Supporting Information

An Investigation of Chain Microstructure of Polypropylene Polymerized by Ziegler-Natta catalysts with Diester- and Diether-Compound as Internal donor via Hydrogen Chain Transfer

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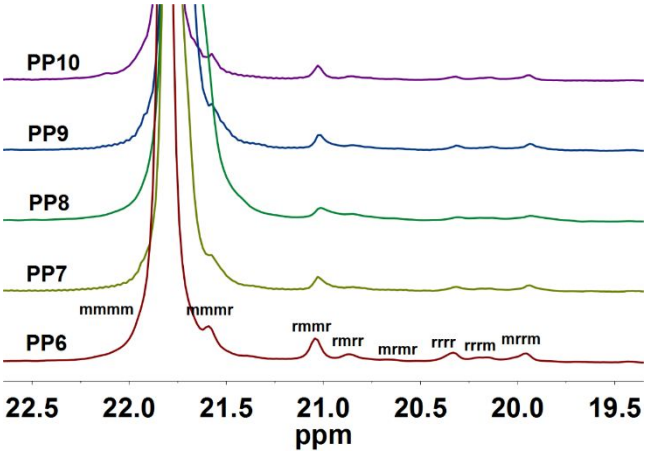

Figure S1. ^{13}C NMR spectra of PP samples prepared by cat2. The spectra were recorded at 120℃ using *o*-dichlorobenzene-d_4 as solvent.

