Electronic Supplementary Material (ESI) for Polymer Chemistry

Supplementary Information for

Hydroxyl telechelic building blocks from fatty acid methyl esters for the synthesis of poly(ester/amide urethane)s with versatile properties.

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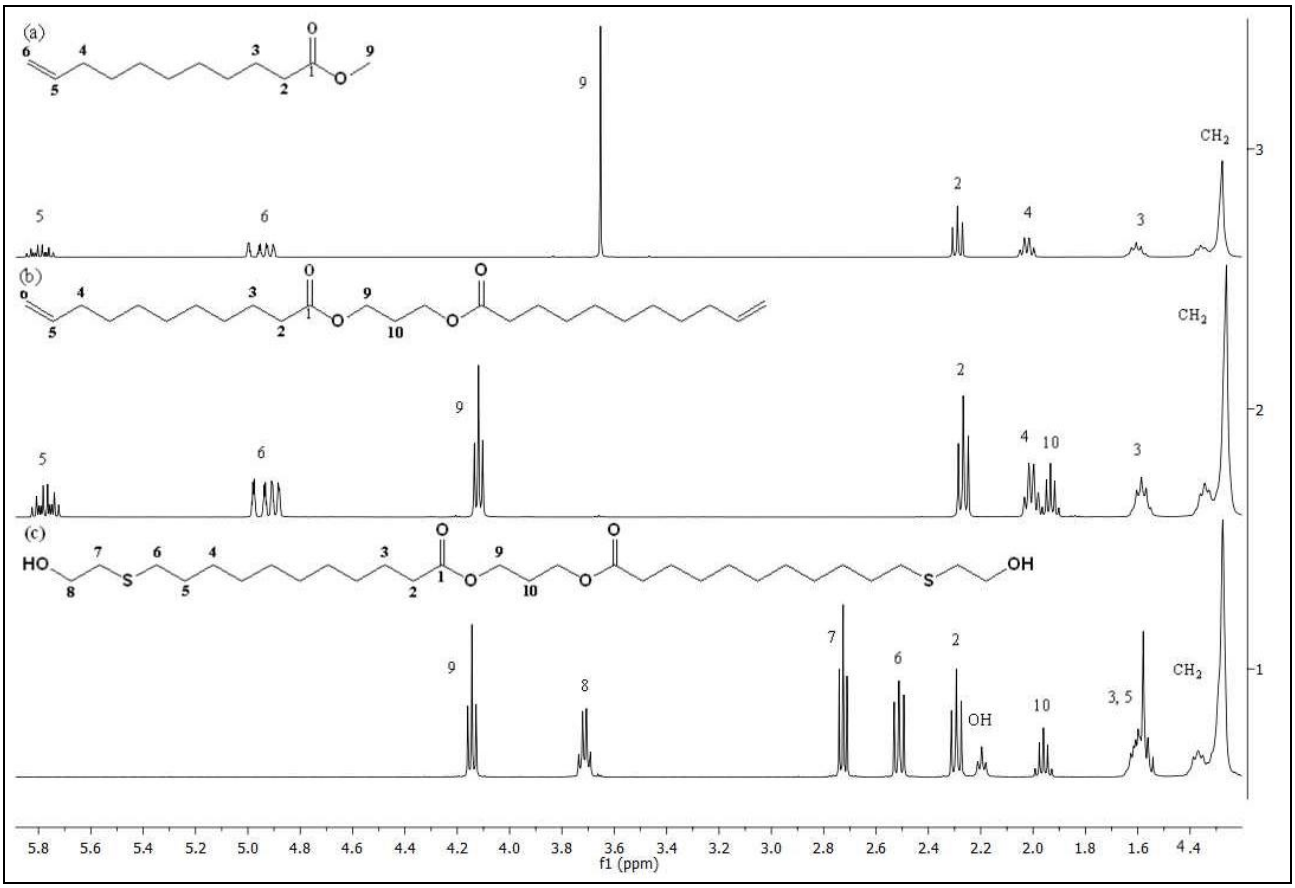

Figure S1. Stacked ^{1}H-NMR spectra of (a) UndME (methyl undecenoate), (b) UndPdE and (c) UndPdE -diol

