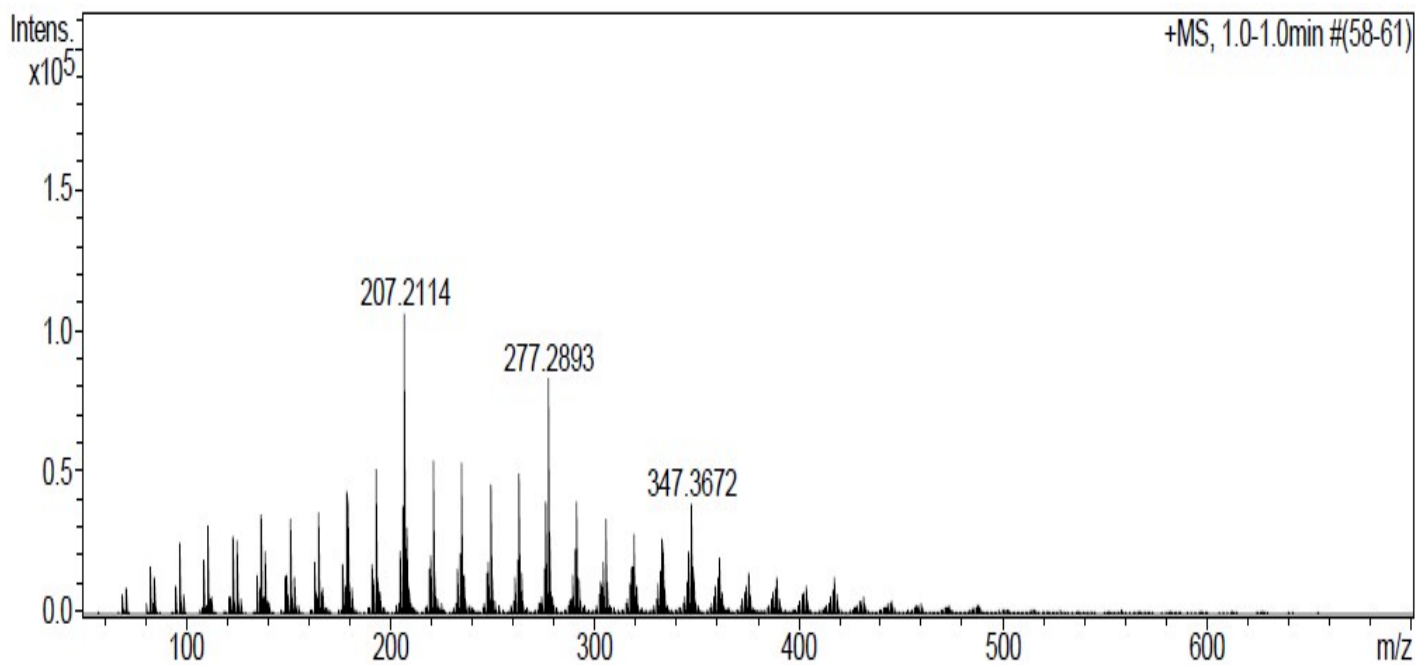


Figure S2: A typical APCI spectrum of the oligomer synthesised using pre-catalyst **1**

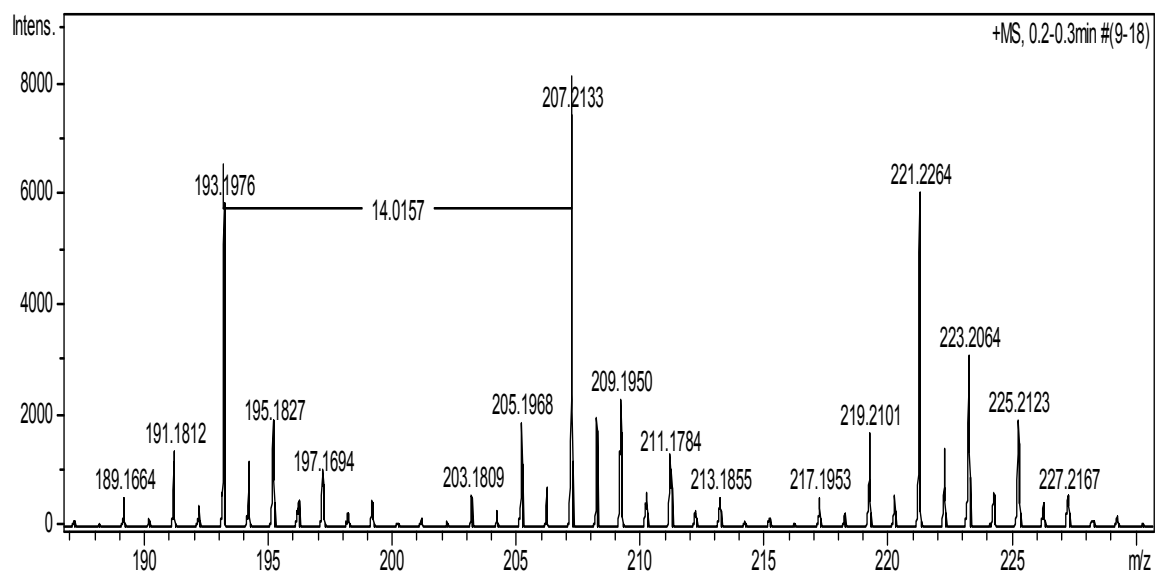


Figure S3: A typical APCI spectrum of the oligomer showing isotopic distributions

