Electronic Supplementary Material (ESI) for Green Chemistry

α,ω-Di(glycerol carbonate) Telechelic Polyesters and Polyolefins as Precursors to PolyHydroxyUrethanes: an Isocyanate-free approach

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Electronic Supplementary Information

α,ω-Di(glycerol carbonate) Telechelic Polyesters and Polyolefins as Precursors to PolyHydroxyUrethanes: an Isocyanate-free approach

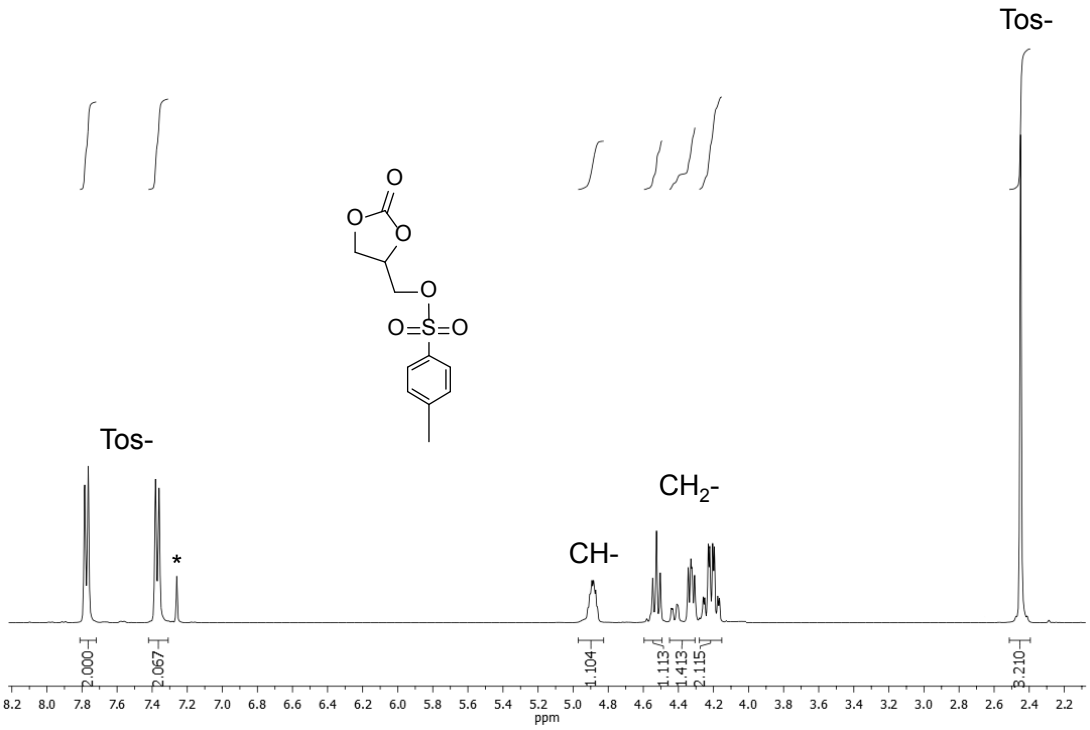

Figure S1. ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of 4-tosylmethyl-1,3-dioxolan-2-one (GC-OTs) (* stands for residual solvent resonances).

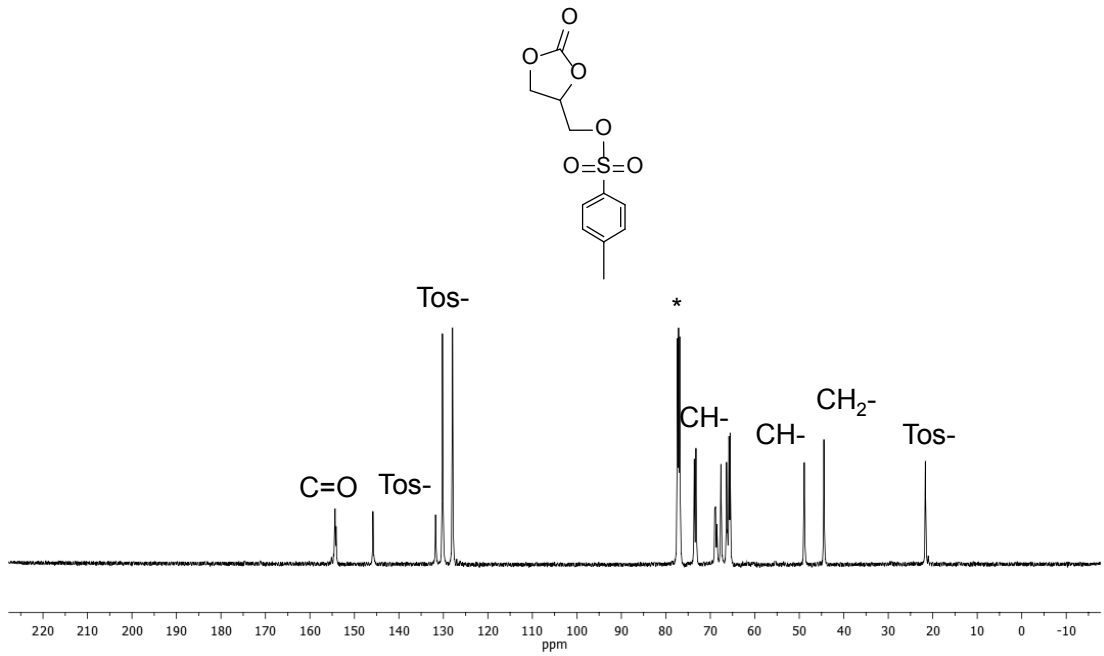

Figure S2. $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$, 25 °C) spectrum of 4-tosylmethyl-1,3-dioxolan-2-one (GC-OTs) (* stands for residual solvent resonances).

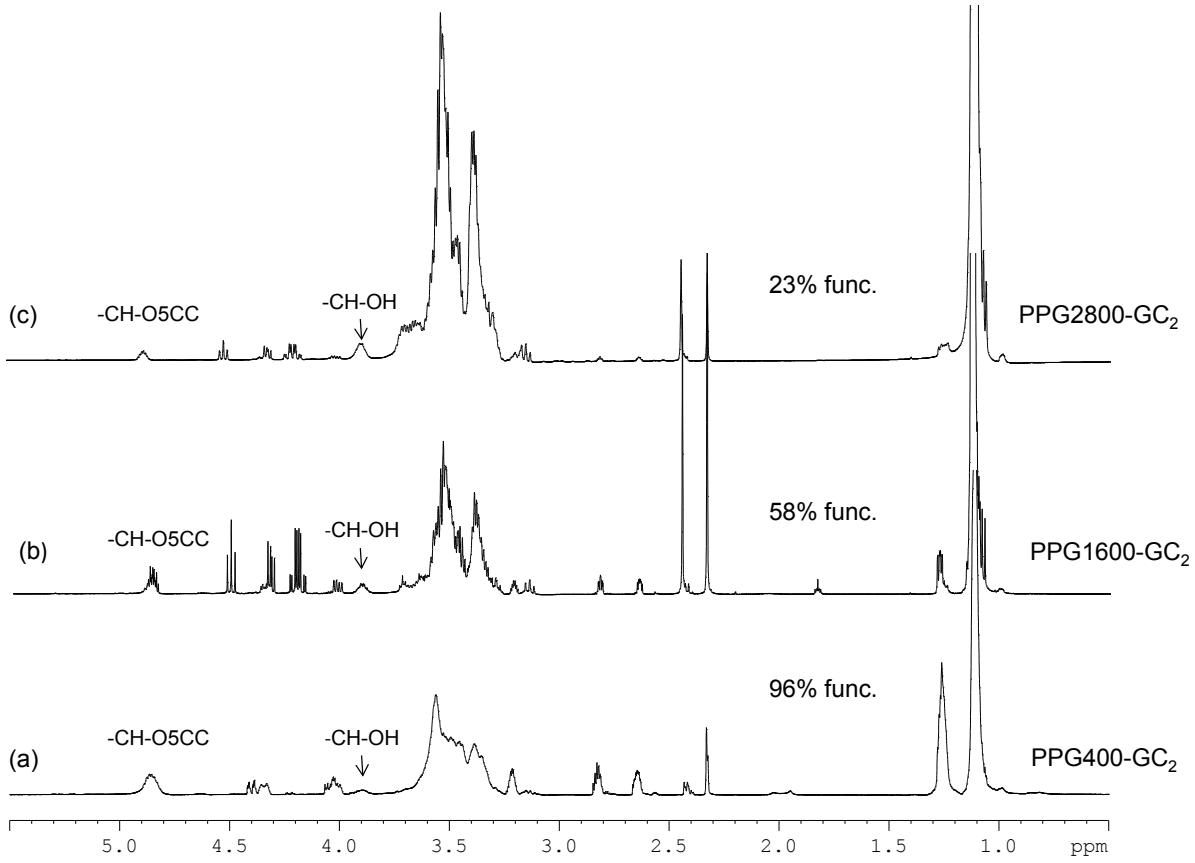

Figure S3. ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C) spectra of $PPG_{400,1600,2800}$-GC_2 prepared from the reaction of the corresponding $PPG_{400,1600,2800}$-OH_2 with GC-OTS.

