Electronic Supplementary Material (ESI) for Polymer Chemistry.

An Additional Potential Donor-bearing Alkylidene-containing Latent NHC-Ruthenium-based Catalyst for Olefin Metathesis Polymerization

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Figure S1. [1]H NMR spectra of ligand L1, complex **1** and SM

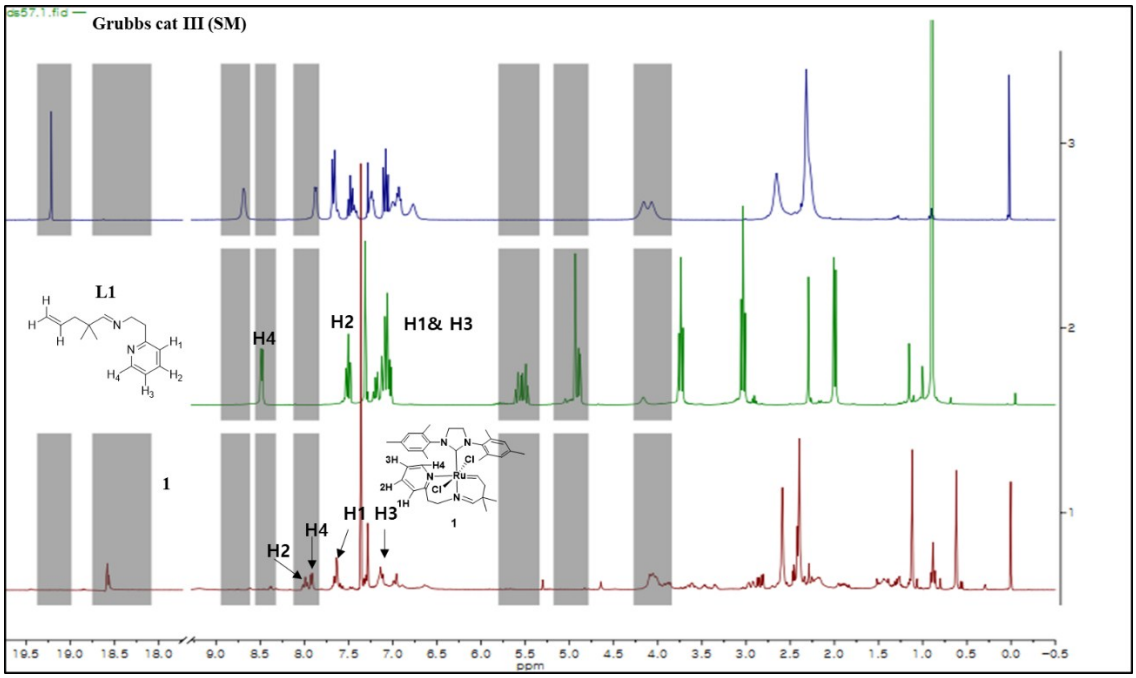

Figure S2. [1]H NMR spectra of ligand L2, complex **2** and SM

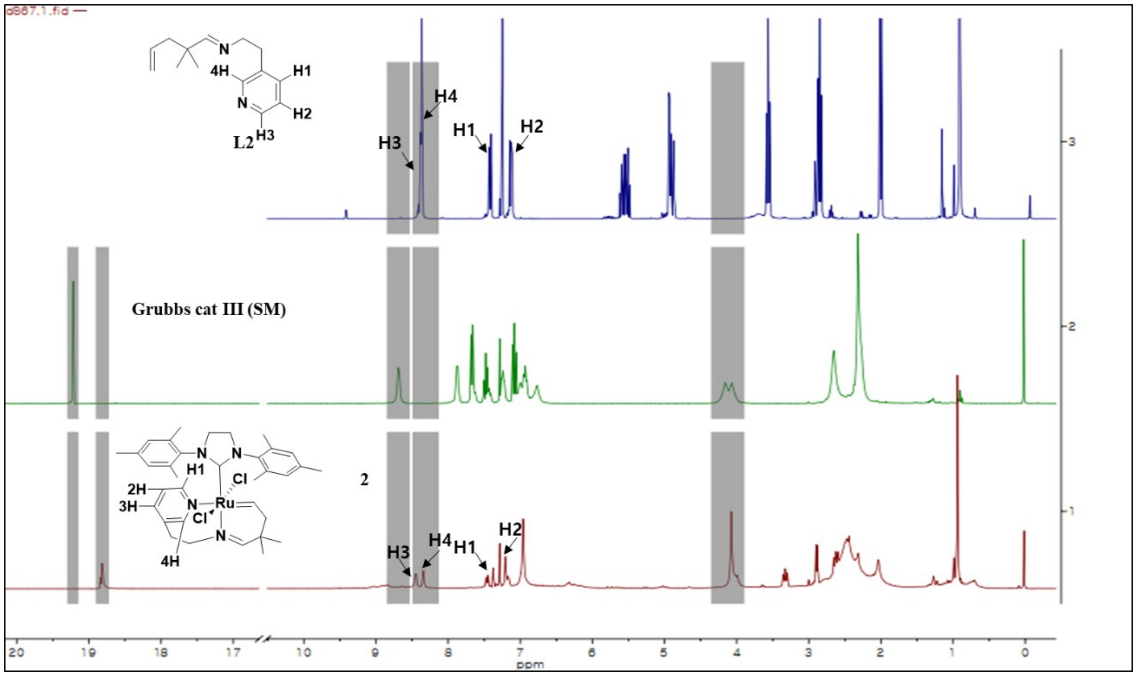

Figure S3. [1]H NMR spectra of ligand L3, complex **3** and SM