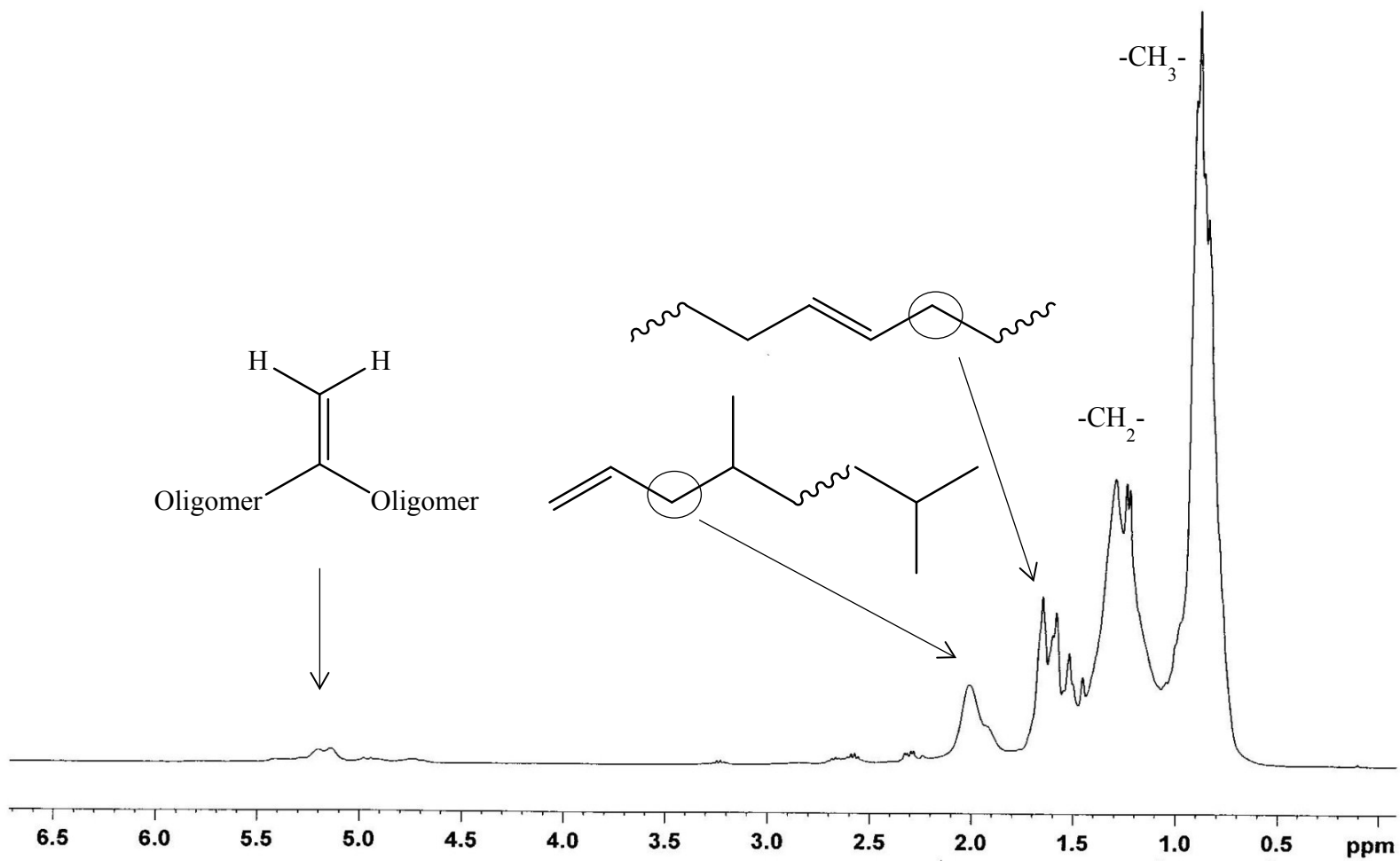


Figure S4: ^1H NMR spectrum of ethylene oligomer produced using pre-catalyst **3** run in CDCl_3 at 25 $^\circ\text{C}$