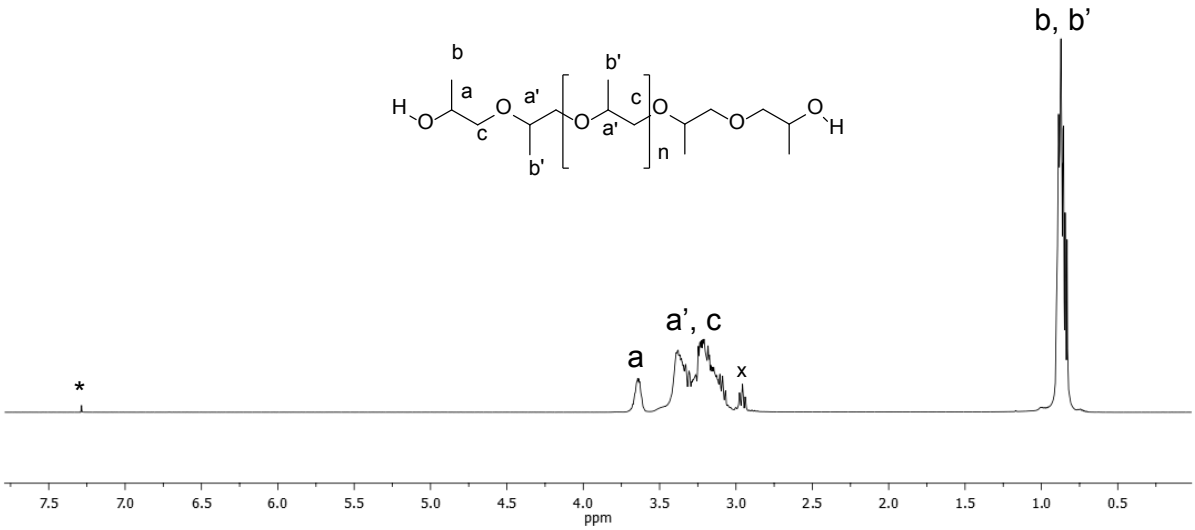

Figure S4. ^{1}H NMR (500 MHz, CDl_3, 25 °C) spectrum of PPG_{400}-OH_2 (* stands for residual solvent resonances, and x stands for an unidentified impurity).

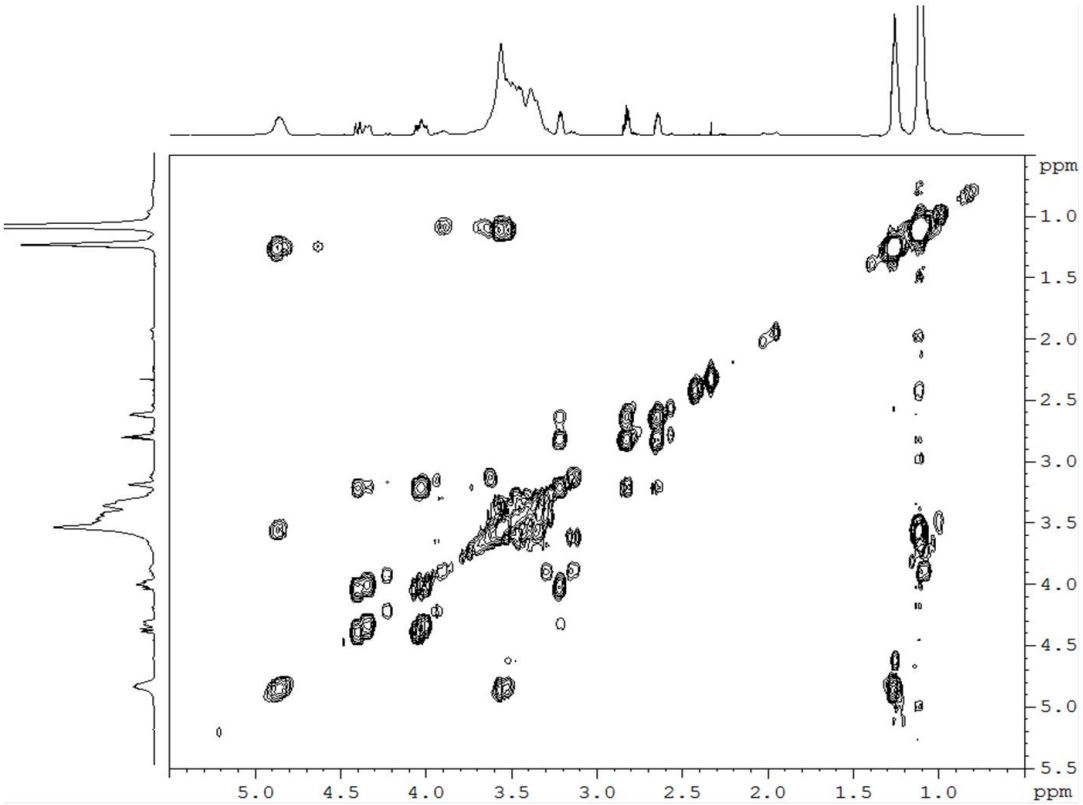

Figure S5. ^{1}H-^{1}H COSY NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of PPG_{400}-GC_2.

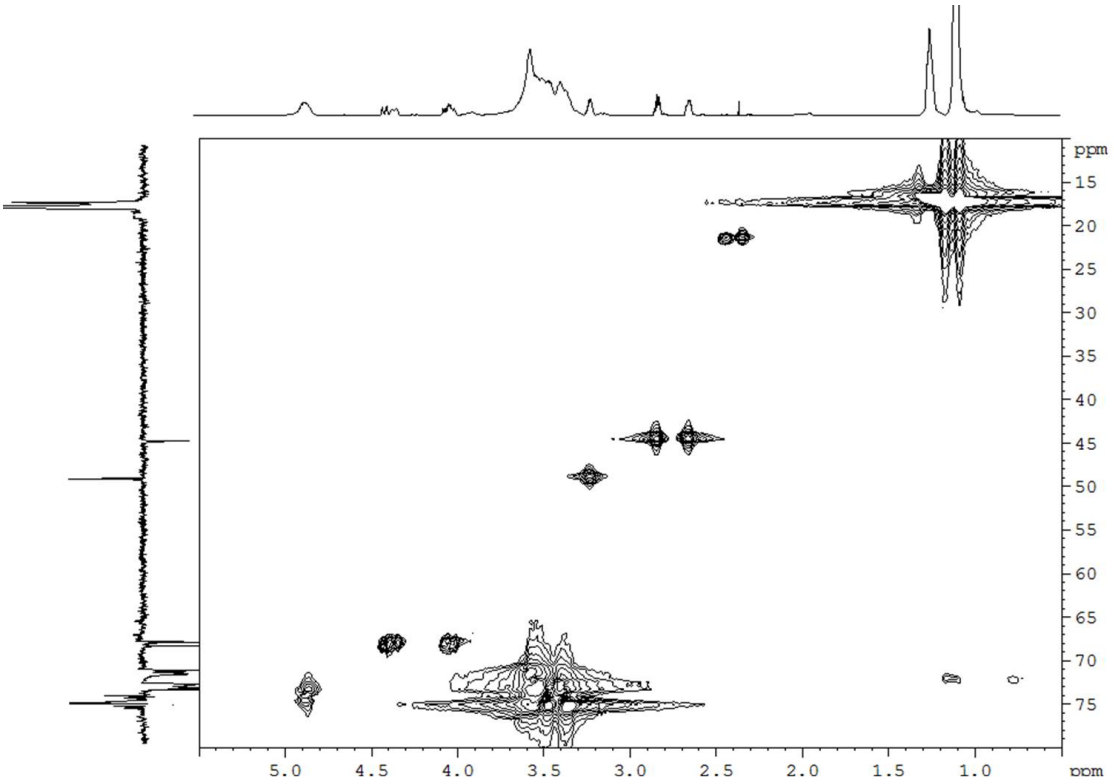

Figure S6. ^{1}H-^{13}C (DEPT) HMQC NMR spectrum (500 MHz, $CDCl_3$, 25 °C) of PPG_{400}-GC_2.

