Supplementary Information for:

Ring opening metathesis polymerizations in d-limonene: a renewable polymerization solvent and chain transfer agent for the synthesis of alkene macromonomers

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Table S1. GC/MS data for the products resulting from the oligomerization of 1,5-hexadiene (HD) in d-limonene.[a]

entry	[HD] (M)	CDT[b] (%)	**B_3** (%)	**A_1** (%)	**B_4** (%)	**A_2** (%)	**B_5** (%)	**A_3** (%)	**C_1** (%)	**B_6** (%)	**A_4** (%)	**C_2** (%)	**B_7** (%)	**A_5** (%)	**C_3** (%)
Retention time (min)		6.1	6.9	7.6	11.1	11.7	13.9	14.5	14.9	16.1	16.6	17.1	18.0	18.6	19.2
1	1.0	6.3	23.7	10.1	17.6	7.8	13.8	5.5	0.5	7.0	3.1	0.2	2.9	1.4	0.1
2	0.6	4.1	15.1	23.9	10.7	16.3	6.6	9.8	2.7	2.9	3.8	1.5	0.9	1.3	0.4
3	0.3	2.3	9.6	40.0	6.7	19.8	3.1	8.6	3.2	0.9	2.8	1.8	0.1	0.5	0.6
4	0.2	1.7	5.2	41.9	3.4	21.9	2.0	8.9	8.6	0.6	2.6	3.2	-[d]	-[d]	-[d]
5[c]	0.2	1.1	20.9	45.9	8.2	14.7	2.2	4.0	1.3	0.5	0.9	0.3	-[d]	-[d]	-[d]

[a]All reactions were run at 45° C for 24 h with 1,5-hexadiene (3.0 mmol), d-limonene and 1 mol % of (1,3-dimesitylimidazolidine-2-ylidene)(tricyclohexylphosphine)benzylidene ruthenium dichloride unless otherwise noted. [b]CDT = cyclododecatriene. [c]Reaction time was 3 h. [d]Not detected.

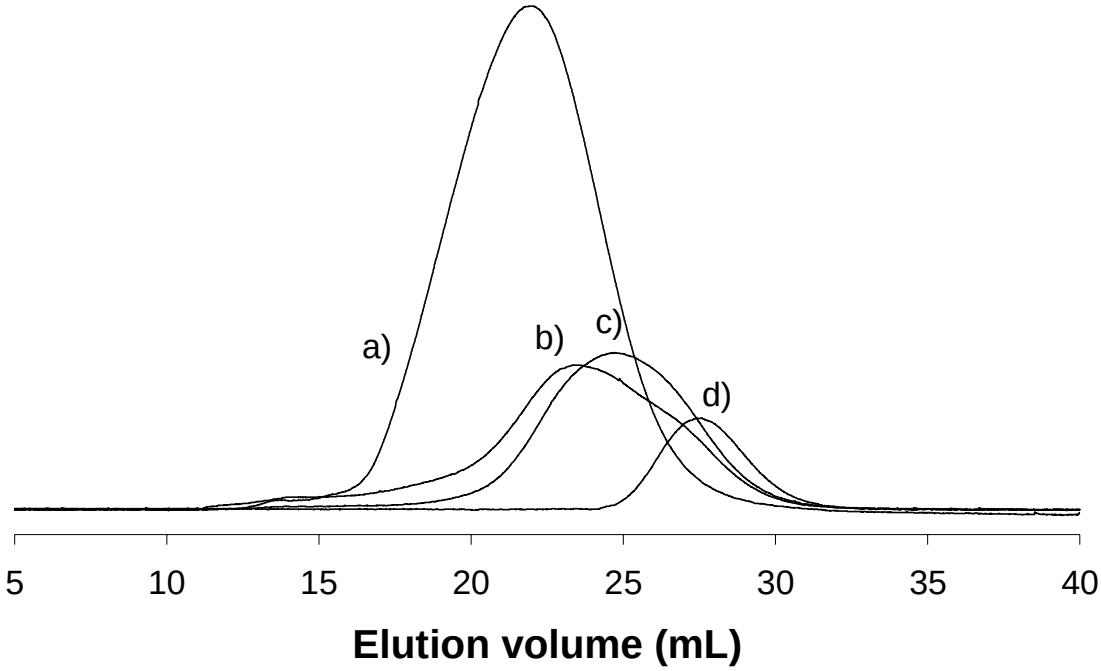

Figure S1. Size exclusion chromatography data (90° lighting scattering detector) for the ring opening metathesis polymerization of 1,5-cyclooctadiene (1.3 M) in d-limonene at 23° C for a) 1 h, b) 3 h, c) 6 h and d) 20 h.