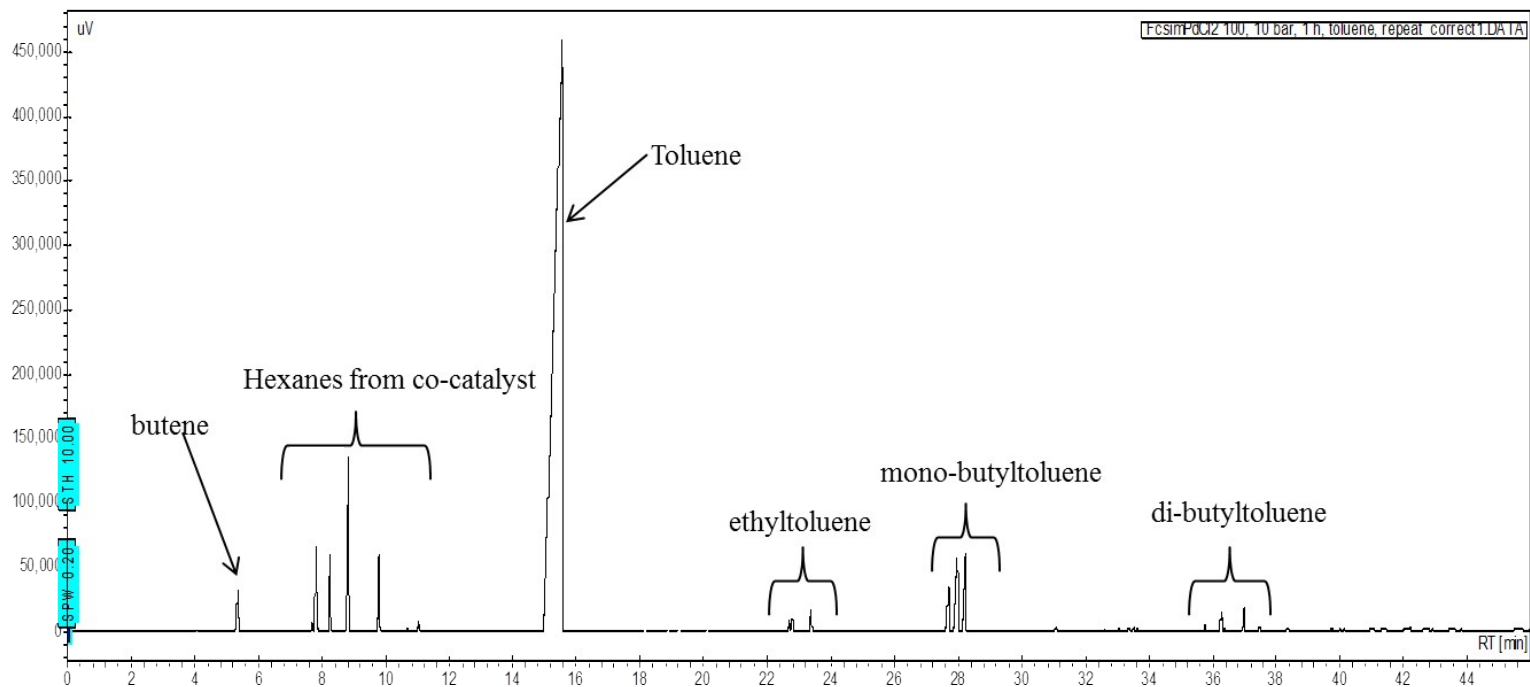


Figure S5: GC showing butene and alkylated toluenes produced using pre-catalyst **3**, EtAlCl₂ co-catalyst in toluene solvent, temperature = 25 °C, Al:Ni =200:1, pressure = 10 bar, time = 1 h.