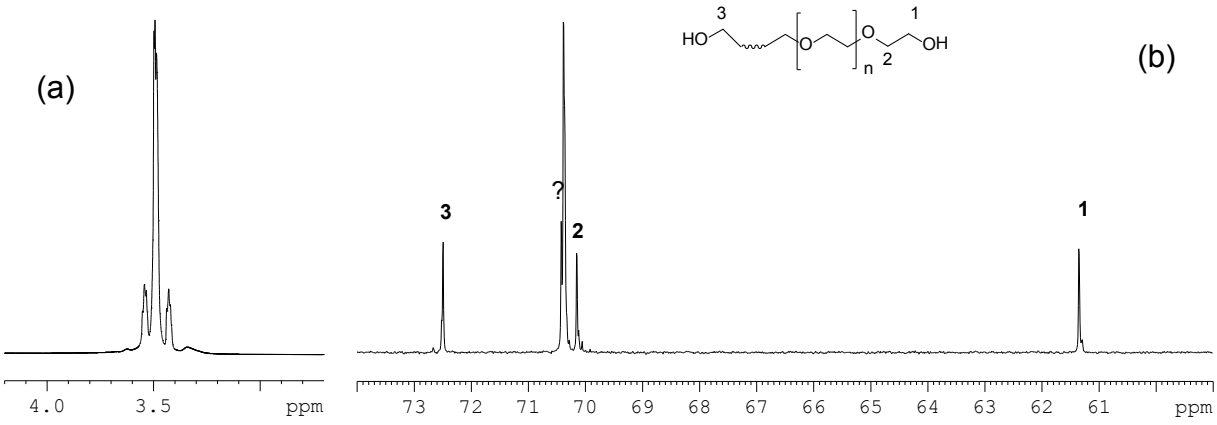

Figure S7. (a) ^{1}H (500 MHz, $CDCl_3$, 25 °C) and (b) ^{13}C $\{^{1}H\}$ (125 MHz, $CDCl_3$, 25 °C) NMR spectra of PEG_{400}-OH_2.

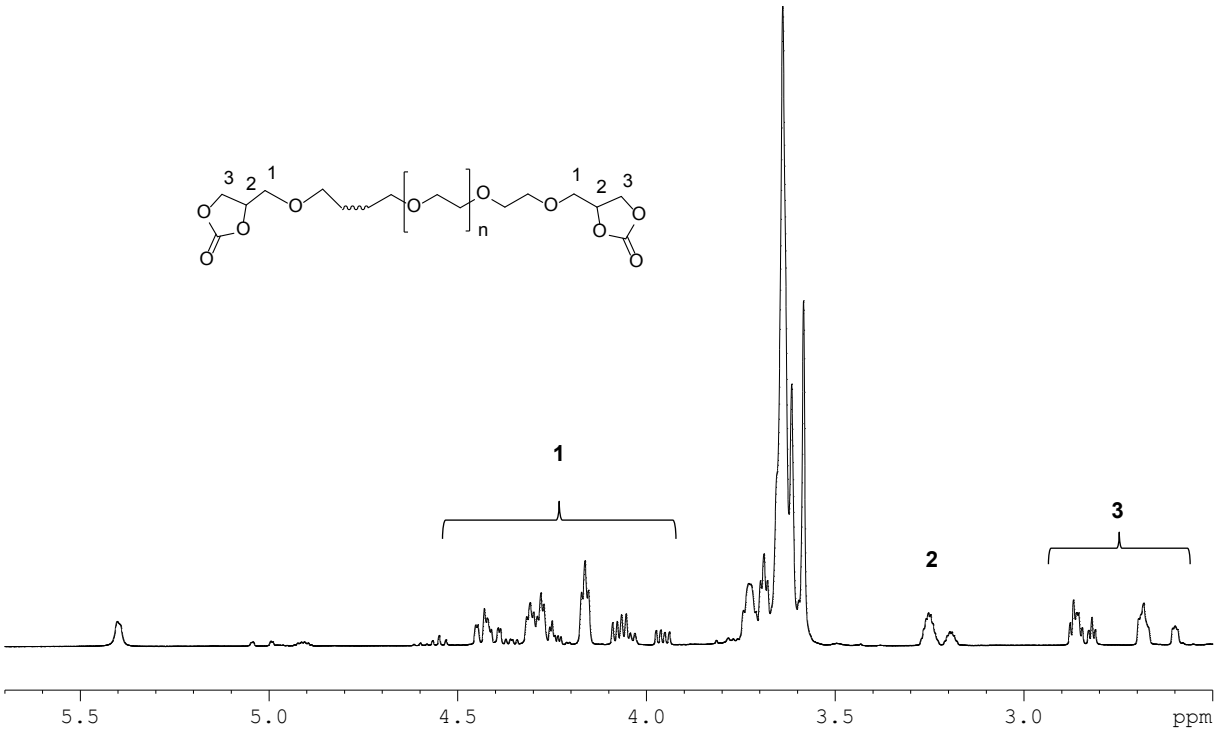

Figure S8. ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of the PEG_{400}-GC_2.

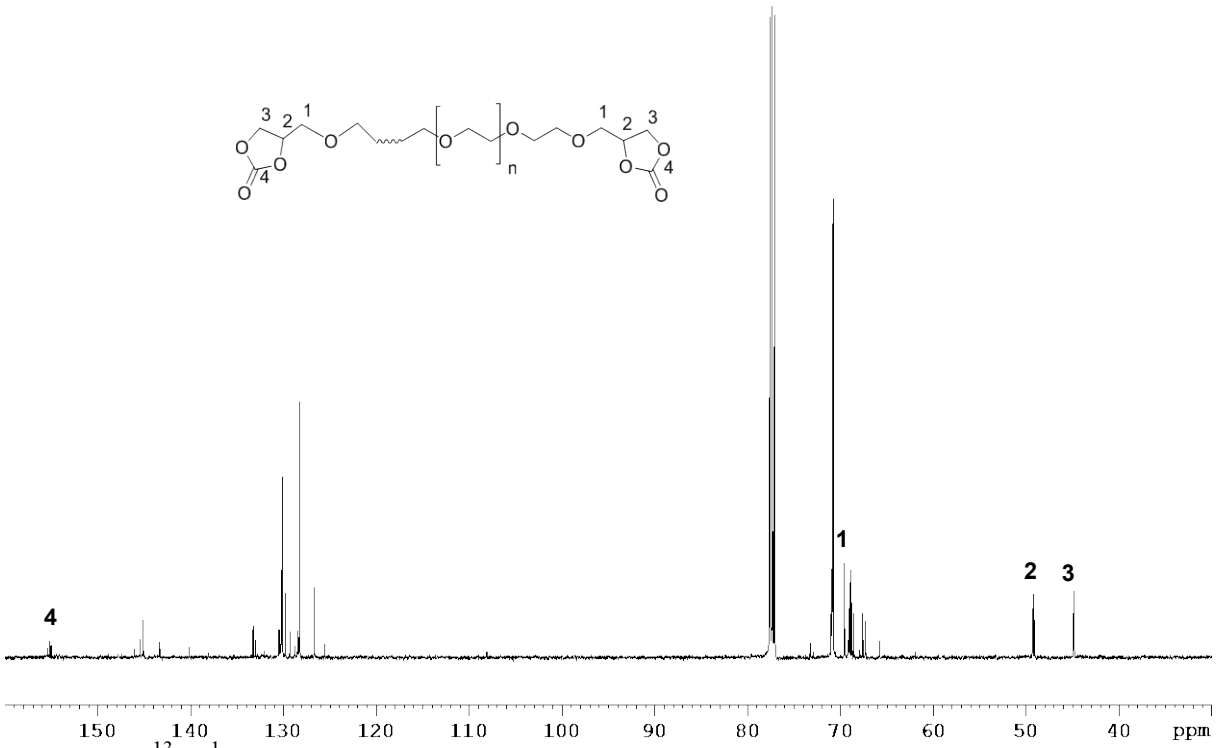

Figure S9. $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$, 25 °C) spectrum of the PEG_{400}-GC_2.

