

## Supporting Information

### Sunflower oil-based thermosets *via* the Passerini three-component reaction

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# 1 Fatty acid content of high oleic sunflower oil and double bonds per triglyceride

The fatty acid (FA) content of the used high oleic sunflower oil in this project was already determined and described in a former publication (note: in the former publication, this oil is labeled “HOSO04”).<sup>[1]</sup> Here, the outcome of the previous analysis is summarized, as it is important for this study (Table S1).

**Table S1:** Fatty acid content determination of high oleic sunflower oil *via* GC-MS and supplemented by <sup>1</sup>H NMR spectroscopy.

Fatty Acid		% FA <i>via</i> GC-MS	% FA supplemented by <sup>1</sup> H NMR spectroscopy
Myristic	C14:0	0.02	0.02
Palmitic	C16:0	3.89	3.89
Stearic	C18:0	3.43	3.43
Arachidic	C20:0	0.02	0.02
Oleic and	C18:1 cis (ω-9)	88.93	88.69
linolenic	C18:3 cis (ω-3)		0.24
Elaidic	C18:1 trans (ω-9)	–	–
Linoleic	C18:2 cis (ω-6)	3.71	3.71
SFAs	C14:0, C16:0, C18:0, C20:0	7.36	7.36
UFAs	C18:1, C18:2, C18:3	92.64	92.64

The fatty acid content was used to calculate the number of double bond protons per triglyceride with Equation (S1).

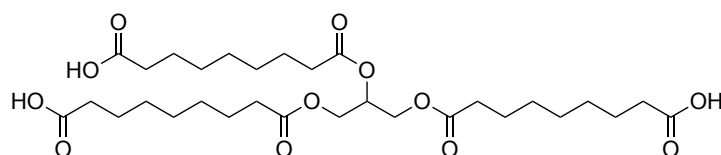
$$\frac{\text{double bond protons}}{\text{triglyceride}} = \text{oleic acid} \times 2 + \text{linoleic acid} \times 4 + \text{linolenic acid} \times 6 = 5.81 \quad (\text{S1})$$

This number will be used to calculate the yield of the employed oxidative cleavage on high oleic sunflower oil (SI chapter 2.1). For one double bond cleavage, two carboxylic acids form. Hence, for a yield of 100%, the integral of α-CH<sub>2</sub> protons of carboxylic acids (2.18 ppm) in the <sup>1</sup>H NMR spectrum should duplicate. The conversion of double bonds into carboxylic acids, that is, the yield estimated by <sup>1</sup>H NMR spectroscopy, can be calculated with Equation (S2) by division of the integral of α-CH<sub>2</sub> protons of carboxylic acids by 2 and the calculated number of vinylic protons inside the oil (5.81), after normalizing the spectrum relative to the signal of the glyceryl moiety.

$$\text{NMR-Yield (\%)} = \frac{\text{integral}(\alpha\text{-CO}_2\text{H})}{2 \times 5.81} \times 100 \quad (\text{S2})$$

## 2 Experimental procedures and spectral data

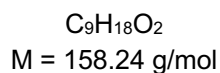
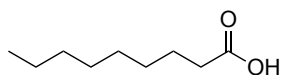
### 2.1 Oxidative cleavage of high oleic sunflower oil



The oxidative cleavage of high oleic sunflower oil was performed according to a literature reported procedure.<sup>[1]</sup> The procedure is described in the main text of the publication.

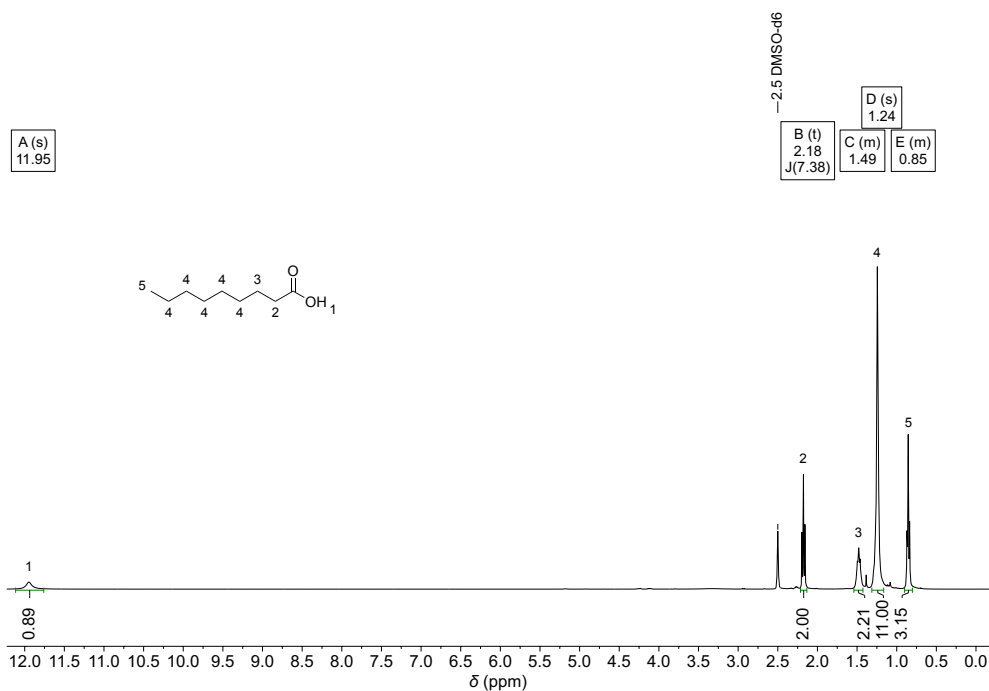
Analytical data will be listed here for the three fractions that were obtained by flash column chromatography.