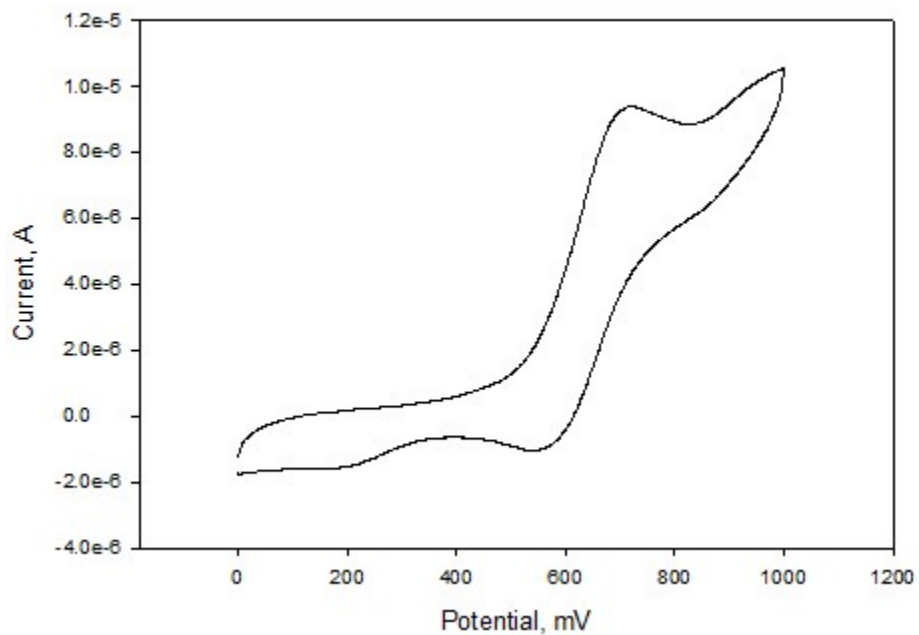


Figure S6: Cyclic voltammogram of compound **L7** in DMF, [tBuN][BF₄] as supporting electrolyte, Ag/AgCl as reference electrode, platinum wire as counter electrode, glassy carbon as working electrode, scan rate of 100 mVs⁻¹, temperature 25 °C.

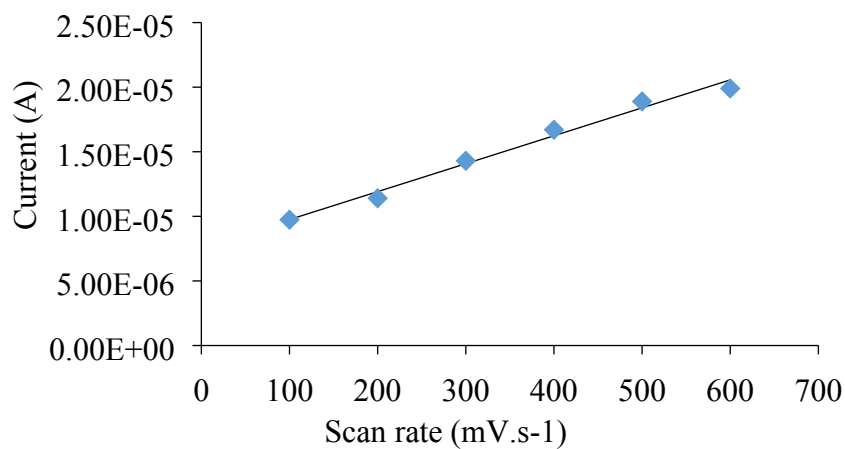


Figure S7: A plot of scan rate vs. current for ligand **L2** showing diffusion control mechanism

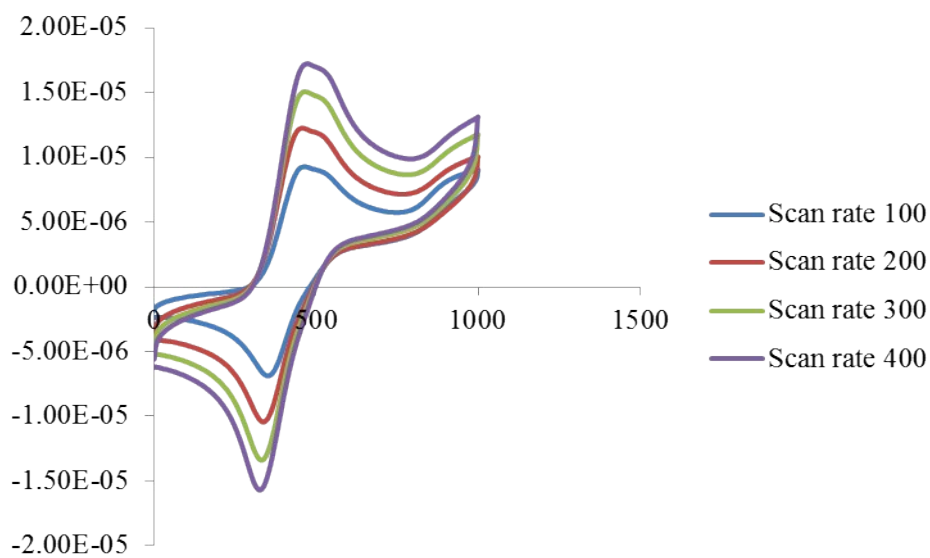
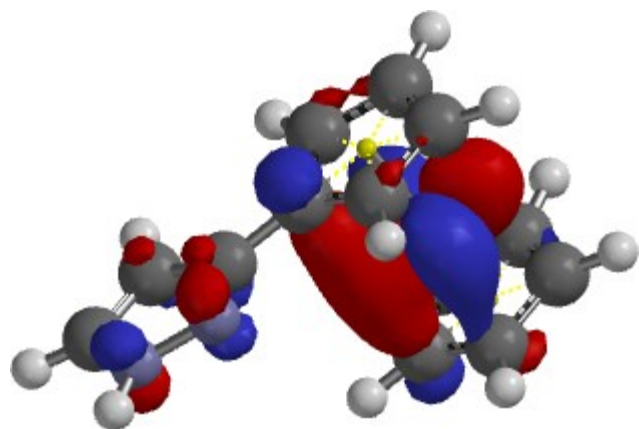


Figure S8: Cyclic voltammogram of compound **L2** with different scan rates showing independent of formal oxidation potential with scan rates ($\text{mV}\cdot\text{s}^{-1}$).