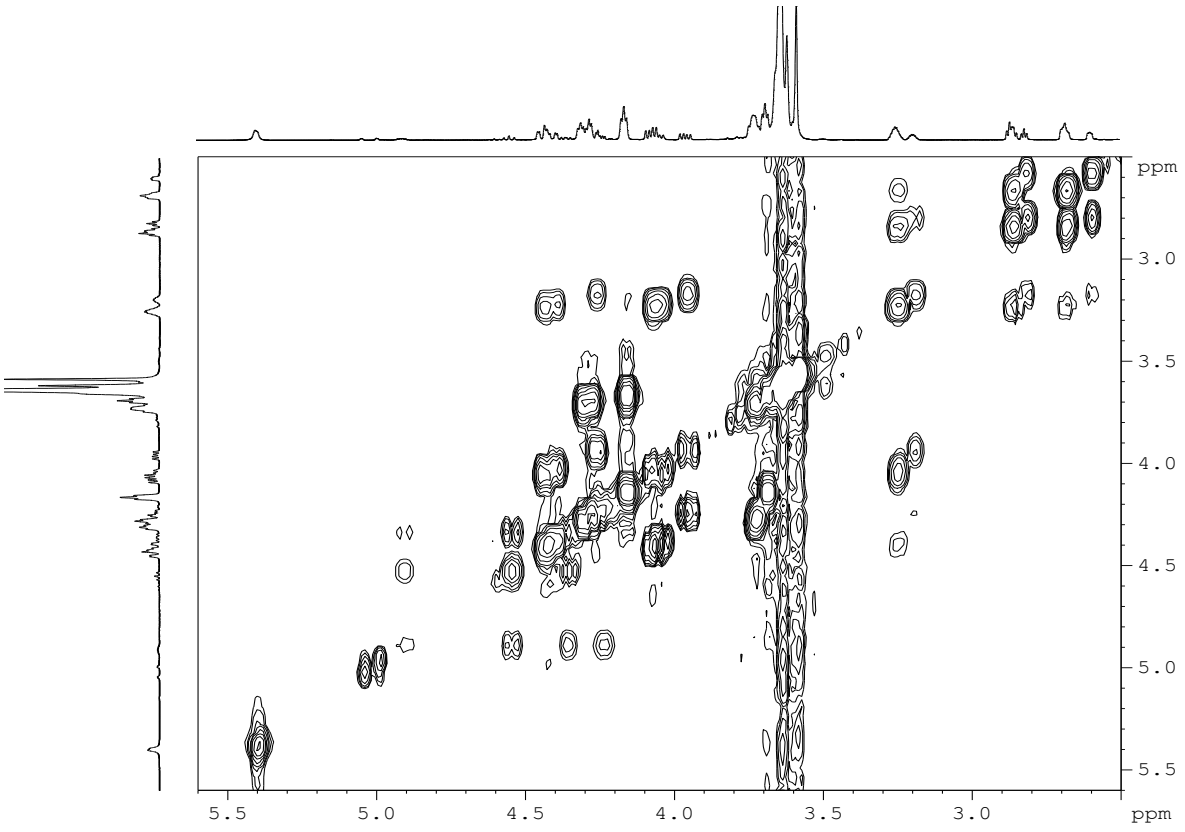

Figure S10. ^{1}H-^{1}H COSY NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of the PEG_{400}-GC_2.

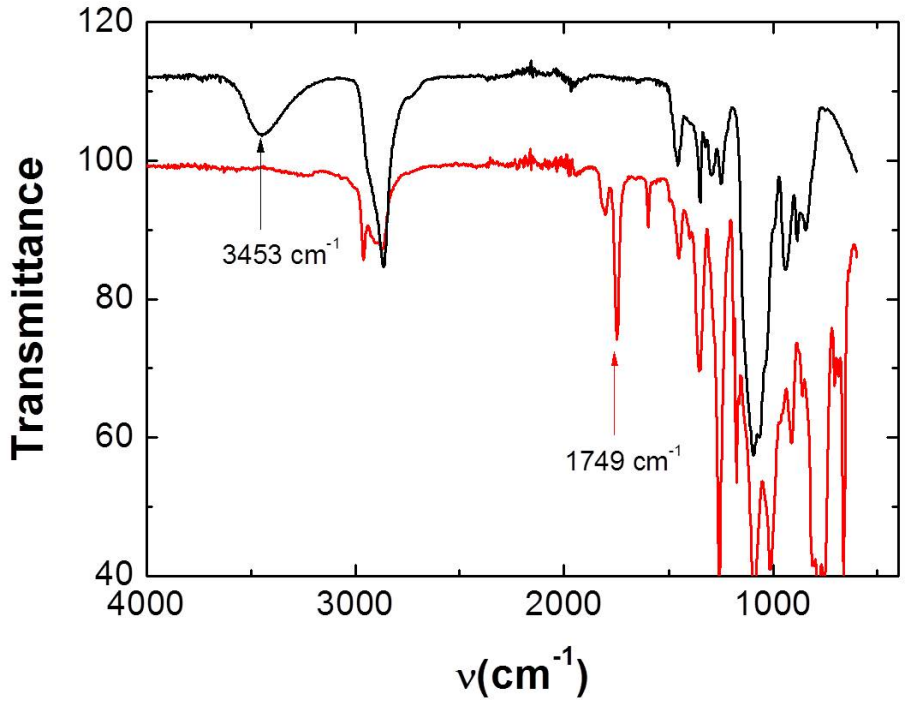

Figure S11. FTIR spectra of PEG_{400}-OH_2 (black trace) and the resulting PEG_{400}-GC_2 (red trace).

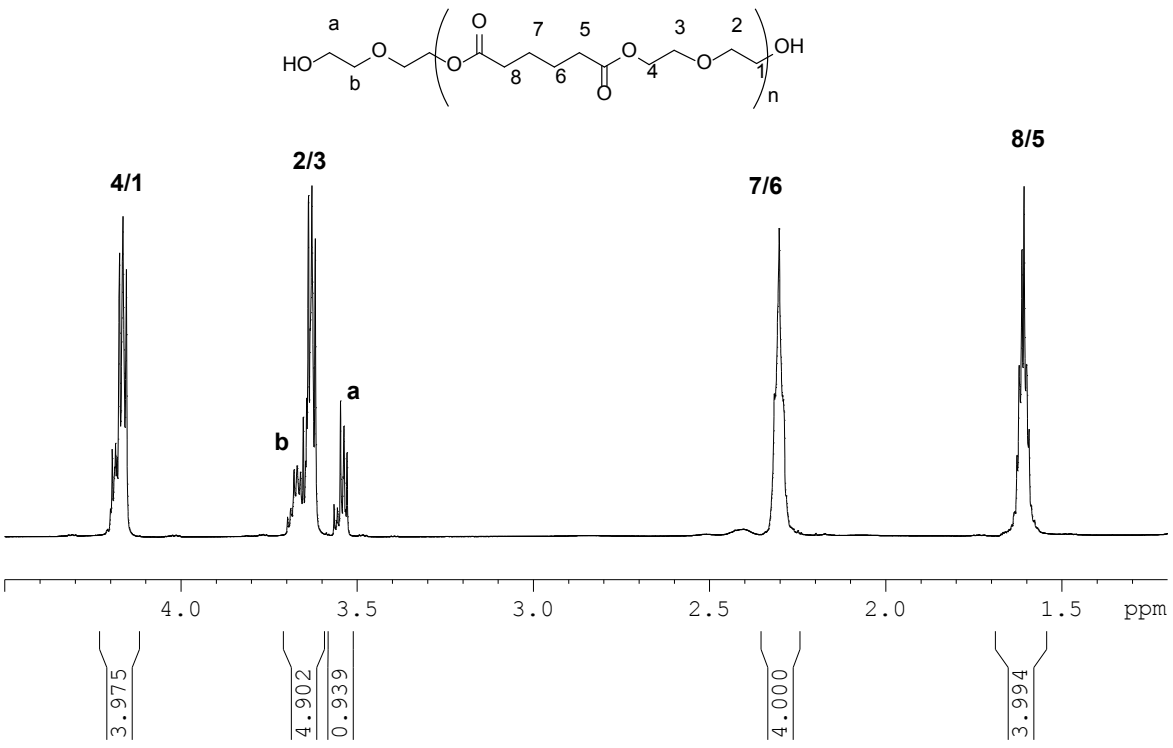

Figure S12. ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of the PEE-OH_2.

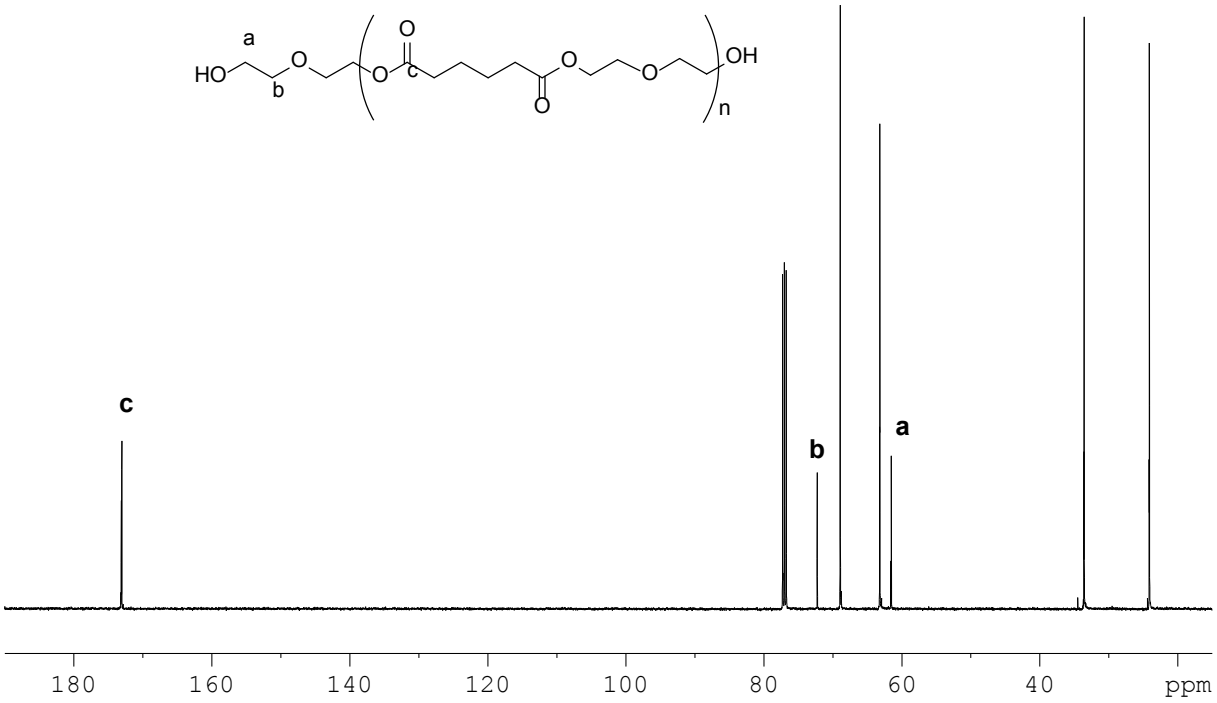

Figure S13. $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$, 25 °C) spectrum of the PEE-OH_2.