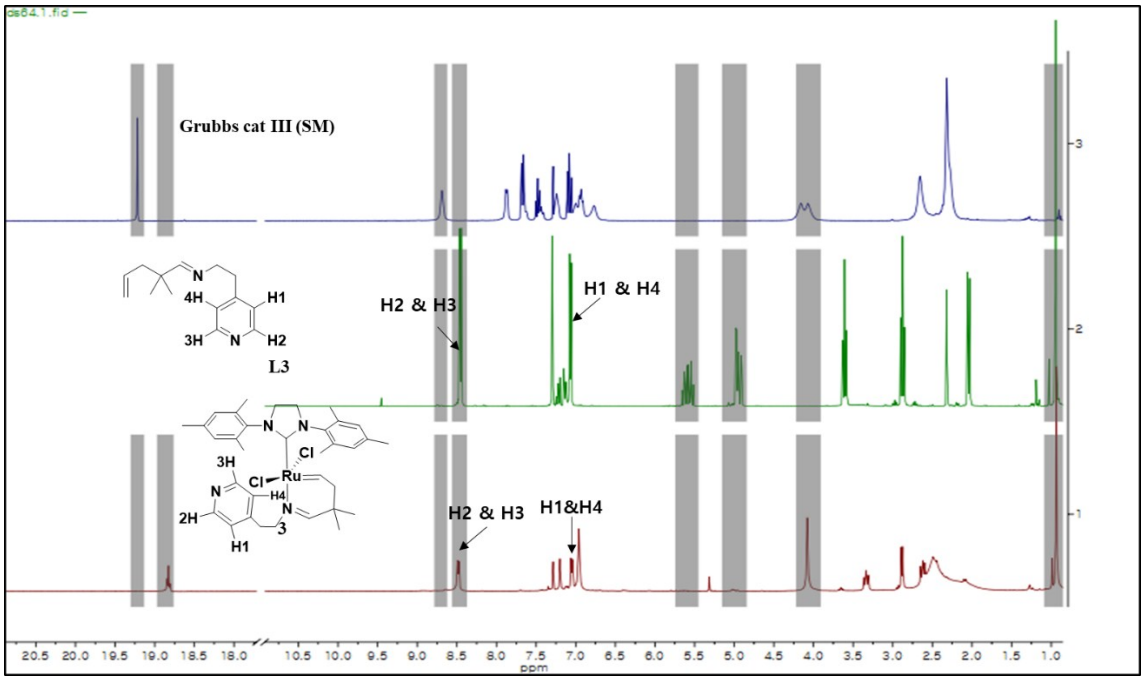

Figure S4. [1]H NMR spectra of ligand L3, complex **4** and SM

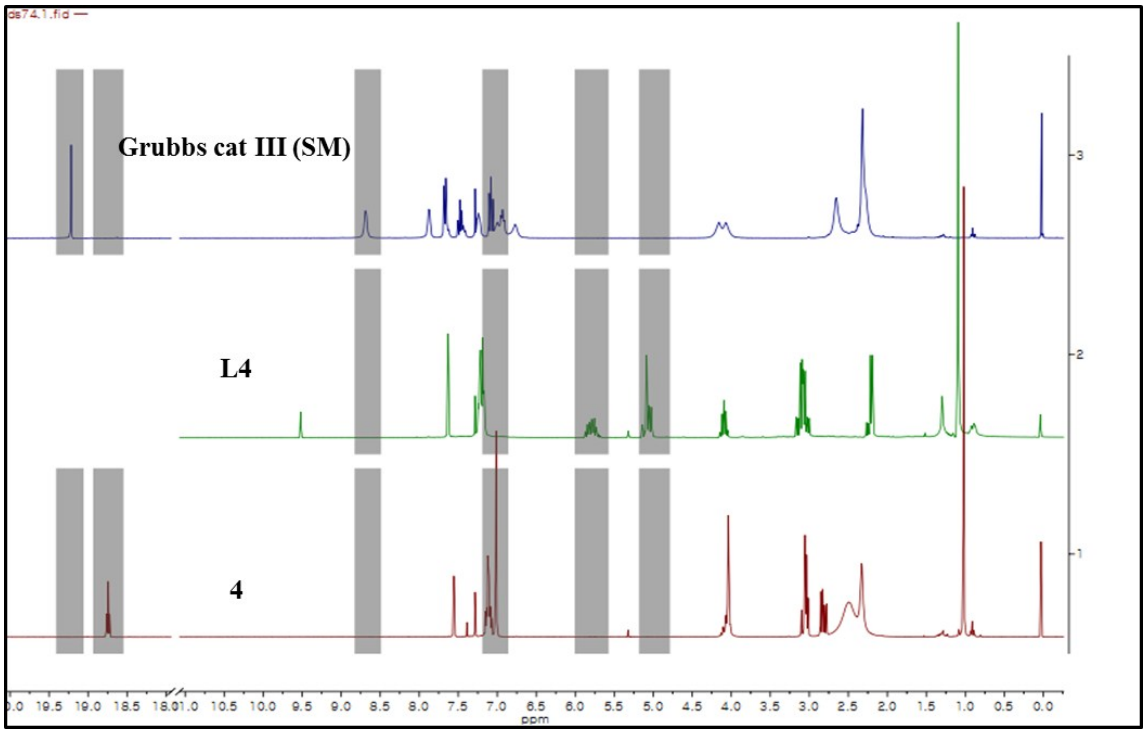

Figure S5: Exotherm plot of ROMP of DCPD for **1**, **2** and complex **C** at 80 °C. Catalysts and DCPD ratio: 1:10000