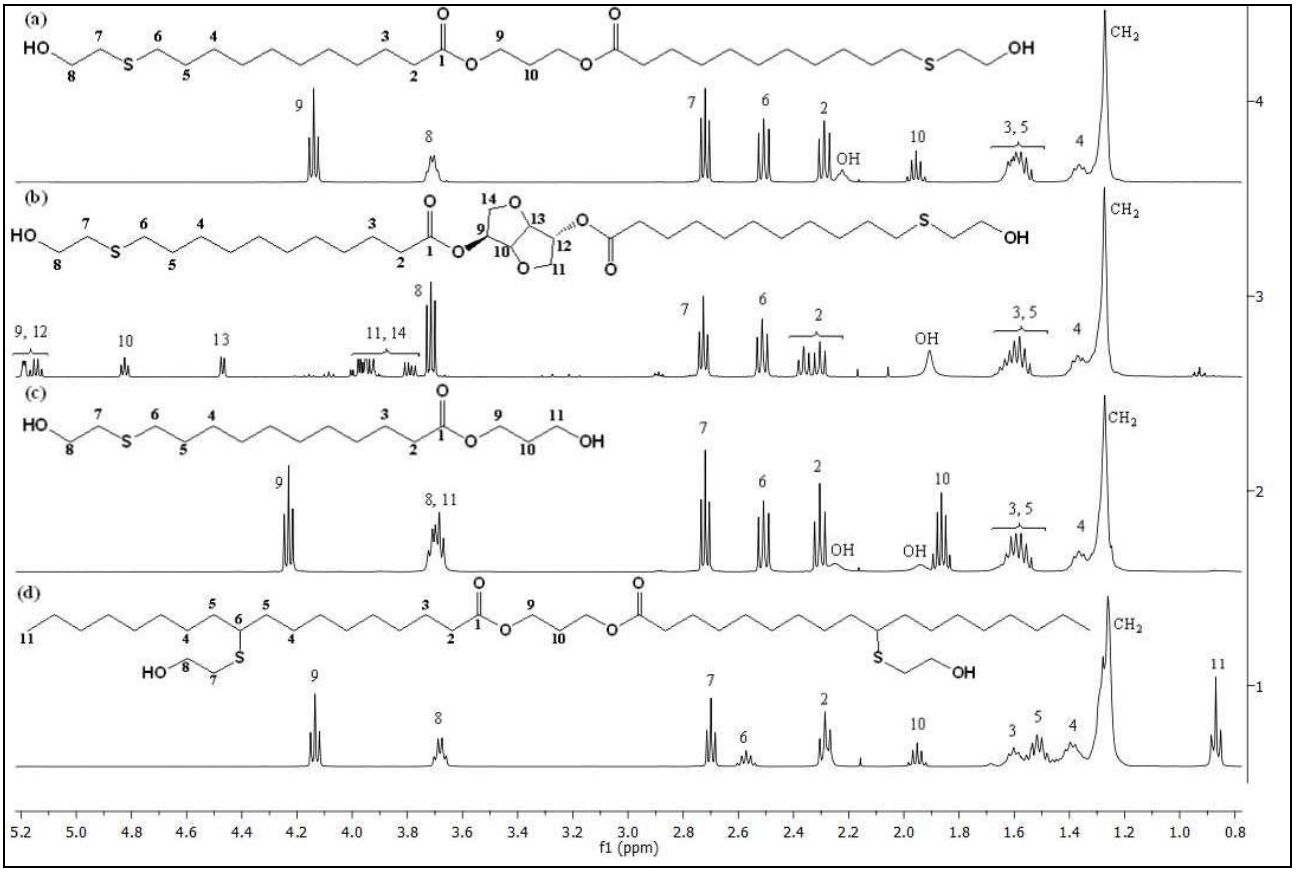

Figure S2. Stacked ^{1}H-NMR spectra of (a) UndPdE-diol, (b) UndIdE-diol, (c) UndPmE-diol and (d) OlPdE-diol (all in $CDCl_3$). Abbreviations used are as follows: [Und=from methyl undecenoate, Ol=from methyl oleate]; [P=propyl, I=from isosorbide] ; [d=di-, m=mono-] and [E=ester].

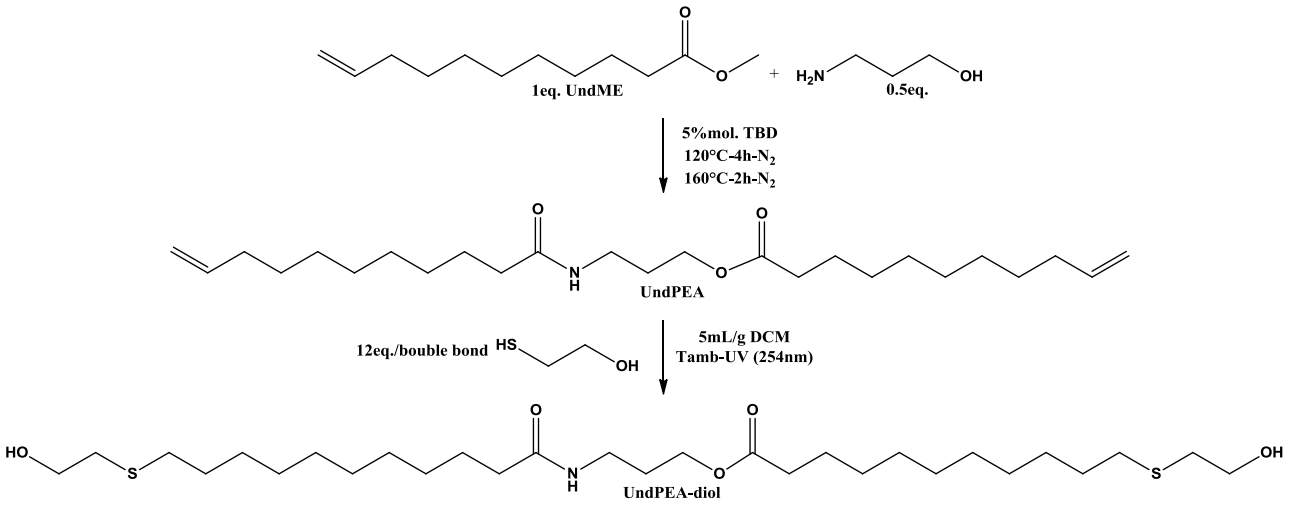

Figure S3. Synthesis of UndPEA-diol (Undecenoate Propyl EsterAmide-diol) from methyl undecenoate and 1,3-aminopropanol.