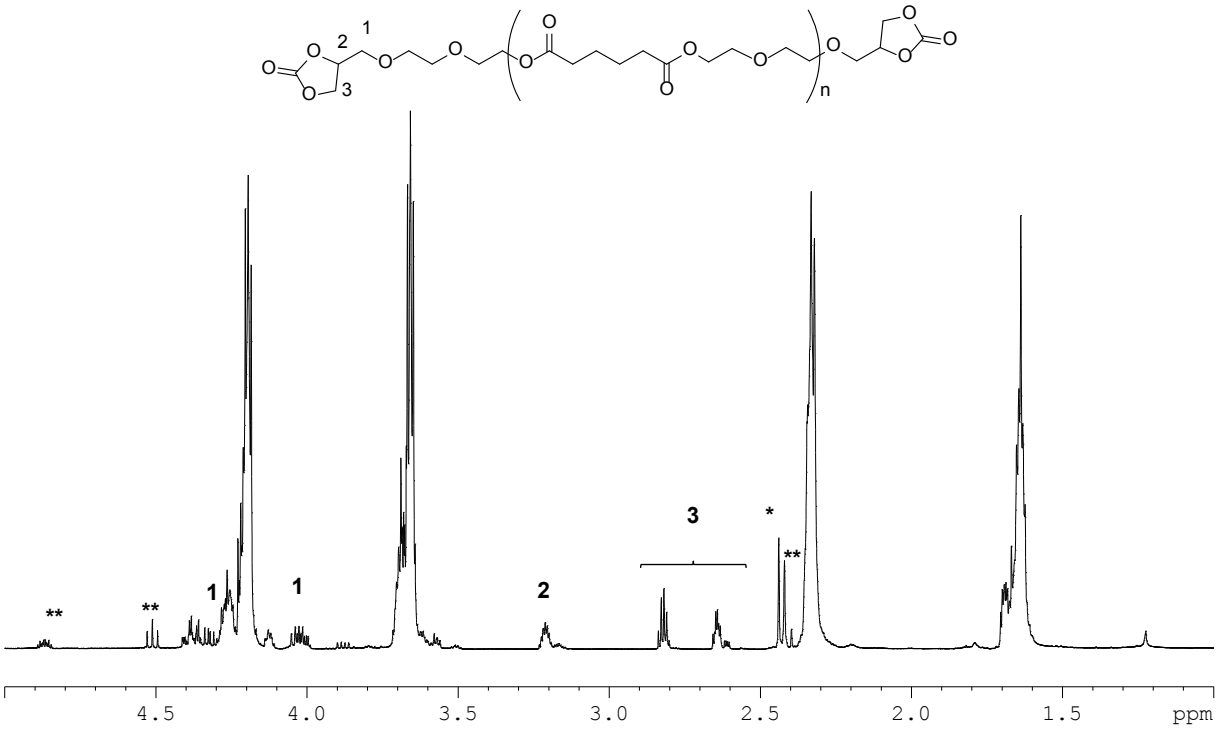

Figure S14. ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of PEE-GC_2 (* marker stands for residual toluene and ** for the starting reagent).

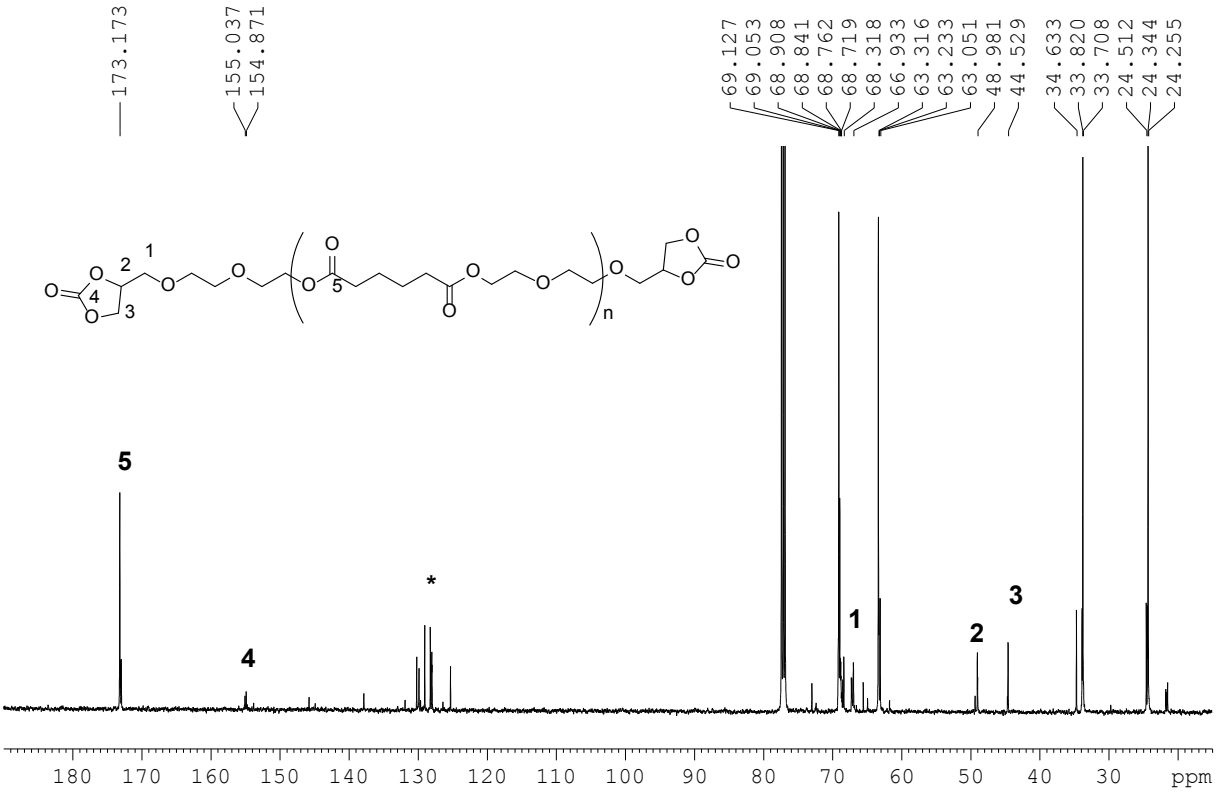

Figure S15. $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$, 25 °C) spectrum of PEE-GC_2 (* marker stands for residual toluene).