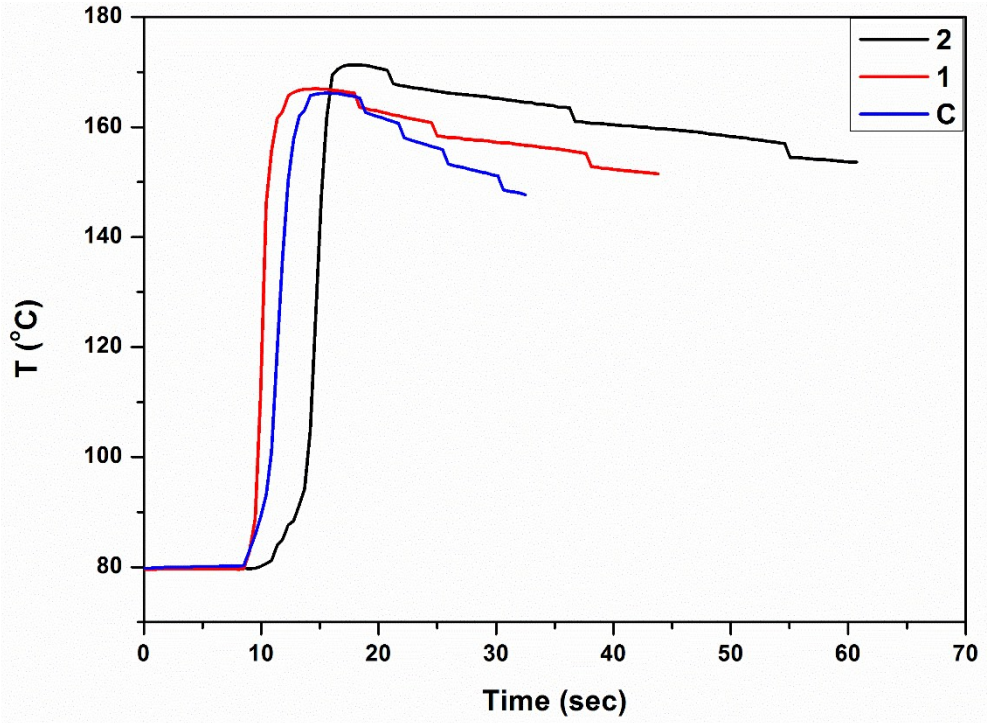

Figure S6. FT-IR spectra of ligands (L1-L4)