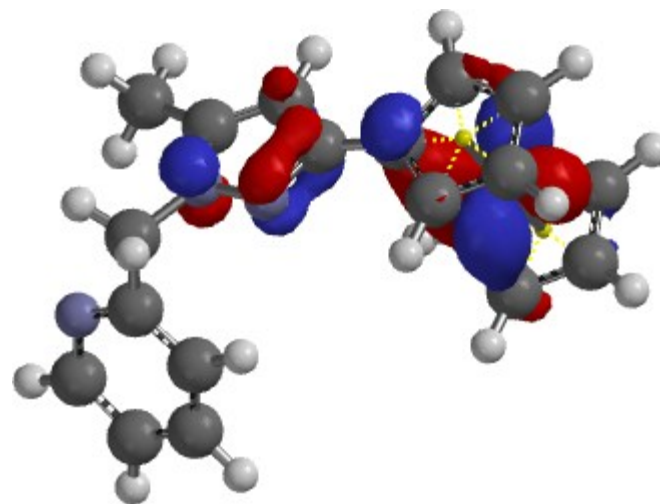
Table S1: Half wave potentials and catalytic activity of pre-catalysts **1-8**

Entry	Compound	$E_{1/2}$ (mV)	Activity ($\text{kg}\cdot\text{molNi}^{-1}\cdot\text{h}^{-1}$)
1	1	425.0	262
2	2	393.0	196
3	3	436.0	210
4	4	433.0	130
5	5	425.0	1 776*
6	6	393.0	1 023*
7	7	436.0	671*
8	8	433.0	578*
9	9	417.0	823*
10	10	424.0	710*

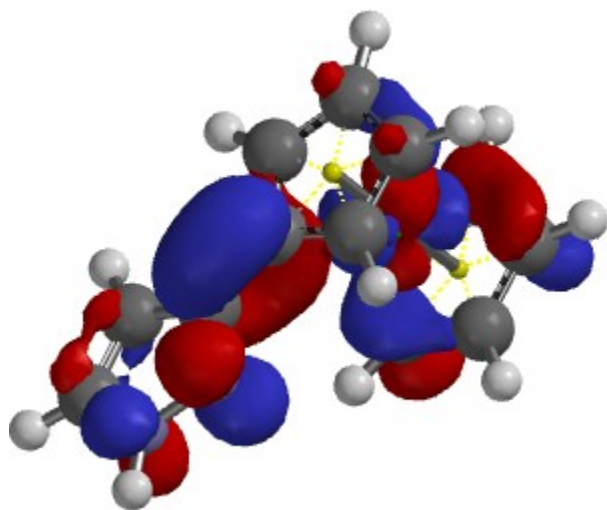
Activity obtained under the condition; ethylene pressure = 10 bar, Al:Pd = 200, time = 1 h, solvent = hexane. Activity obtained under the condition; ethylene pressure = 10 bar, Al:Ni = 400, time = 1 h, solvent = chlorobenzene.* Values obtained from reference 13b.



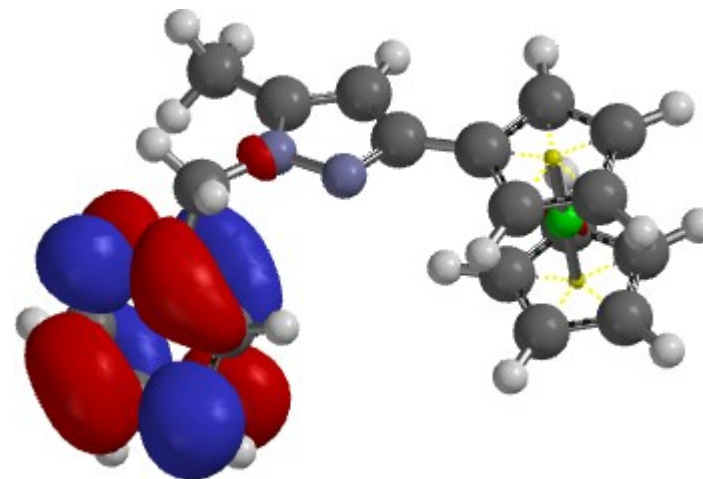
L1 HOMO



L4 HOMO



L1 LUMO



L4 LUMO

Figure S9: Shapes of HOMO and LUMO of ligands **L1** and **L4** using B3LYP level of theory and LACVP* basis set

