Supporting Information

Self-Reporting Dynamic Covalent Polycarbonates Networks

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Content

1. ^{1}H NMR spectra of the prepared substances

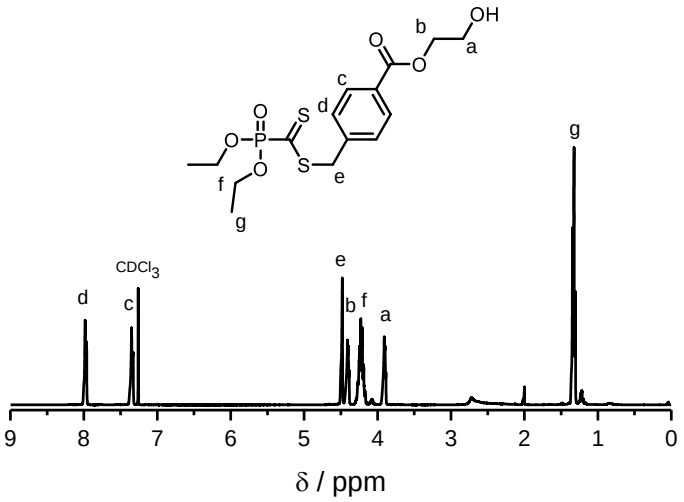

Figure S1 ^{1}H NMR spectrum of **PDT-OH** in $CDCl_3$ at ambient temperature.

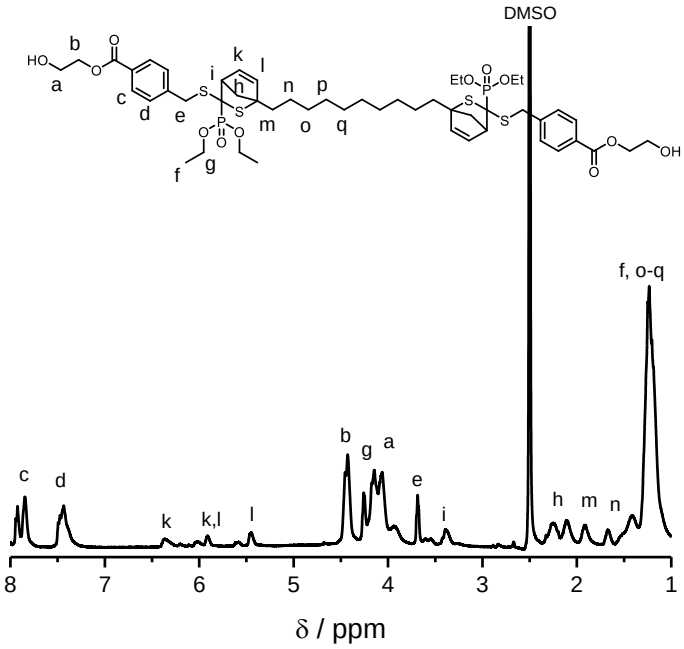

Figure S2 ^{1}H NMR spectrum of **HDA-diol** in DMSO-d6 at ambient temperature.

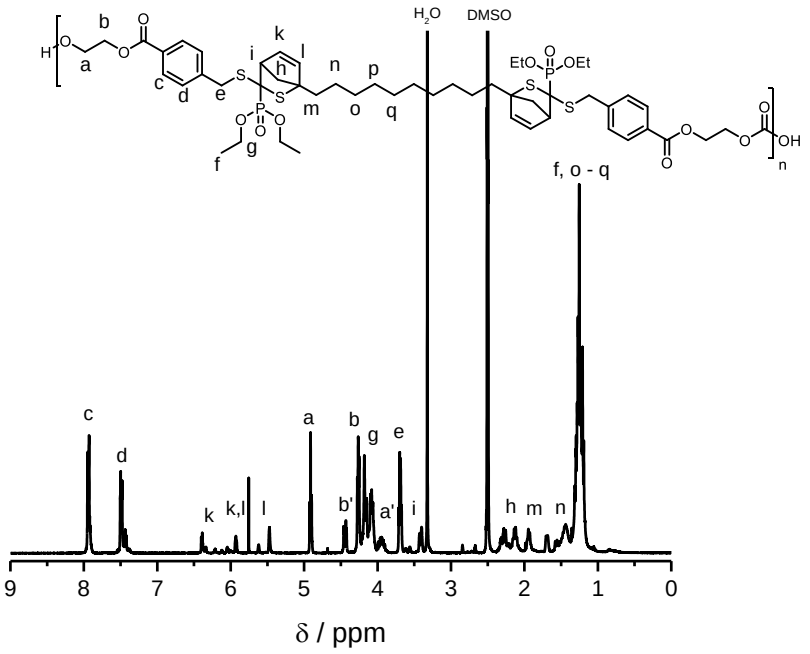

Figure S3 ^{1}H NMR spectrum of **HDA-PC** in DMSO-d6 at ambient temperature. a' and b' relate to the hydrogens at the end-functionality of the polymer.