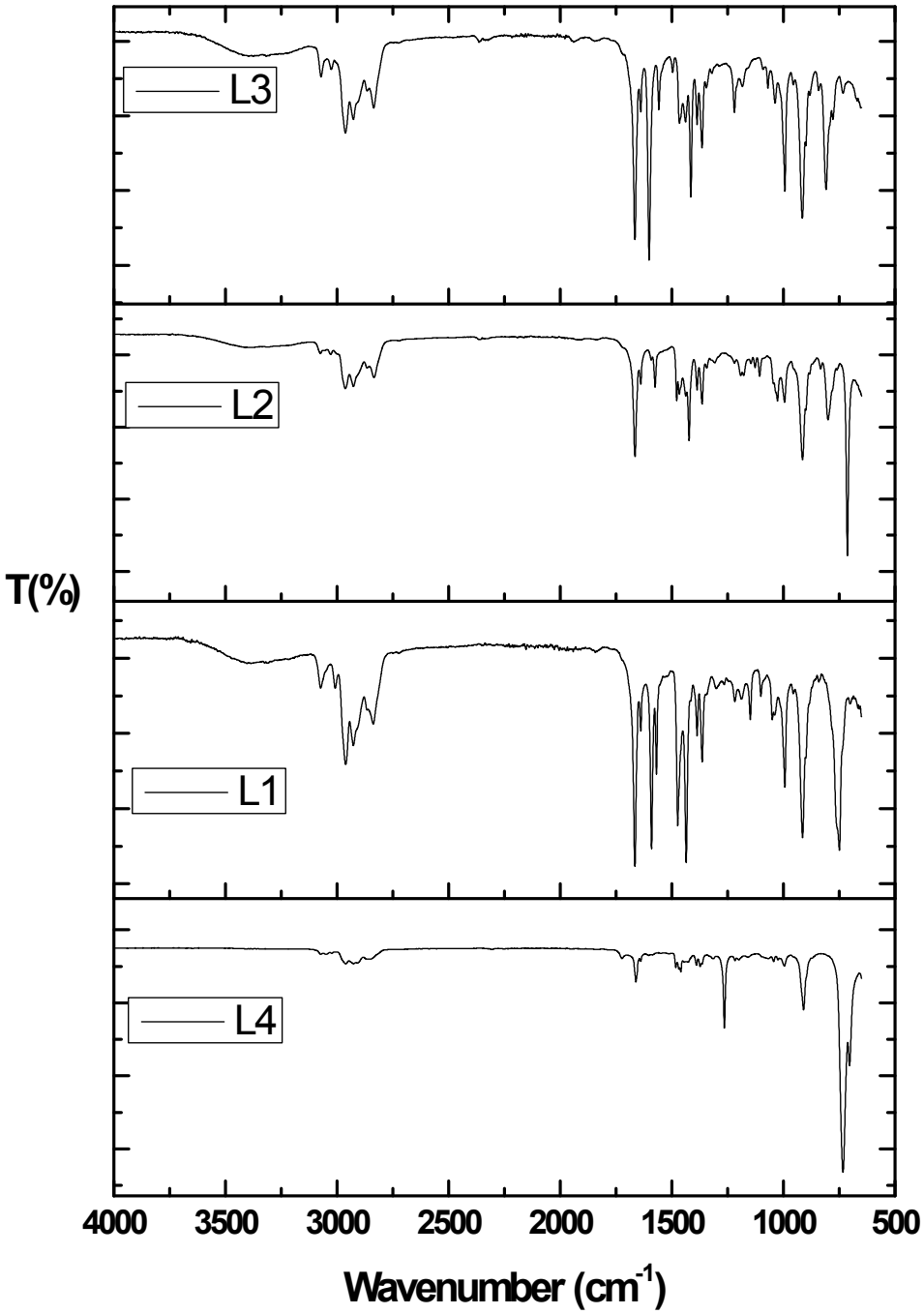

Figure S7. FT-IR spectra of compounds (**1-4**)