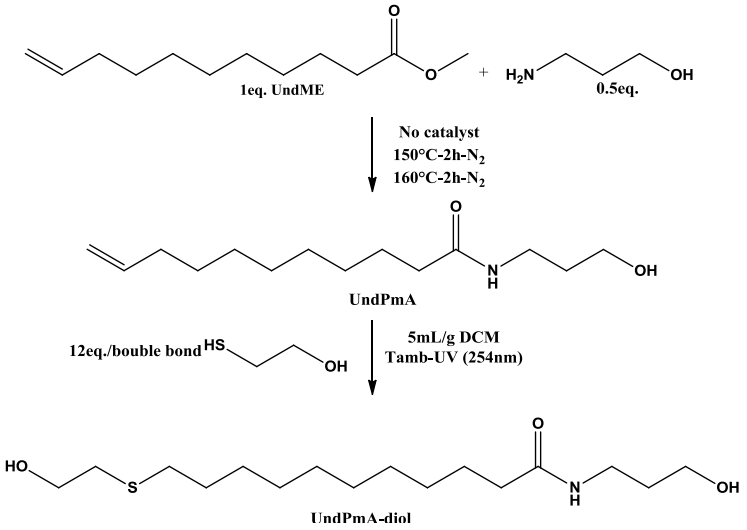

Figure S4. Synthesis of UndPmA-diol (Undecenoate Propyl monoAmide-diol) from methyl undecenoate and 1,3-aminopropanol.

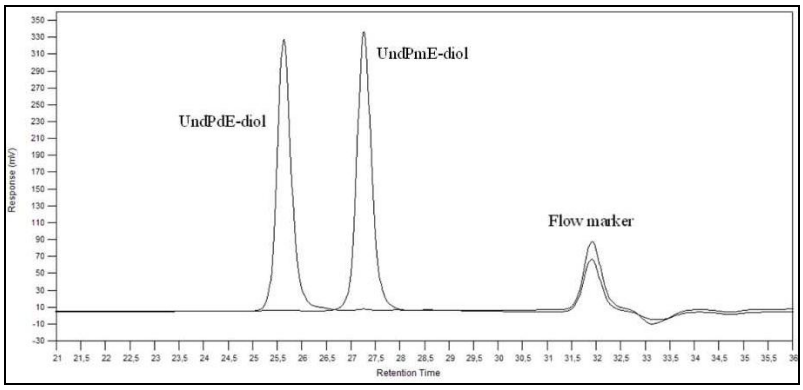

Figure S5. SEC trace of UndPdE-diol.

Synthesized diol	wt% Yield (Step 1 - 2)	%purity GC	T_m (°C)
Esters			
UndPdE-diol	73 - 82	92.3	70
UndIdE-diol	50 - 74	94.9	64
OlPdE-diol	61 - 66	87.1	-43.5[1]
UndPmE-diol	55 - 76	97.1	57
Amides			
UndPEA-diol	58 - 70	94.5	92
UndBdA-diol	83 - 92	nd	145
UndPmA-diol	45 - 72	99.9	86

Figure S6. Characterizations of the diols containing ester, ester-amide and amide linkages. [(1)]

Determined by DSC, 10°C/min.

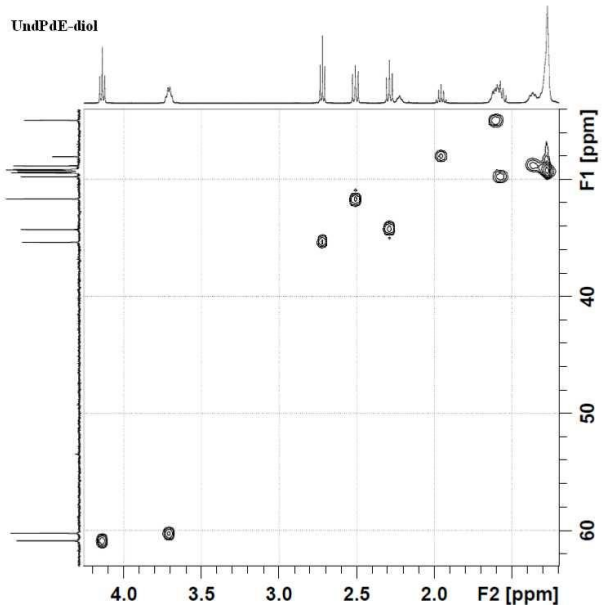

Figure S7. HSQC 2D-NMR of UndPdE-diol.