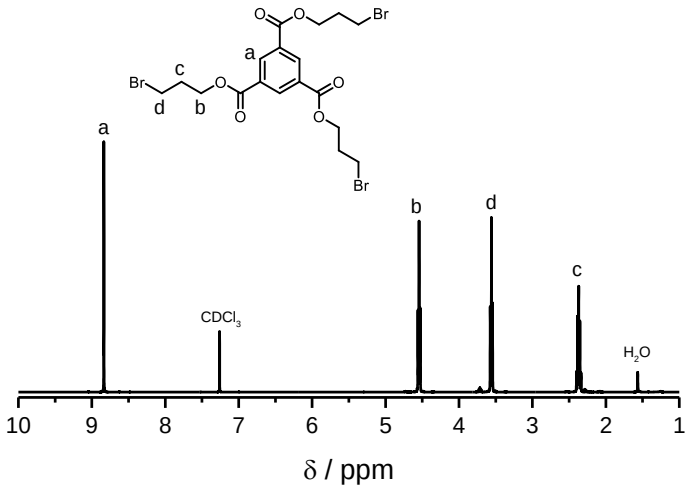

Figure S4 ^{1}H NMR spectrum of **TriBr-linker** in $CDCl_3$ at ambient temperature.

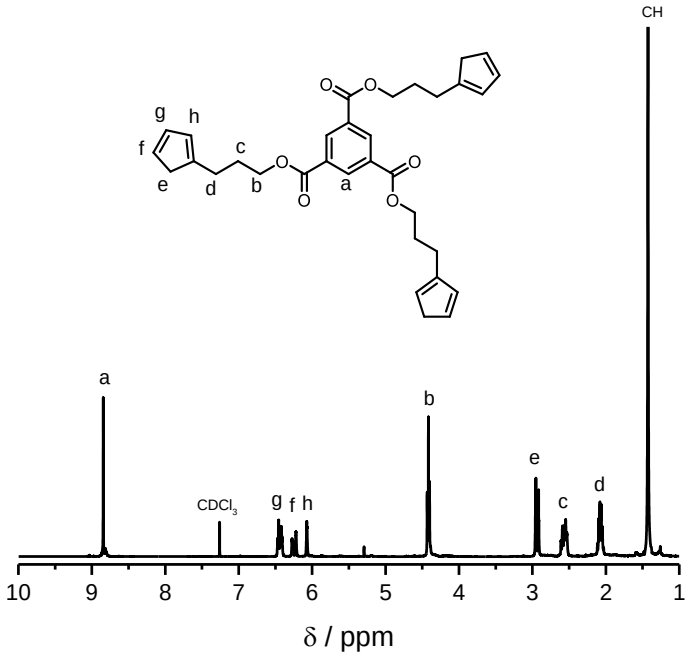

Figure S5 ^{1}H NMR spectrum of **TriCp-linker** in $CDCl_3$ at ambient temperature.