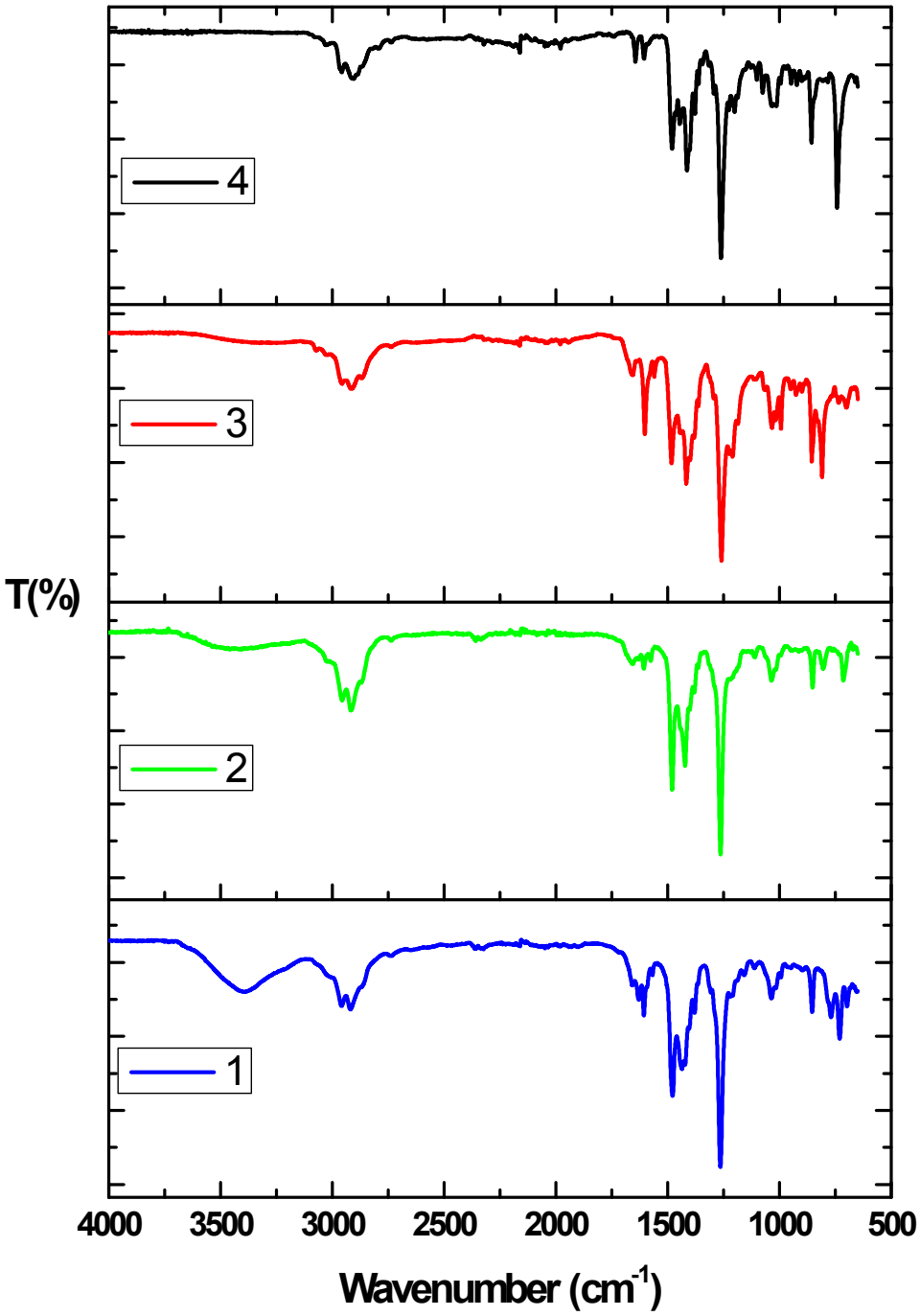

Figure S8. DSC curves for mixture of catalysts (1, 2, 3 and 4) and DCPD in the ratio of 1:1000, heating rate 10 ^{o}C/min.

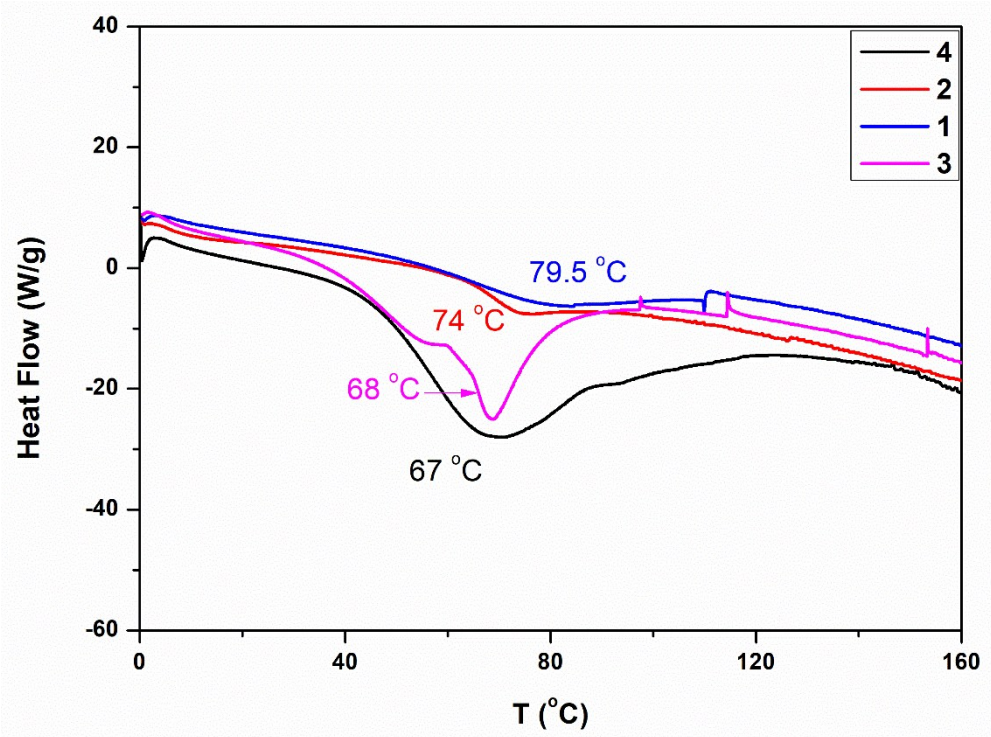

Table S1. FT-IR analysis data for ligand and complex (change in –C=N)