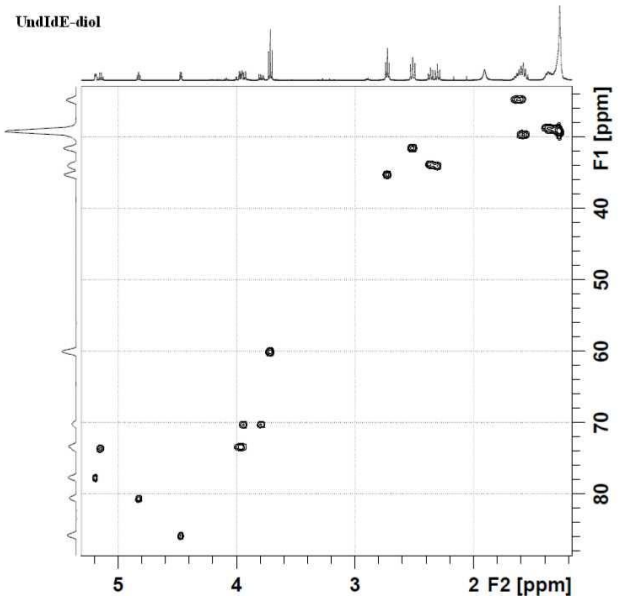

Figure S8. HSQC 2D-NMR of UndIdE-diol.

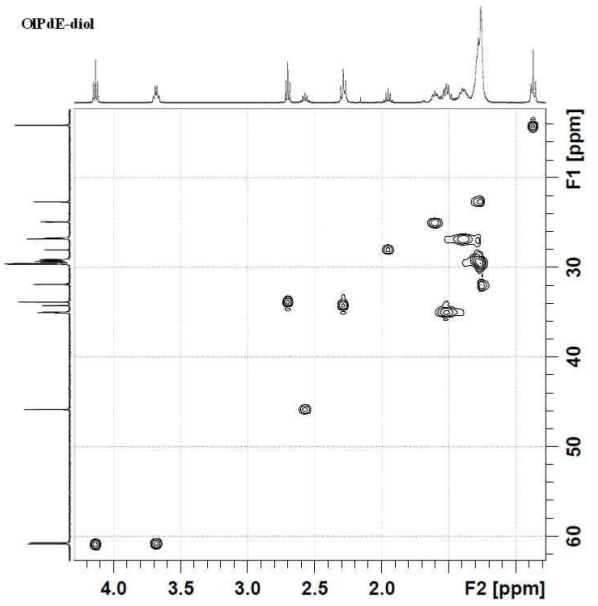

Figure S9. HSQC 2D-NMR of OlPdE-diol.

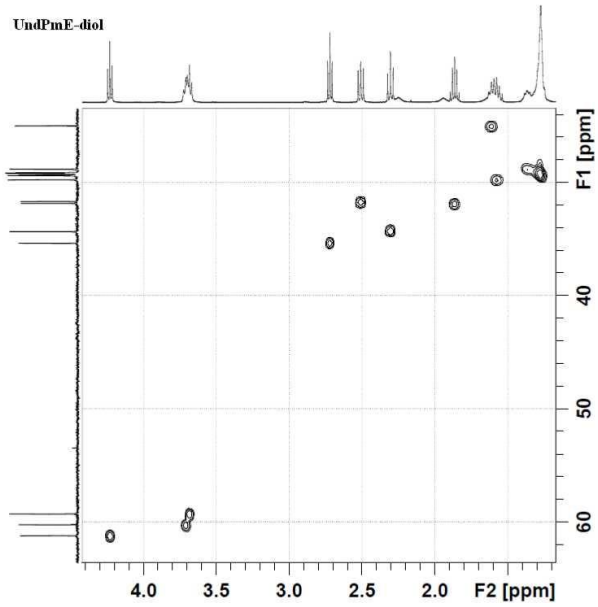

Figure S10. HSQC 2D-NMR of UndPmE-diol.

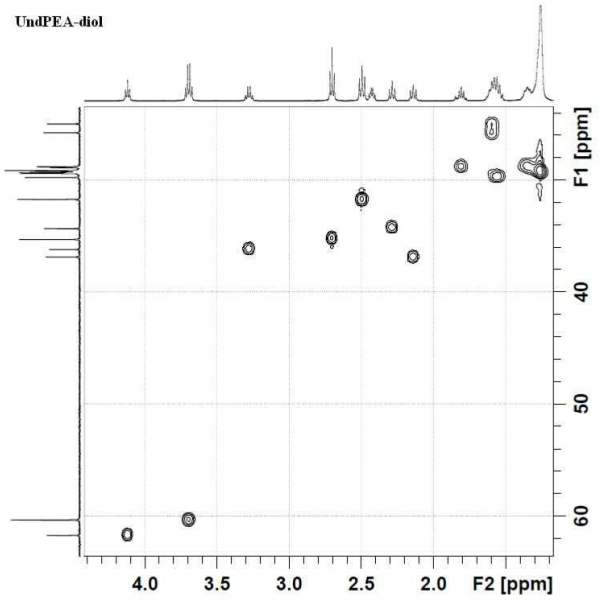

Figure S11. HSQC 2D-NMR of UndPEA-diol.