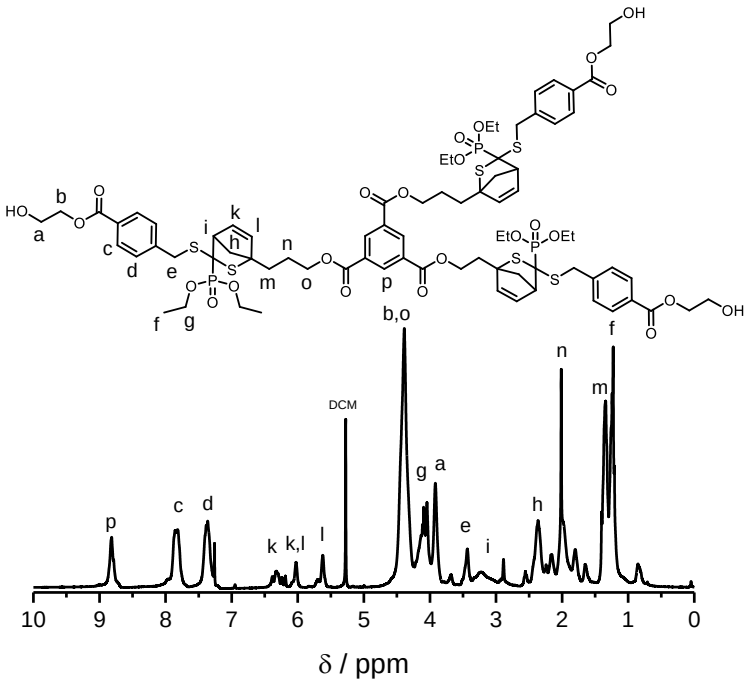

Figure S6 ^{1}H NMR spectrum of **HDA-triol** in $CDCl_3$ at ambient temperature.

2. ESI mass spectra of the HDA-diol and HDA-triol

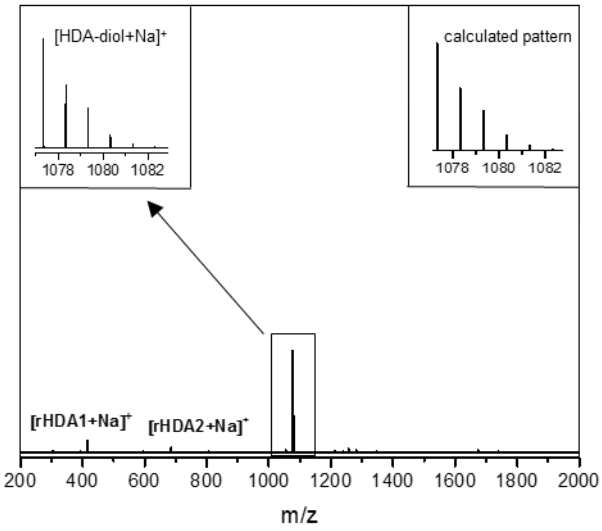

Figure S7 ESI mass spectrum of the **HDA-diol**. The retro HDA products are formed during the ionization process due to the high temperatures (320 °C).

Tabel S1 Sum formula, the exact masses of the experimentally obtained data, theoretical m/z values and the deviation of both for the **HDA-diol** and the products of the retro HDA reaction (rHDA1 and rHDA2).

Label	Sum formula	m/z_{exp}	m/z_{theo}	Δm/z
$[HDA\text{-}diol+Na]^+$	$[C_{50}H_{72}NaO_{12}P_2S_4]^+$	1077.3289	1077.3274	0.0015
$[rHDA1+Na]^+$	$[C_{15}H_{21}NaO_6PS_2]^+$	415.0414	415.0409	0.0005
$[rHDA2+Na]^+$	$[C_{35}H_{51}NaO_6PS_2]^+$	685.7277	685.7257	0.0020

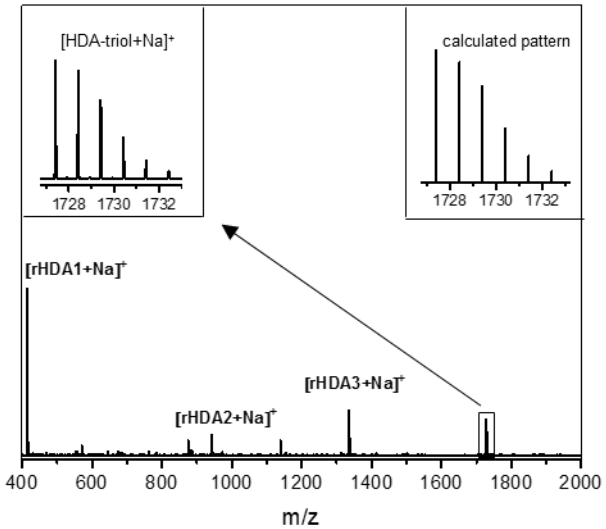

Figure S8 ESI mass spectrum of the **HDA-triol**. The retro HDA products are formed during the ionization process due to the high temperatures (320 °C).

Tabel S2 Sum formula, the exact masses of the experimentally obtained data, theoretical m/z values and the deviation of both for the **HDA-triol** and the products of the retro HDA reaction (rHDA1, rHDA2 and rHDA3).