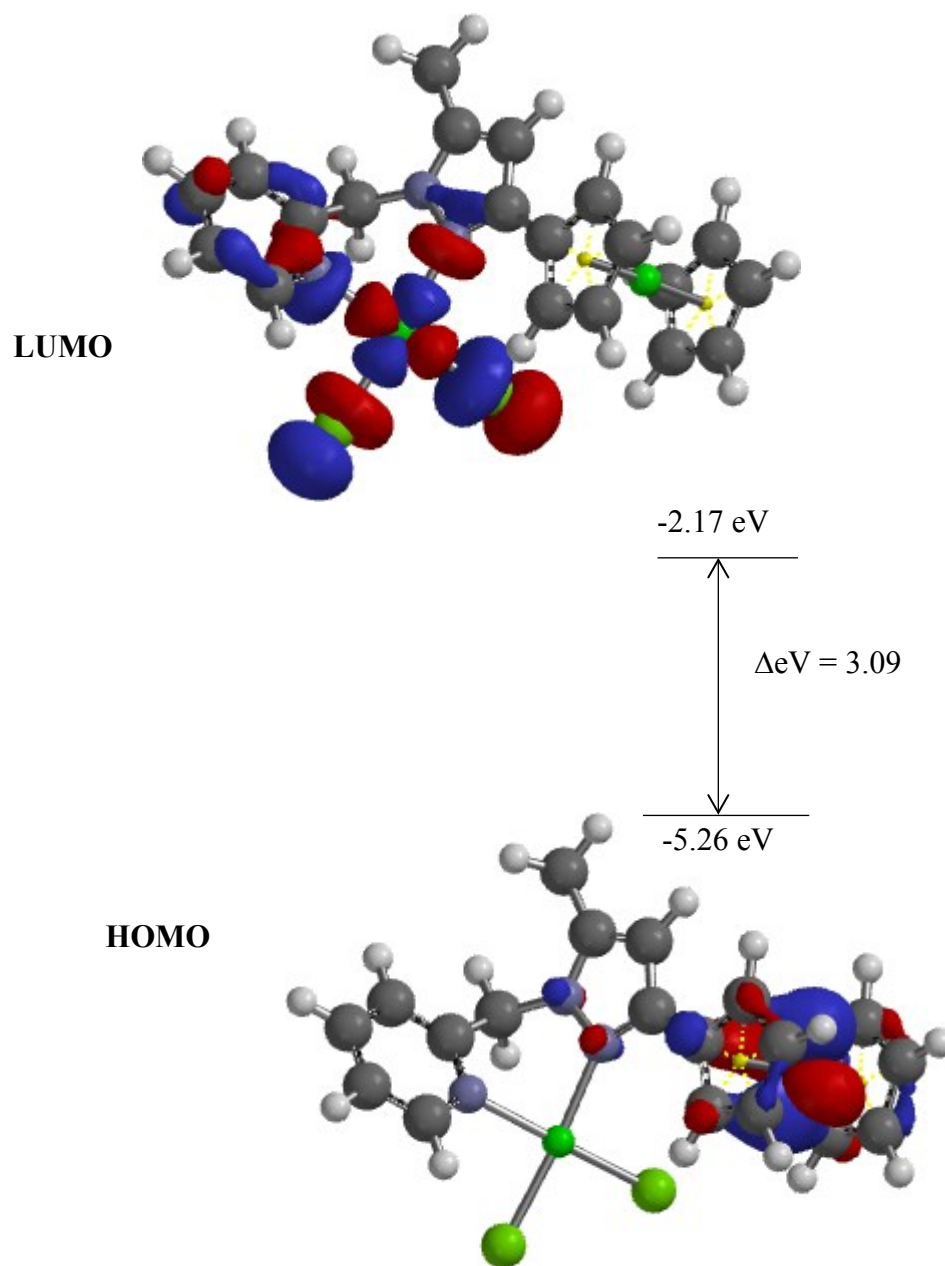


Figure S10: Frontier molecular orbitals of palladium complex **2** as determined by density functional theory using B3LYP level of theory and LACVP* basis set with isovalue of 0.032