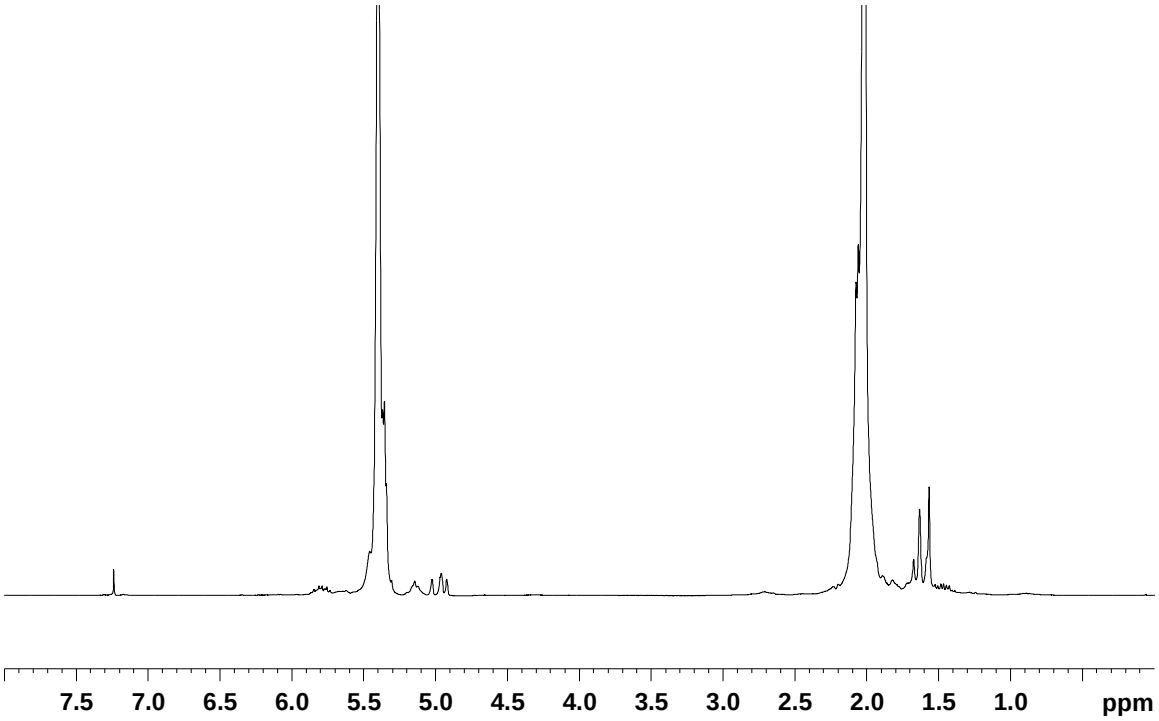

Figure S2. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum for product resulting from the ring opening metathesis polymerization of 1,5-cyclooctadiene (1.3 M) in d-limonene at ambient temperature after 20 h.