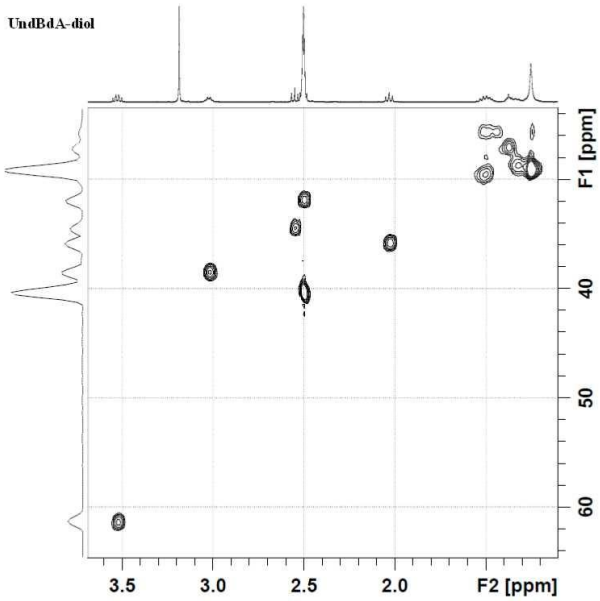

Figure S12. HSQC 2D-NMR of UndBdA-diol.

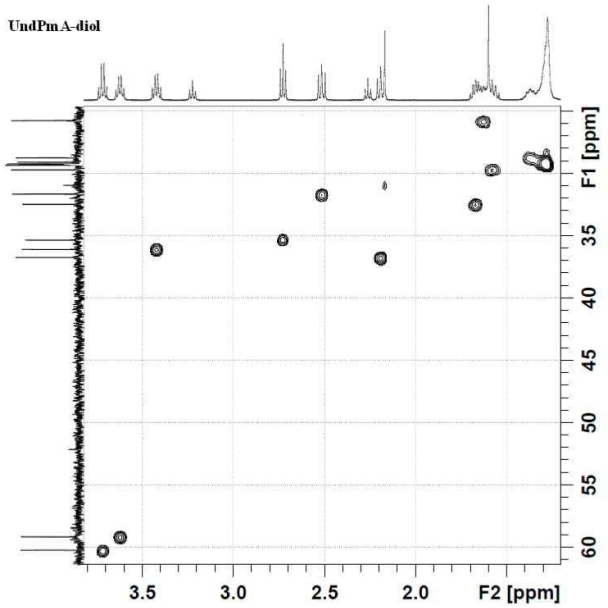

Figure S13. HSQC 2D-NMR of UndPmA-diol.

Sample	THF	Chloroform	DMF
Poly(ester urethane)s			
PU-dE-1	+	+	+
PU-dE-2	+	+	+/-
PU-dE-3	+	+	+
PU-dE-4	+	+	+
PU-dE-5	+	+	+
PU-dE-6	+	+	+
PU-mE-1	+	+	+
PU-mE-2	+/-	+/-	+/-
Poly(esteramide urethane)s and Poly(amide urethane)s			
PU-EA-1	+	+	+
PU-EA-2	+ heat	+ heat	+
PU-dA-1	+/- heat	+ heat	-
PU-dA-2	-	-	-
PU-mA-1	+ heat	+	+
PU-mA-2	-	-	+ heat

Figure S14. Solubility of PUs in THF, chloroform and DMF.