Label	Sum formula	m/z_{exp}	m/z_{theo}	Δm/z
$[HDA\text{-}triol+Na]^+$	$[C_{78}H_{99}NaO_{24}P_3S_6]^+$	1727.4114	1727.3956	0.0158
$[rHDA1+Na]^+$	$[C_{15}H_{21}NaO_6PS_2]^+$	415.0411	415.0409	0.0002
$[rHDA2+Na]^+$	$[C_{48}H_{57}NaO_{12}PS_2]^+$	943.2940	943.2921	0.0019
$[rHDA3+Na]^+$	$[C_{63}H_{78}NaO_{18}P_2S_4]^+$	1335.3455	1335.3438	0.0017

3. SEC analysis of the prepared linear polycarbonates (HDA-PC) P1 – P4

Table S3 SEC analysis of the prepared linear polycarbonates **P1** – **P4**. M_n and M_w in g mol^{-1}.

	M_n	M_w	Đ
P1	3.100	4.200	1.4
P2	2.800	5.600	2.0
P3	7.500	16.000	2.4
P4	7.600	20.000	2.7

Table S4 SEC analysis of the degradation of **P4** upon heating. M_n and M_w in g mol^{-1}.

	M_n	M_w	Đ
P4 (25 °C)	7.600	20.000	2.7
P4 (60 °C)	3.600	12.000	3.4
P4 (100 °C)	1.600	3.900	2.5
P4 (140 °C)	570	590	1.04

Table S5 SEC analysis of the bonding/debonding behavior of **P4**. M_n and M_w in g mol^{-1}. **P4$_{or.}$** is the original **P4** polymer, **P4$_{deg.}$** the degraded polymer at 120 °C and **P4$_{ref.}$** the reformed polymer upon cooling.

	M_n	M_w	Đ
P4$_{or.}$ (25 °C	7.600	20.000	2.7
P4$_{deg.}$ (120 °C)	1.300	1.700	1.4
P4$_{ref.}$ (25 °C)	9.900	20.000	2.0

4. ^{1}H NMR spectra of the bonding/debonding behavior if P4

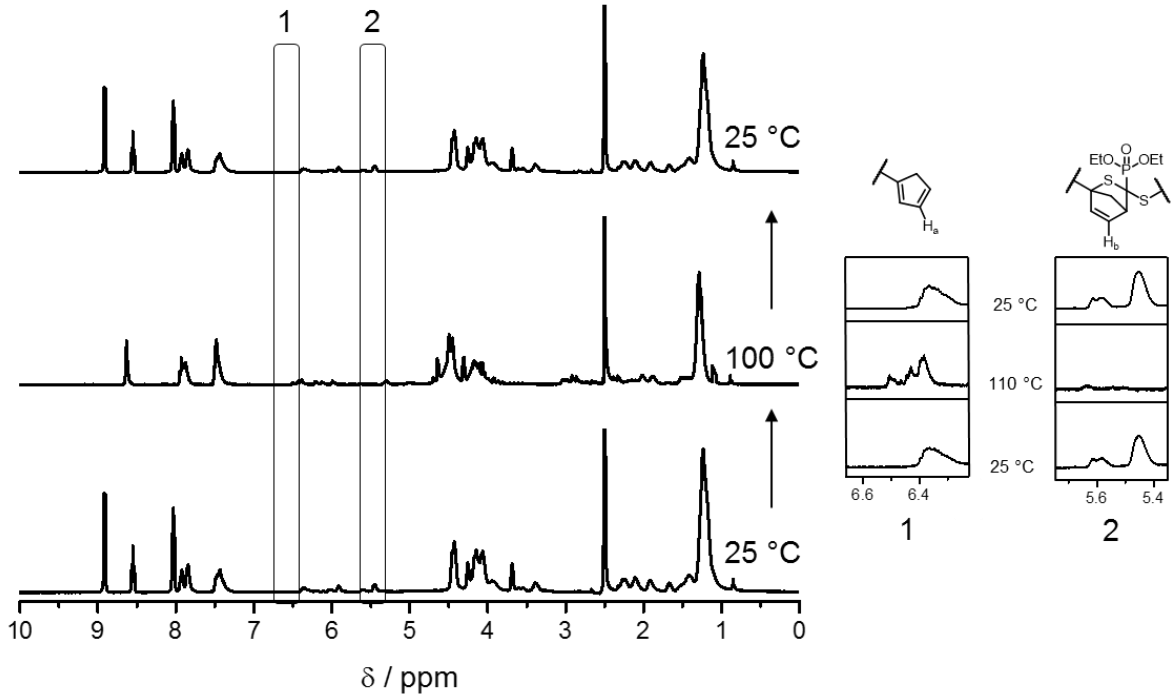

Figure S9 ^{1}H NMR spectra of the bonding/debonding behavior of the prepared linear polycarbonate **P4** in DMSO-d_6.