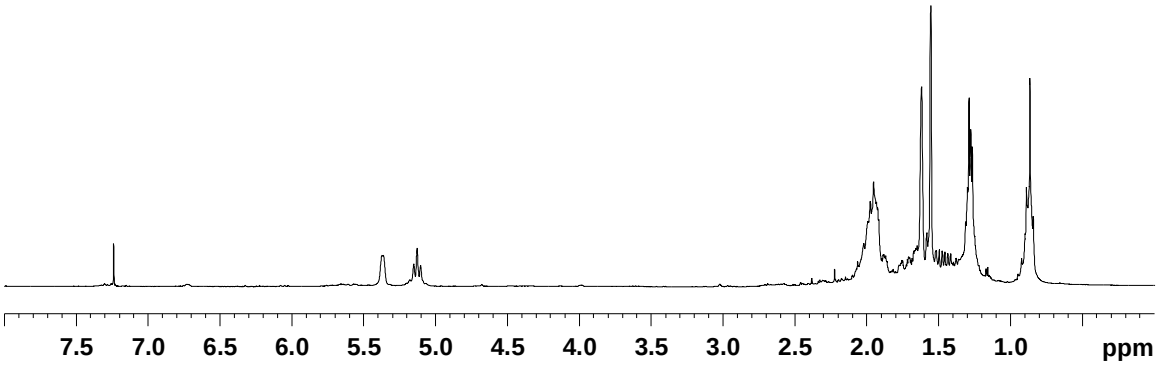

Figure S3. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum for product resulting from the cross metathesis of d-limonene and 1-hexene. The reaction was catalyzed with 2 mol % of (1,3-dimesitylimidazolidine-2-ylidene)(tricyclohexylphosphine)benzylidene ruthenium dichloride

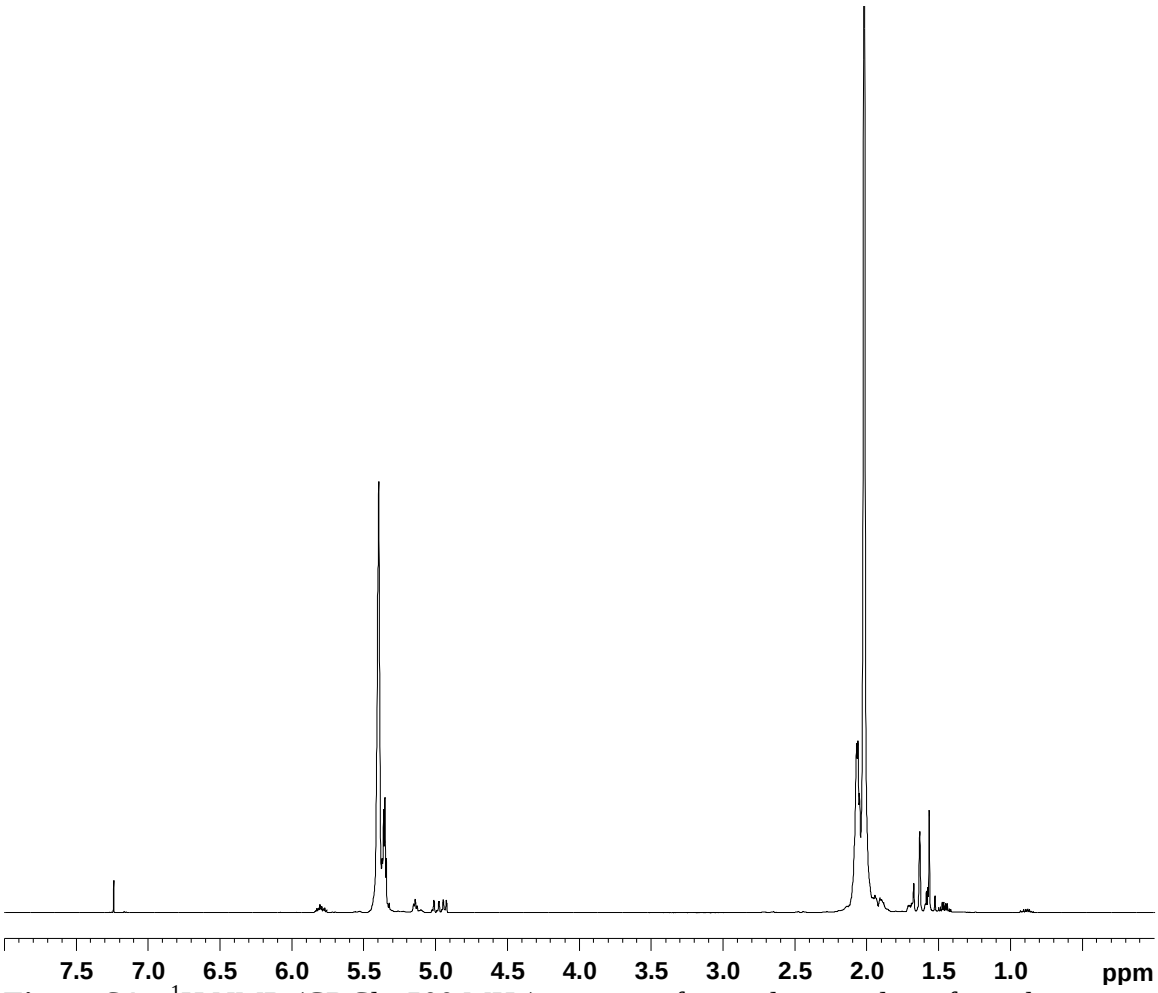

Figure S4. ^{1}H NMR ($CDCl_3$, 500 MHz) spectrum for product resulting from the ring opening metathesis polymerization of 1,5-cyclooctadiene (1.3 M) in d-limonene at 70° C after 1 h.