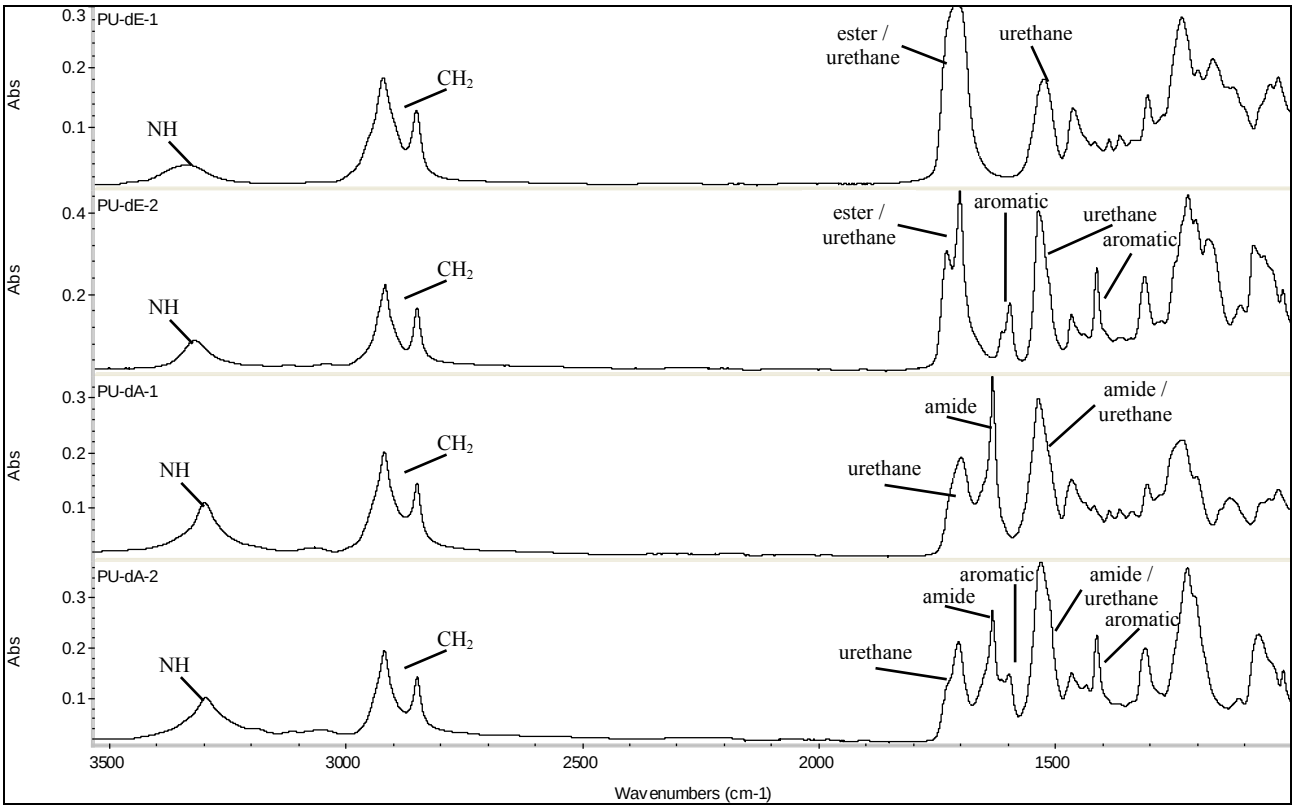

Figure S15. Stacked FTIR-ATR spectra of PU-dE-1: UndPdE-diol + IPDI ; PU-dE-2 : UndPdE-diol + MDI ; PU-dA-1 : UndBdA-diol + IPDI and PU-dA-2 : UndBdA-diol + MDI. Abbreviations used are as follows: [Und=from methyl undecenoate]; [P=propyl, B=butyl] ; [d=di-] and [E=ester, A=amide].

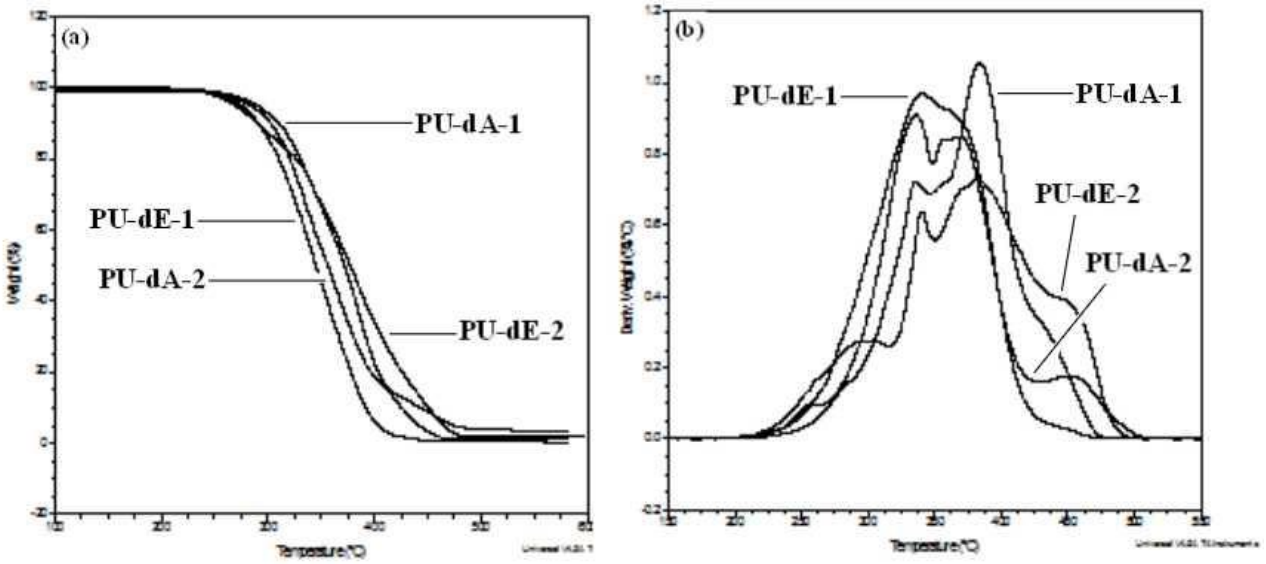

Figure S16. (a) Weight loss as a function of temperature (b) Derivate of weight loss with temperature for PU-dE-1, PU-dE-2, PU-dA-1 and PU-dA-2 obtained from TGA experiment at 10°C/min under nitrogen atmosphere.