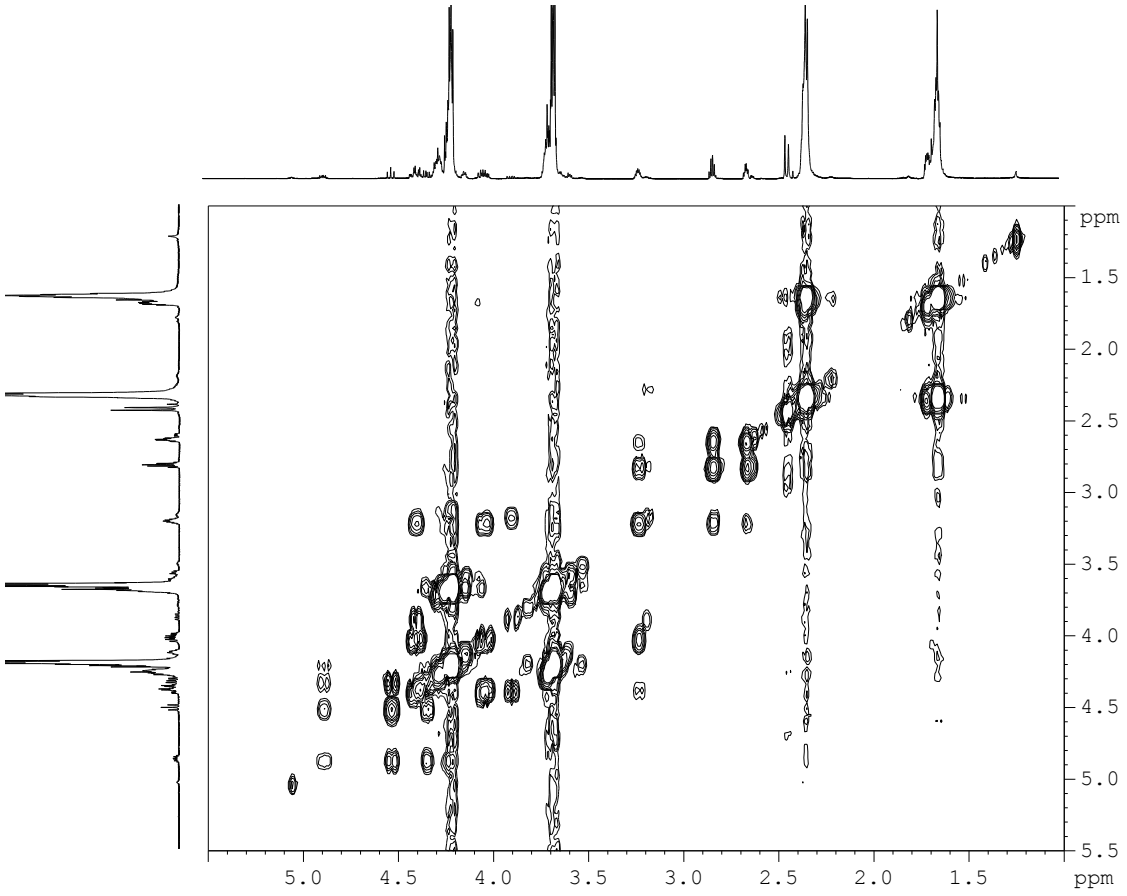

Figure S16. ^{1}H-^{1}H COSY NMR spectrum (500 MHz, $CDCl_3$, 25 °C) of PEE-GC_2.

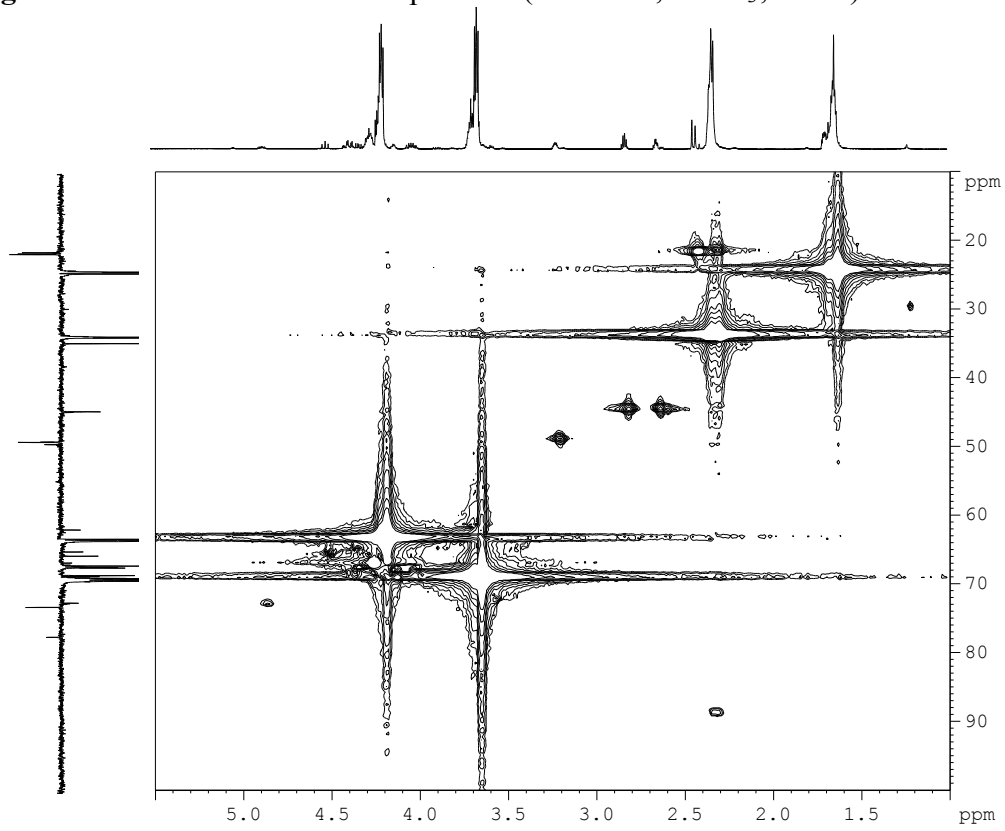

Figure S17. ^{1}H-^{13}C (DEPT) HMQC NMR spectrum (500 MHz, $CDCl_3$, 25 °C) of PEE-GC_2.

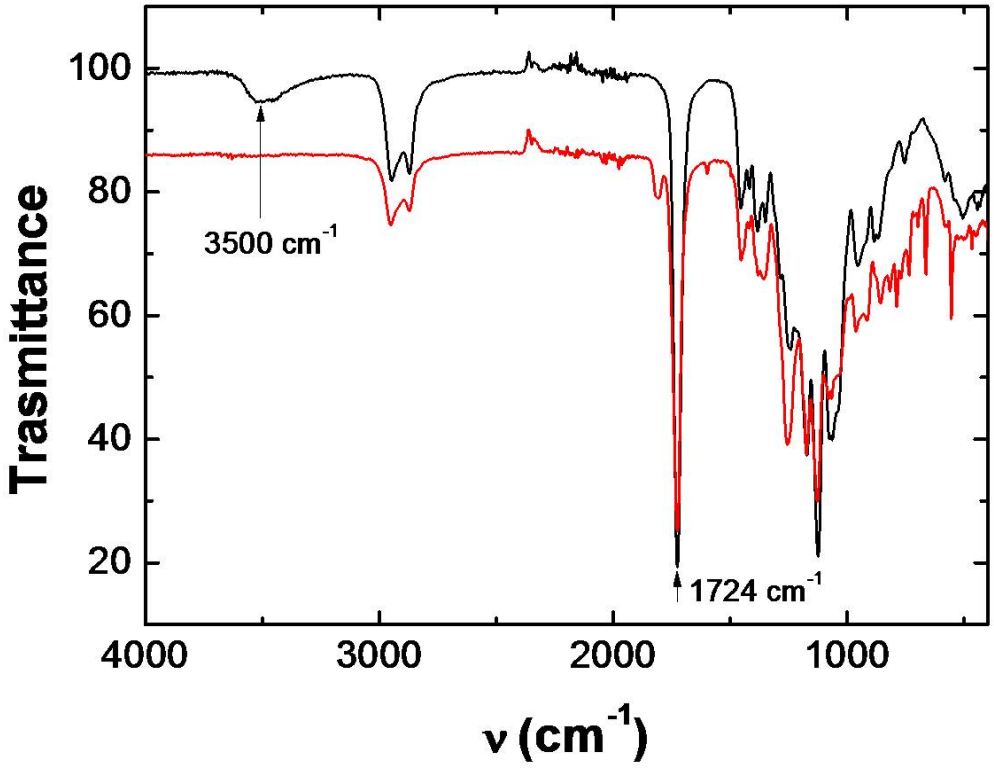

Figure S18. FTIR spectra of PEE-OH_2 (black trace) and the resulting PEE-GC_2 (red trace).

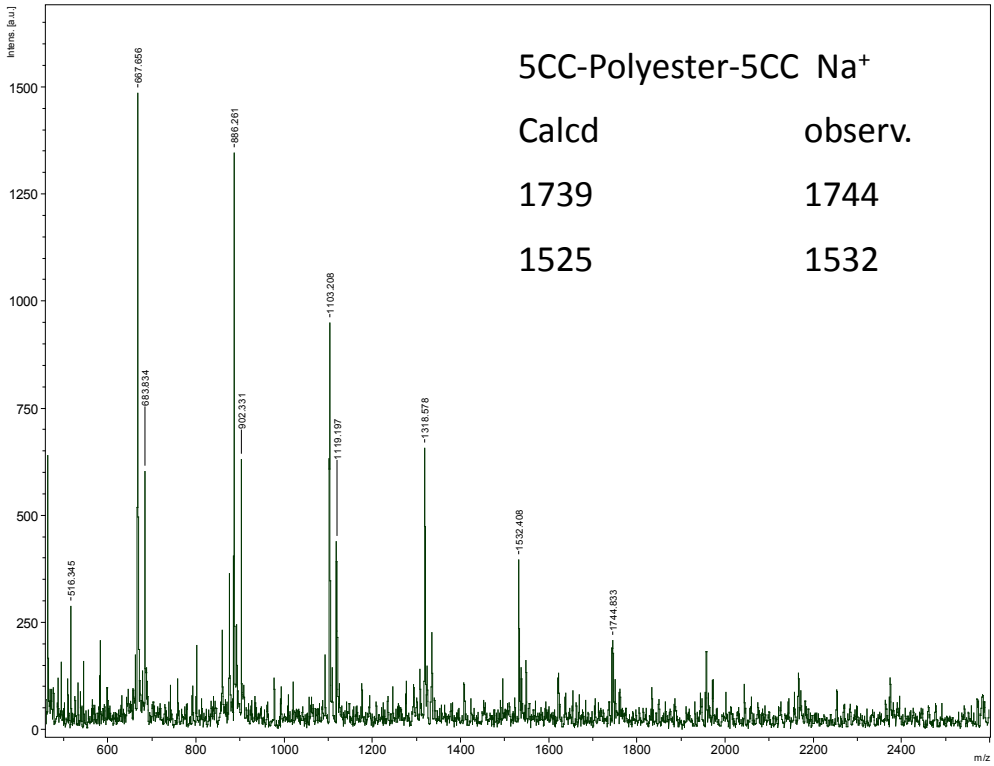

Figure S19. MALDI-ToF MS spectrum of PEE-GC_2.