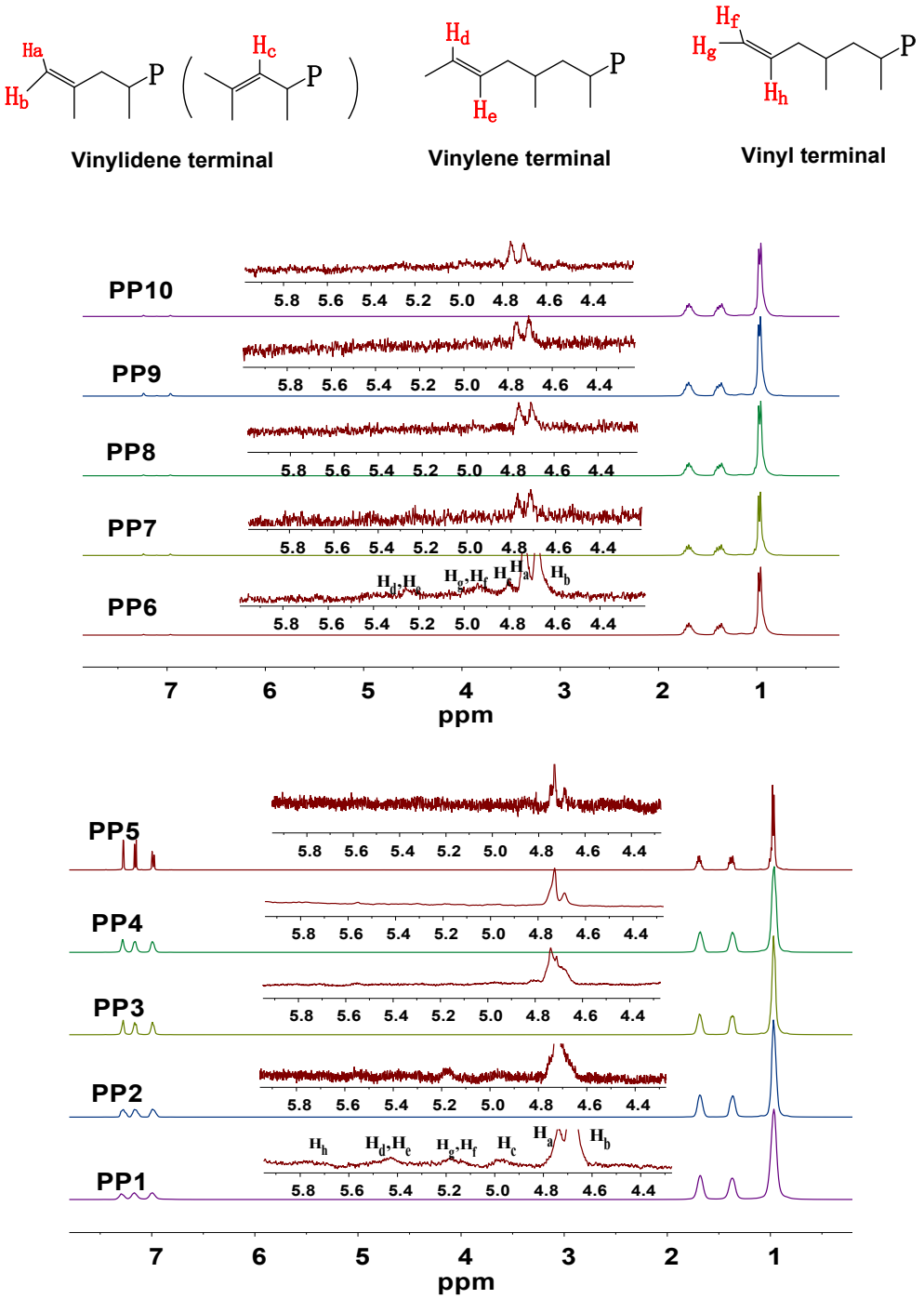

Figure S2. ^{1}H NMR spectra of PP1-PP10. Structure H_a and H_b correspond to the vinylidene (chain transfer reaction of β-H), structure H_c is the isomer of H_a and H_b, structure H_d and H_e correspond to the vinylene terminal (2,1-addition); structure H_f, H_g and H_h correspond to the vinyl terminal (chain transfer reaction of β-Me).

Table S1. The Domain range and the optimal annealing temperature *Ts* of polypropylene samples

Run	Domain-Ⅰ (°C)	Domain-Ⅱ (°C)	Domain-Ⅲ (°C)	T_s (°C)
PP1	$Ts>172$	$167<Ts\leqslant172$	$Ts\leqslant167$	167
PP2	$Ts>172$	$169<Ts\leqslant172$	$Ts\leqslant169$	169
PP3	$Ts>172$	$169<Ts\leqslant172$	$Ts\leqslant169$	169
PP4	$Ts>172$	$169<Ts\leqslant172$	$Ts\leqslant169$	169
PP5	$Ts>173$	$169<Ts\leqslant173$	$Ts\leqslant169$	169
PP6	$Ts>166$	$162<Ts\leqslant166$	$Ts\leqslant162$	162
PP7	$Ts>167$	$164<Ts\leqslant167$	$Ts\leqslant164$	164
PP8	$Ts>167$	$164<Ts\leqslant167$	$Ts\leqslant164$	164
PP9	$Ts>167$	$164<Ts\leqslant167$	$Ts\leqslant164$	164
PP10	$Ts>167$	$164<Ts\leqslant167$	$Ts\leqslant164$	164

Table S2. The lamellae thicknesses of polypropylene after SSA thermal fractionation

Run	L_1(nm)	L_2(nm)	L_3(nm)	L_4(nm)	L_5(nm)
PP1	91.15	26.08	16.63	9.58	7.90
PP2	76.52	26.91	17.21	9.58	7.90
PP3	75.82	26.45	16.02	9.37	7.95
PP4	65.77	26.37	16.86	9.51	7.98
PP5	-	24.00	14.87	9.47	7.98
PP6	30.50	15.08	9.64	7.58	6.60
PP7	33.43	17.31	10.92	7.90	6.82
PP8	30.07	17.05	10.39	7.78	6.82
PP9	27.89	16.56	10.34	7.83	6.80
PP10	23.91	15.77	9.97	7.66	6.76

Table S3. The relative contents of each peak on the SSA curves of polypropylene

Run	n_1 (%)	n_2 (%)	n_3 (%)	n_4 (%)	n_5 (%)
PP1	0.50	67.00	29.13	1.84	1.47
PP2	0.49	62.34	27.38	8.44	1.34
PP3	1.24	62.83	27.33	2.84	1.81
PP4	0.63	53.68	38.35	5.47	1.86
PP5	-	58.10	32.80	7.60	1.51
PP6	21.46	59.47	14.66	2.13	2.00
PP7	12.06	63.57	20.04	3.23	1.09
PP8	2.08	69.72	24.06	2.77	1.38
PP9	1.68	74.58	19.90	2.11	1.73
PP10	1.20	70.31	23.99	1.87	2.63