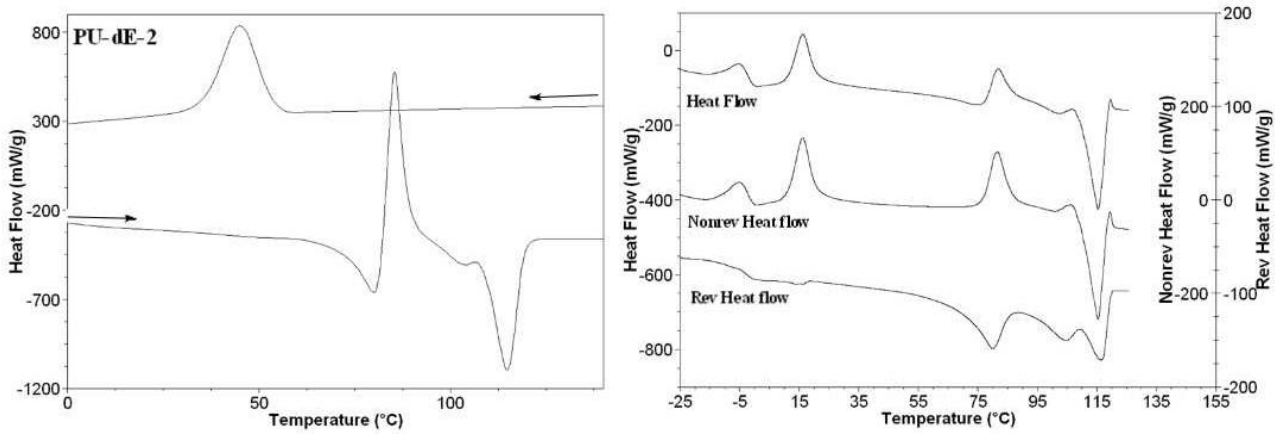

Figure S17. (a) DSC second cycle thermograms at 10°C/min of PU-dE-2 and (b) Mod DSC thermograms at 2°C/min with a modulation amplitude of 0.64 °C and a modulation period of 60 s. of PU-dE-2 cooled from the melt with liquid nitrogen.

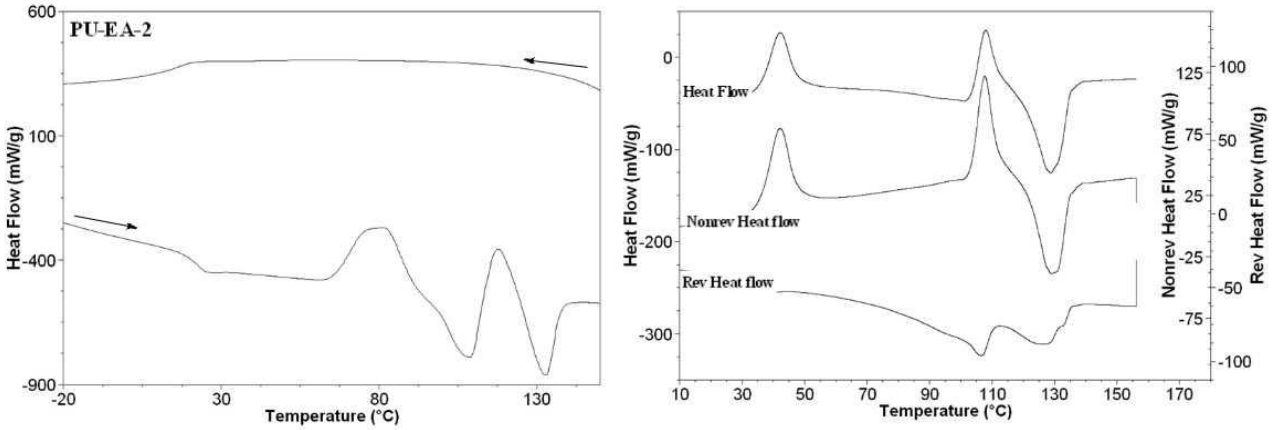

Figure S18. (a) DSC second cycle thermograms at 10°C/min and (b) Mod DSC thermograms at 2°C/min with a modulation amplitude of 0.64 °C and a modulation period of 60 s. of PU-EA-2.