Entry	Catalyst	Ligand	Catalyst $\nu_{(C=N)}$, cm^{-1}	Ligand $\nu_{(C=N)}$, cm^{-1}	Frequency change $\Delta\nu_{(C=N)}$
1	**1**	L1	1652	1665	13
2	**2**	L2	1649	1664	15
3	**3**	L3	1653	1665	12
4	**4**	L4	1644	1660	16

Table S2. The T_g of the PDCDP obtained from complexes **1-4** in the ration of cat:DCPD = 1:10000, N/R –not recorded

Entry	Catalyst	T_g of the PDCDP at 30 and 60 ℃	T_g of the PDCDP at 80 ℃
1	**1**	96.45	144.21
2	**2**	107.82	149.21
3	**3**	108.14	N/R
4	**4**	114.41	N/R
5	**complex C**	130.91	153.98

Table S3. Crystal data and structure refinement for **4**

CCDC number	1954315	
Empirical formula	C36 H46 Cl2 N3 Ru	
Formula weight	692.73	
Temperature	296(1) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P2(1)/n	
Unit cell dimensions	a = 13.6977(4) Å	α= 90°.
	b = 11.9911(3) Å	β= 96.9080(10)°.
	c = 21.2056(5) Å	γ = 90°.
Volume	3457.75(16) $Å^3$	
Z	4	
Density (calculated)	1.331 Mg/m^3	
Absorption coefficient	0.636 mm^{-1}	
F(000)	1444	
Crystal size	0.30 x 0.20 x 0.08 mm^3	
Theta range for data collection	1.88 to 26.79°	
Index ranges	-17<=h<=17, 0<=k<=15, 0<=l<=26	
Reflections collected	7350	
Independent reflections	7350 [R(int) = 0.0000]	
Completeness to theta = 26.79°	99.8 %	
Absorption correction	Multi-scan	
Max. and min. transmission	0.9509 and 0.8321	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	7350 / 10 / 379	
Goodness-of-fit on F^2	1.055	
Final R indices [I>2sigma(I)]	R1 = 0.0490, wR2 = 0.1316	
R indices (all data)	R1 = 0.0617, wR2 = 0.1422	
Largest diff. peak and hole	1.039 and -0.706 $e.Å^{-3}$	

Table S4. Bond lengths [Å] and angles [°] for **4**

Ru(1)-C(22)	1.786(4)
Ru(1)-C(1)	2.043(3)
Ru(1)-N(3)	2.135(3)
Ru(1)-Cl(2)	2.3700(10)
Ru(1)-Cl(1)	2.3781(10)
C(22)-Ru(1)-C(1)	98.37(15)
C(22)-Ru(1)-N(3)	89.01(14)
C(1)-Ru(1)-N(3)	172.45(12)
C(22)-Ru(1)-Cl(2)	97.08(16)
C(1)-Ru(1)-Cl(2)	95.19(10)
N(3)-Ru(1)-Cl(2)	85.41(9)
C(22)-Ru(1)-Cl(1)	94.50(16)
C(1)-Ru(1)-Cl(1)	89.42(10)
N(3)-Ru(1)-Cl(1)	88.42(9)

Table S5. Polymerization Δ*H* of mixture of catalysts (1, 2, 3 and 4) and DCPD in the ratio of 1:1000

Entry	Catalysts	Δ*H* (J/g)
1	**1**	-116
2	**2**	-98.2
3	**3**	-175
4	**4**	-126
5	**G1**(reported)	-347[1]

Table S6. Pot life of the precatalyst - DCPD mixtures at room temperatures

Entry	Catalyst	Pot life of the precatalyst-DCPD mixtures at ambient temperatures (1:10000, precatalyst:DCPD ratio)
1	**1**	no gelation for 120 h
2	**2**	no gelation for 120 h
3	**3**	gelation was observed after 30 min
4	**4**	gelation was observed after 6 min
5	**C**	gelation was observed after 2 min