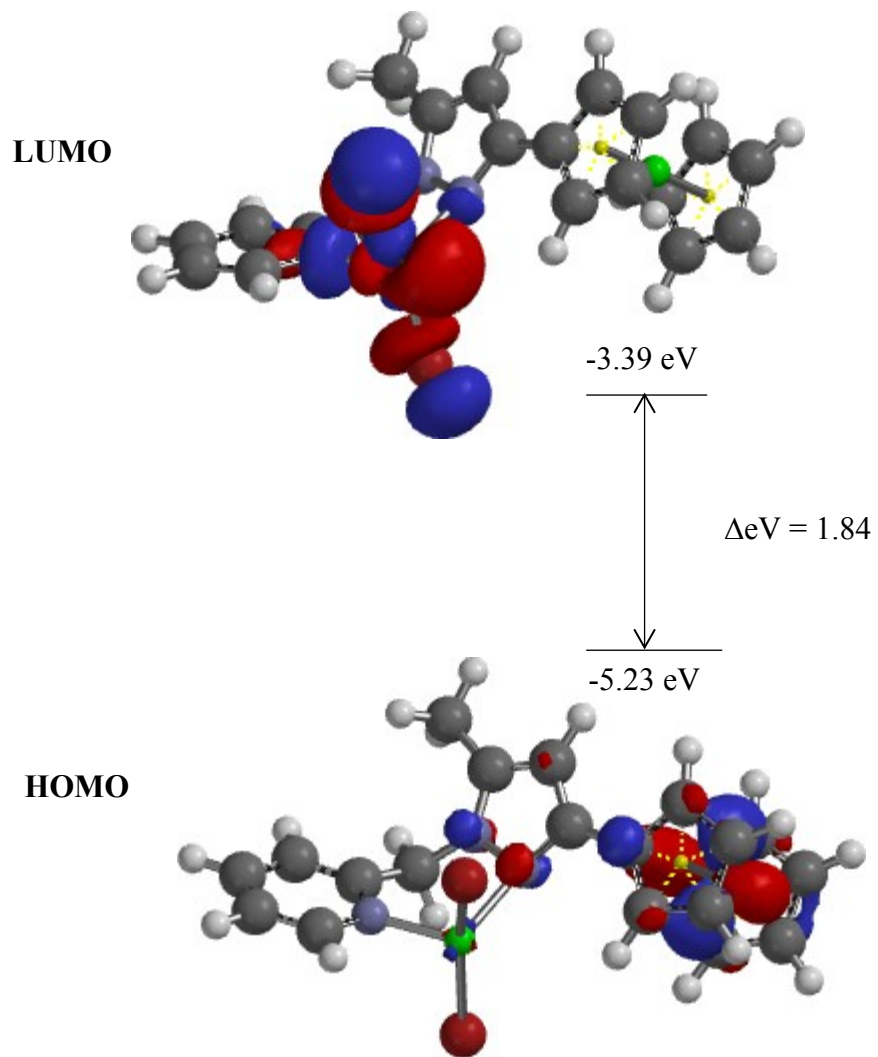


Figure S11: Frontier molecular orbitals of nickel complex **6** as determined by density functional theory using B3LYP level of theory and LACVP* basis set with isovalue of 0.032

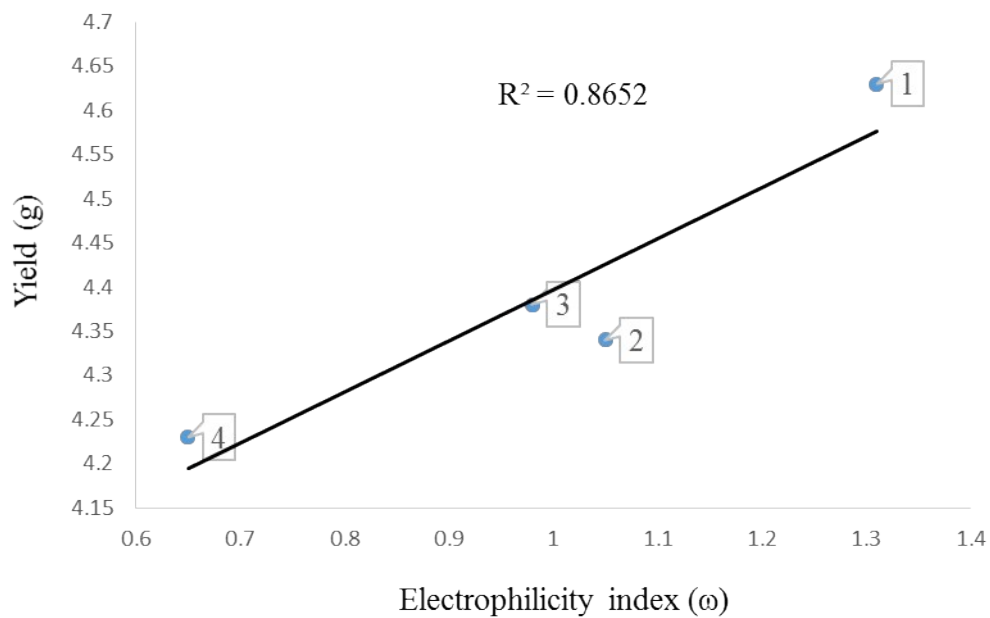


Figure S12: A graph of electrophilicity index against yield of oligomers produced using complexes **1-4**