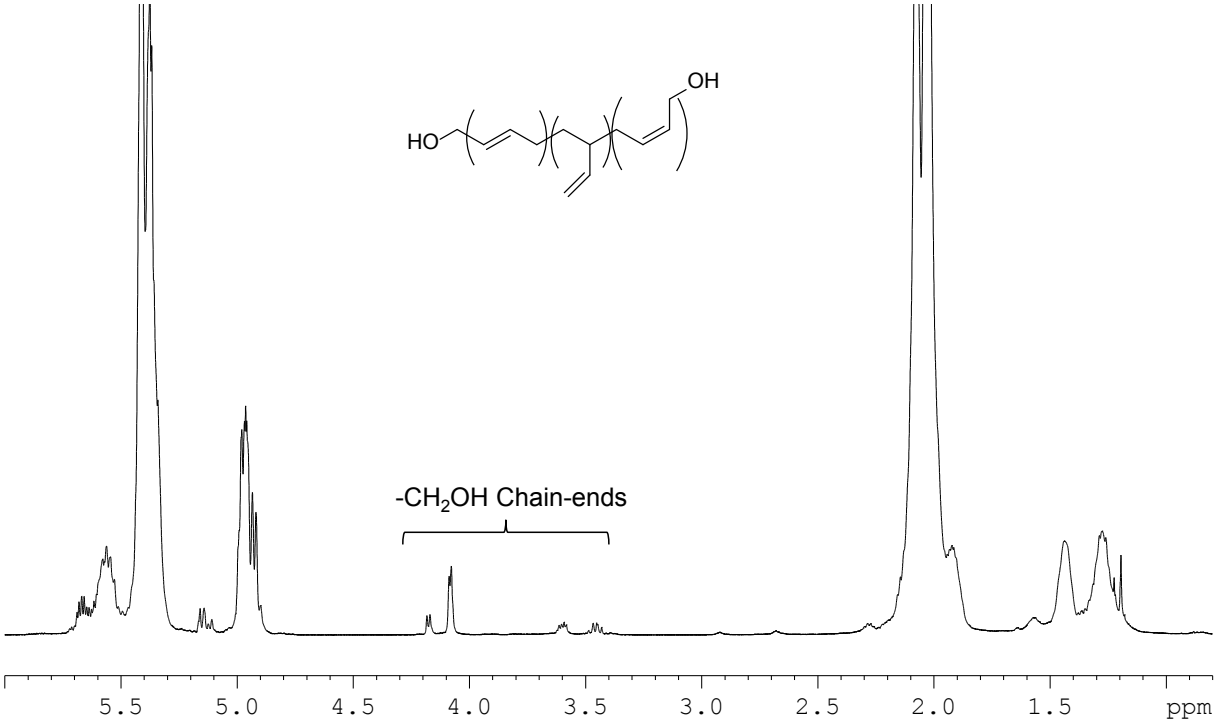

Figure S20. ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of PBD-OH_2.

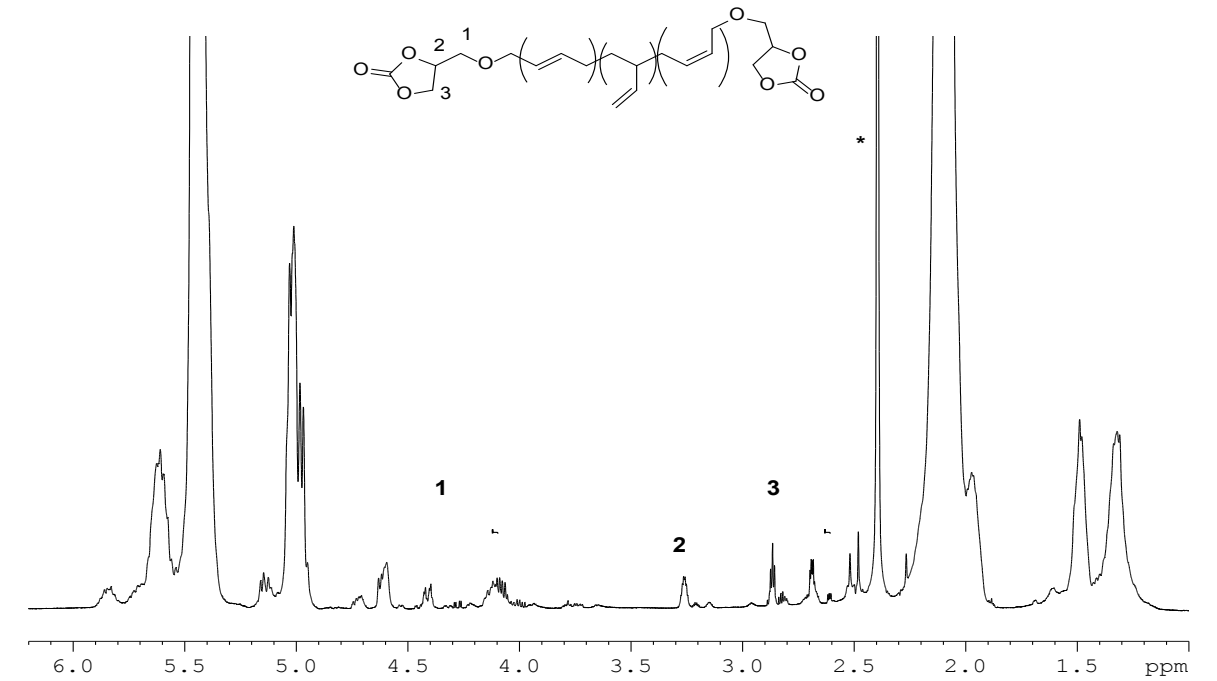

Figure S21. ^{1}H NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of PBD-GC_2 (* marker stands for residual toluene).

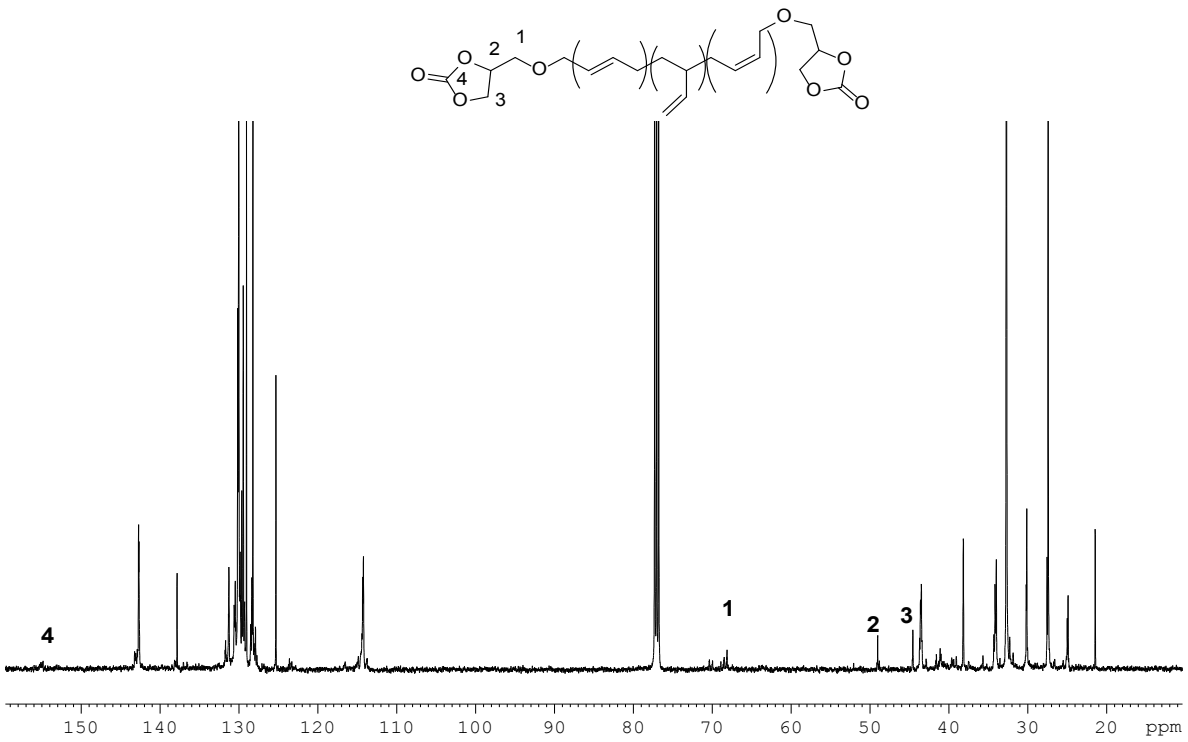

Figure S22. $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$, 25 °C) spectrum of PBD-GC_2.