Table S2. Effect of time and temperature on the ring opening metathesis polymerization of 1,5-cyclooctadiene (1.3 M).[a]

Entry	Solvent	Temp (° C)	Time (h)	Yield (%)	M_w (g/mol)	M_w/M_n
1	toluene	23	1	51	57900	2.64
2	d-limonene	23	1	83	11100	2.38
3	hydrogenated d-limonene	23	1	66	56100	2.0
4	d-limonene	23	3	91	4920	1.65
5	d-limonene	23	6	84	3860	1.55
6	toluene	23	6	71	49900	2.94
7	d-limonene	23	20	76	1740	1.19
8	d-limonene	70	1	56	1120	1.05
9	d-limonene	70	3	37	970	1.09
10	d-limonene	70	6	37	910	1.09
11	d-limonene	70	20	20	870	1.05

[a]All polymerizations were run with 4.0 mmol monomer, 0.005 mmol (1,3-dimesitylimidazolidine-2-ylidene)(tricyclohexylphosphine)benzylidene ruthenium dichloride and 3.0 mL solvent.

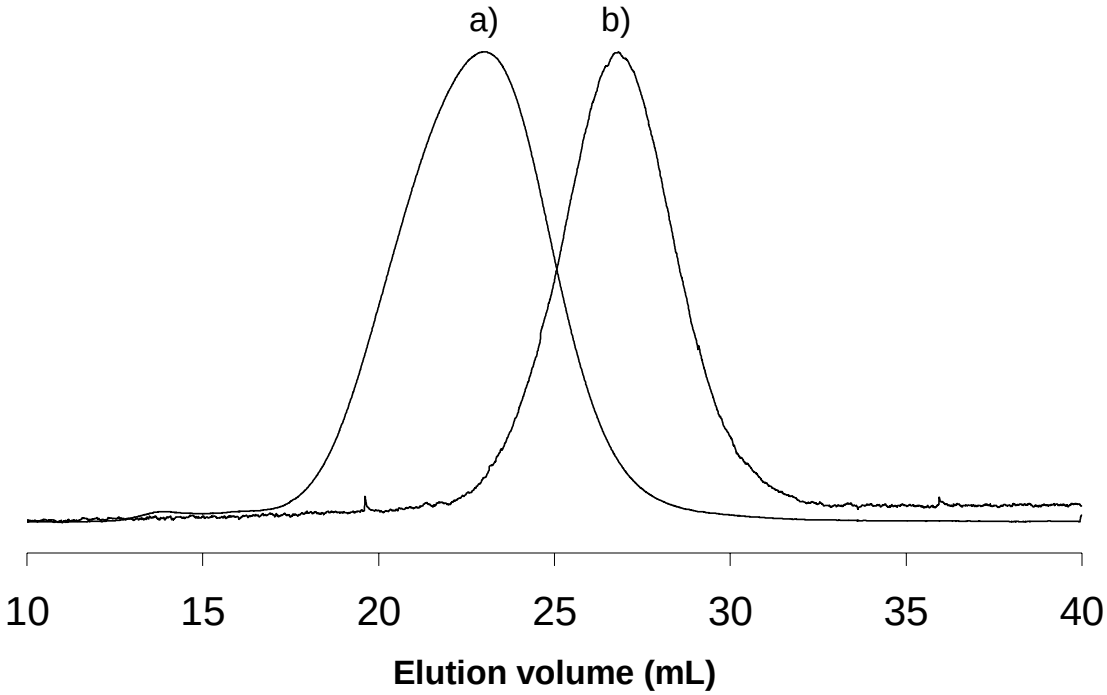

Figure S5. SEC lighting scattering data (90° detector) for the ring opening metathesis polymerization of 1,5-cyclooctadiene (1.3 M) at 23° C for 3 h in a) hydrogenated d-limonene and b) d-limonene.