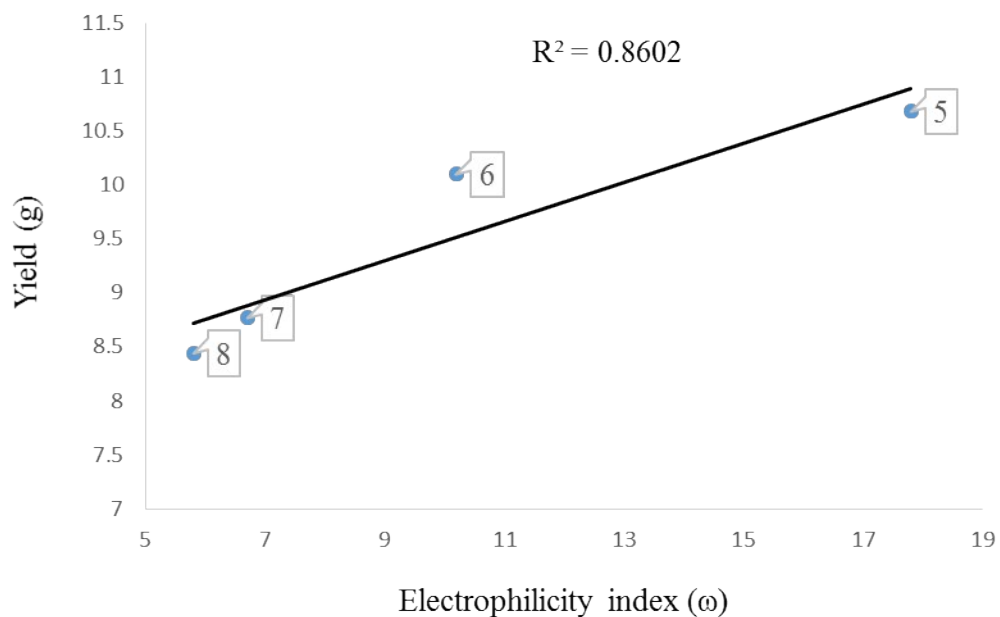


Figure S13: A graph of electrophilicity index against yield of oligomers produced using complexes **5-8**

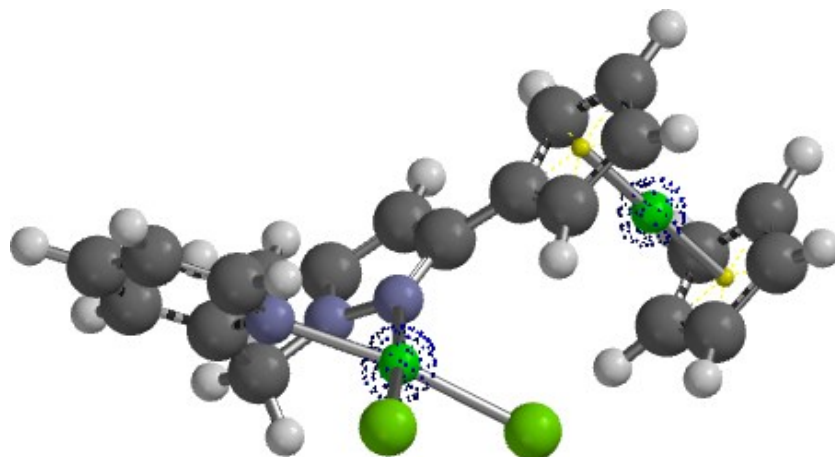


Figure S14: Molecular modelling structure of the electron density of nickel in **1** as determined by density functional theory using B3LYP level of theory and LACVP* basis set with isovalue of 1.0

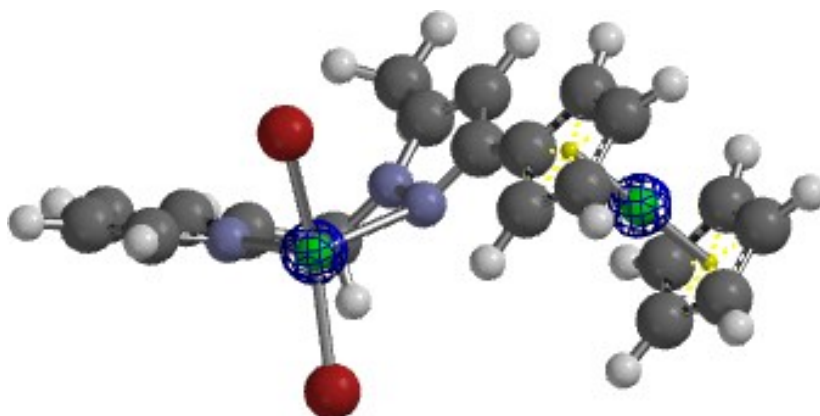


Figure S15: Molecular modelling structure of the electron density of nickel in **6** as determined by density functional theory using B3LYP level of theory and LACVP* basis set with isovalue of 1.0

Table S2: Electron densities of palladium in complexes **1-8**

Complex	Charge density	Yield (g)*
1	0.98547	1.31
2	0.98409	1.05
3	0.98367	0.98
4	0.98301	0.65
5	1.16578	17.80
6	1.16443	10.20
7	1.16321	6.70
8	1.16232	5.80

Yield obtained under the condition; ethylene pressure = 10 bar, Al:Pd = 200, time = 1 h, solvent = chlorobenzene. Yield obtained under the condition; ethylene pressure = 10 bar, Al:Ni = 400, time = 1 h, solvent = chlorobenzene.* Values obtained from reference 13b.