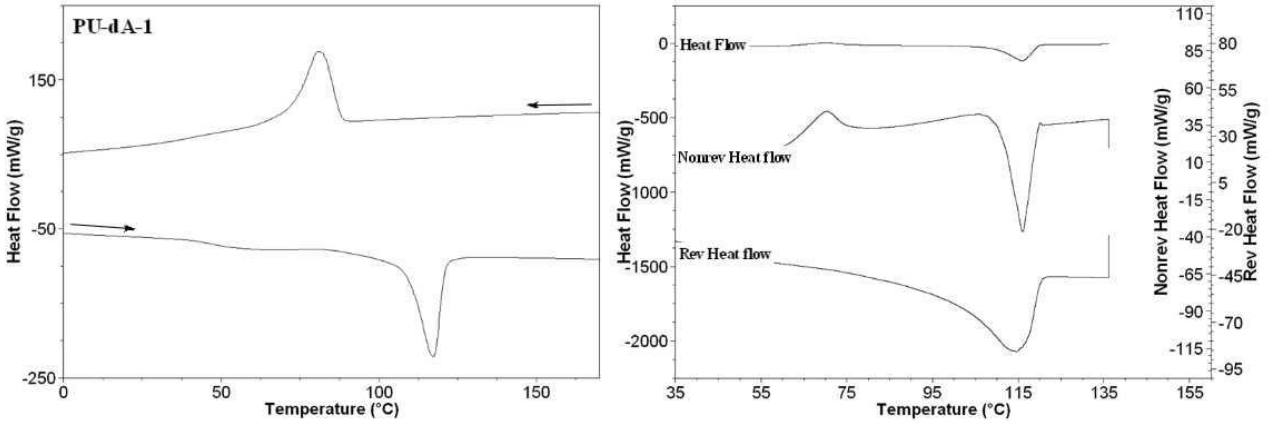

Figure S19. (a) DSC second cycle thermograms at 10°C/min and (b) Mod DSC thermograms at 2°C/min with a modulation amplitude of 0.64 °C and a modulation period of 60 s. of PU-dA-1.

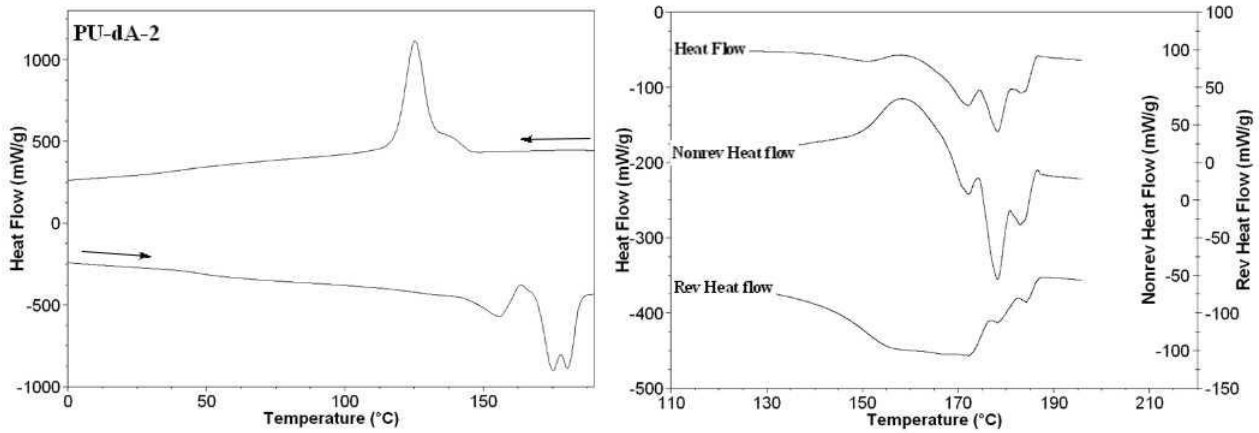

Figure S20. (a) DSC second cycle thermograms at 10°C/min and (b) Mod DSC thermograms at 2°C/min with a modulation amplitude of 0.64 °C and a modulation period of 60 s. of PU-dA-2.

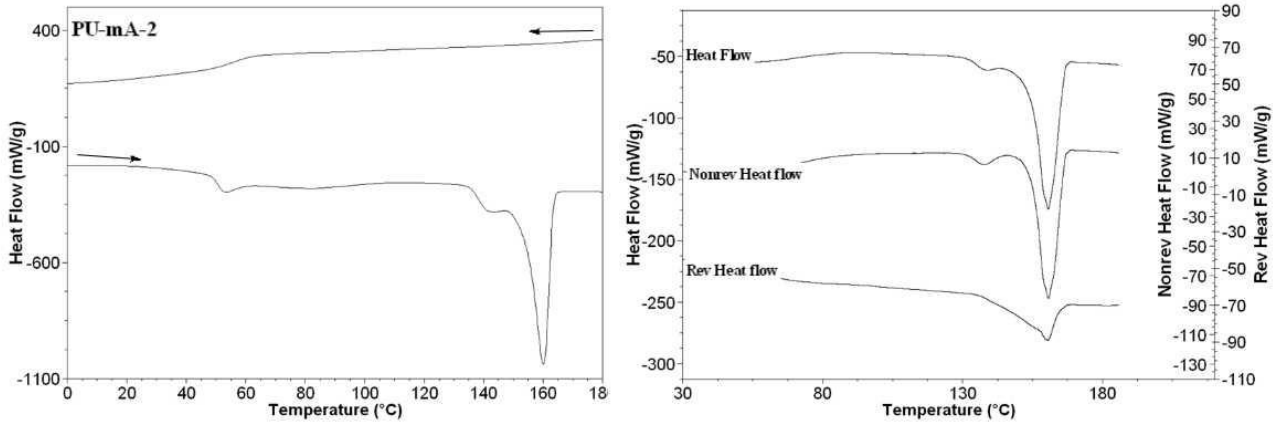

Figure S21. (a) DSC second cycle thermograms at 10°C/min and (b) Mod DSC thermograms at 2°C/min with a modulation amplitude of 0.64 °C and a modulation period of 60 s. of PU-mA-2 after annealing 2 h at 130 °C.