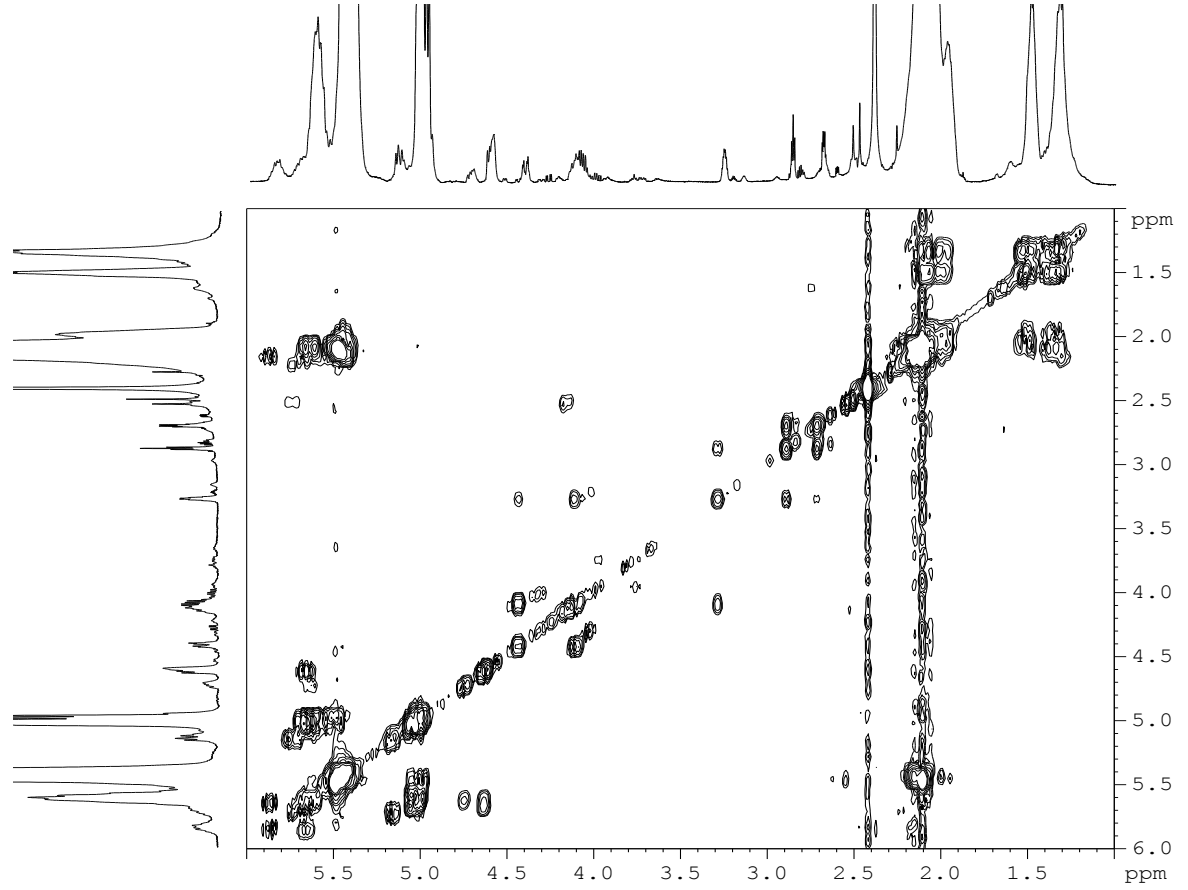

Figure S23. ^{1}H-^{1}H COSY NMR (500 MHz, $CDCl_3$, 25 °C) spectrum of PBD-GC_2.

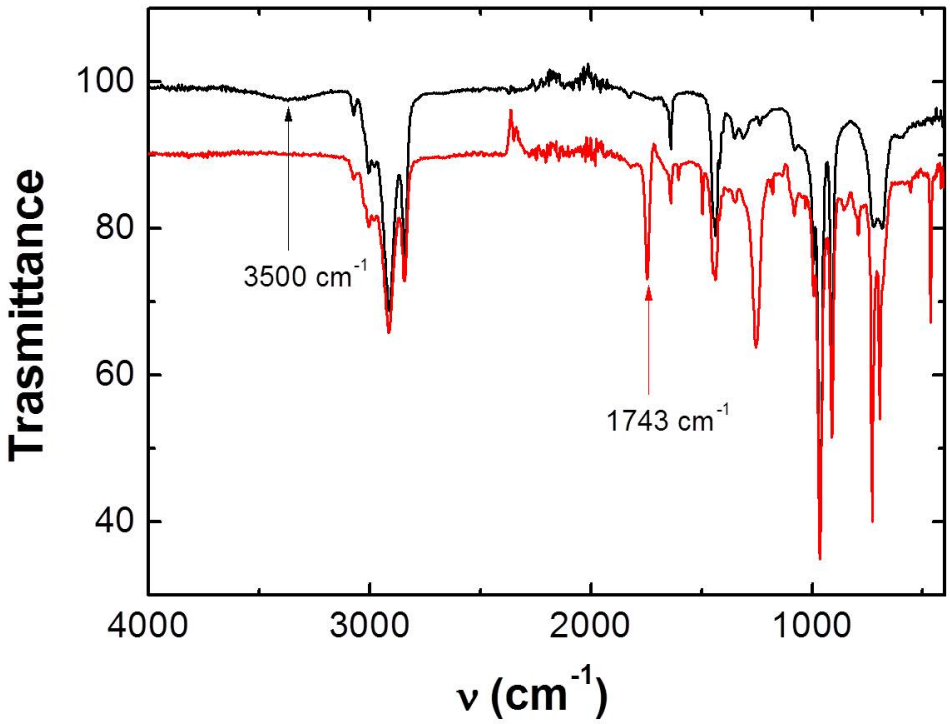

Figure S24. FTIR spectra of PBD-OH_2 (black trace) and the resulting PBD-GC_2 (red trace).

Scheme S1. Synthesis of 4-tosylmethyl-1,3-dioxolan-2-one (GC-OTs).

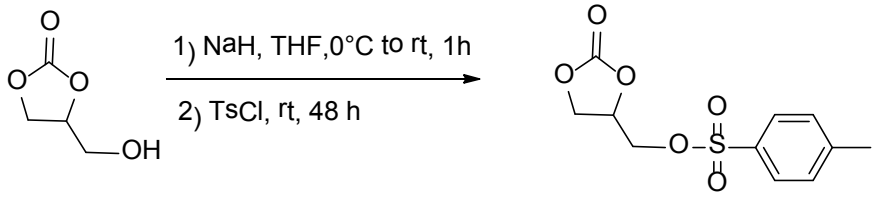

Table S1. α,ω-Dihydroxy and dicyclocarbonate telechelic PEGs characteristics.

	$M_{n,SEC}$ [b]	$Đ_M$ [b]
PEG_{400}-OH_2	-	-
PEG_{400}-GC_2	-	-
PEG_{4000}-OH_2	3950	1.10
PEG_{4000}-GC_2	4400	1.18

[a] Determined by SEC in THF at 30 °C vs. polystyrene standards (uncorrected M_n values).

Table S2. α,ω-Dihydroxy and dicyclocarbonate telechelic PEE characteristics.

	$M_{n,NMR}$ [a]	$M_{n,SEC}$ [b]	$Đ_M$ [b]
PEE-OH_2	1000	1040	2.24
PEE-GC_2	1200	1090	2.14

[a] Determined by NMR analysis of the isolated polymer, from ^1H resonances of both terminal groups [b] Determined by SEC in THF at 30 °C vs. polystyrene standards (uncorrected M_n values).

Table S3. α,ω-Dihydroxy and dicyclocarbonate telechelic PBD characteristics.

	$M_{n,SEC}$ [a]	$Đ_M$ [a]	% 1,4-cis units	% 1,4-trans units	% 1,2 units
PBD-OH_2	3450	2.4	20.0	60.0	20.0
PBD-GC_2	3800	2.29	20.0	60.0	20.0

[a] Determined by SEC in THF at 30 °C vs. polystyrene standards (uncorrected M_n values).