#### Fraction 1: Nonanoic acid



$R_f$  (Fraction 1) = 0.69 (cyclohexane/ethyl acetate, 2:1 + 1% formic acid).

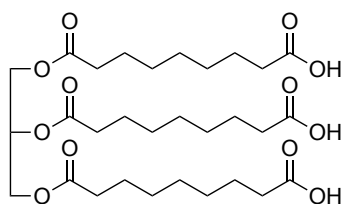
$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ , ppm):  $\delta = 11.95$  (s, 1H,  $\text{H}^1$ ), 2.18 (t,  $J = 7.4 \text{ Hz}$ , 2H,  $\text{H}^2$ ), 1.54–1.42 (m, 3H,  $\text{H}^3$ ), 1.24 (s, 10H,  $\text{H}^4$ ), 0.95–0.76 (m, 3H,  $\text{H}^5$ ).



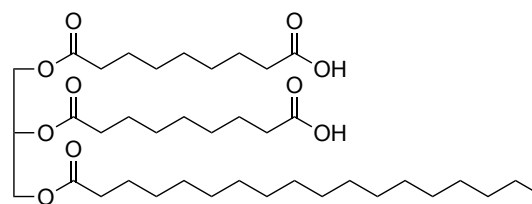
**Figure S1:**  $^1\text{H NMR}$  spectrum of the isolated nonanoic acid by flash column chromatography in  $\text{DMSO-}d_6$ .

## Fraction 2: Sunflower oil-based carboxylic acid with low carboxylic acid content

## Representative Structures:



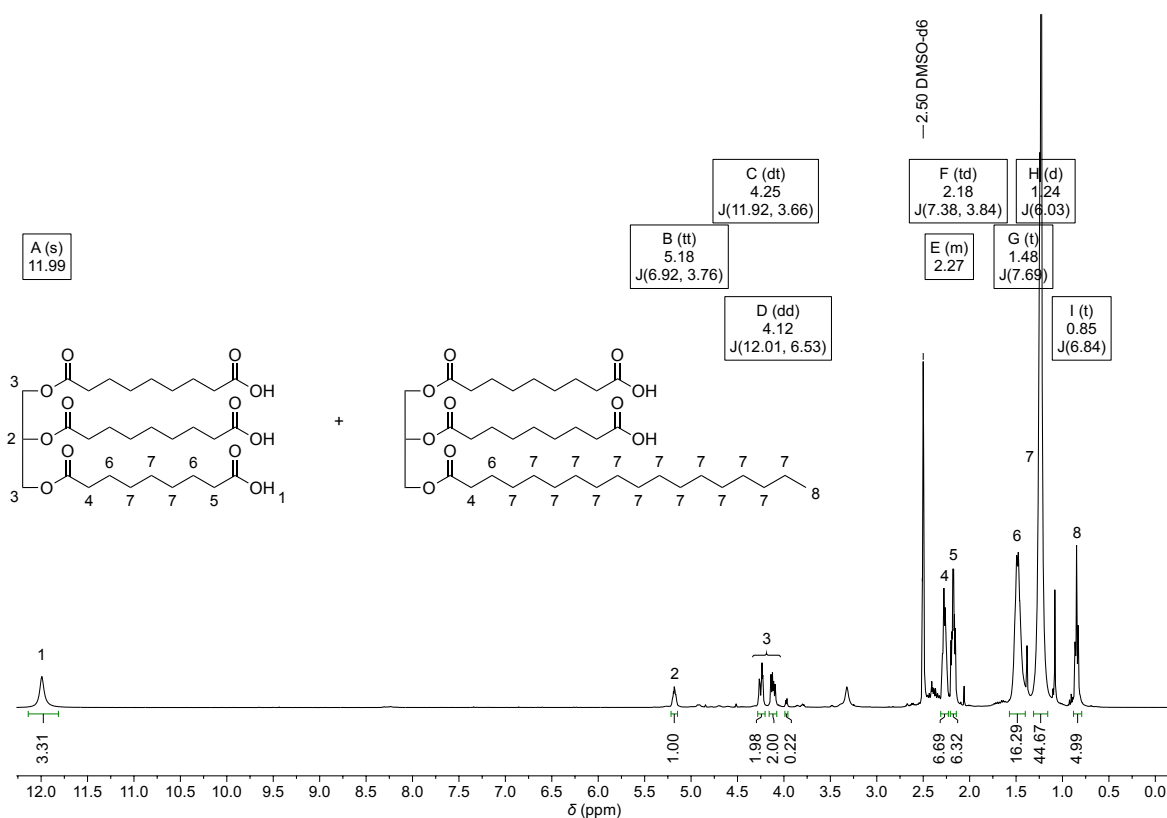
$C_{30}H_{50}O_{12}$   
M = 602.72 g/mol



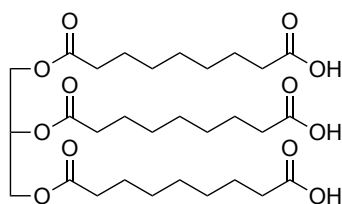
$C_{39}H_{70}O_{10}$   
M = 698.98 g/mol

$R_f$  (Fraction 2) = 0.26 (cyclohexane/ ethyl acetate, 2:1 + 1% formic acid).

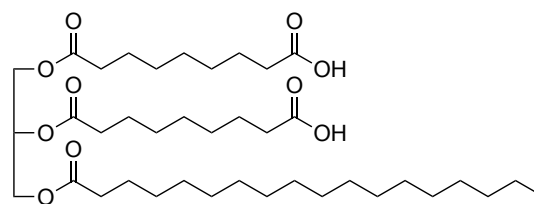
$^1H$  NMR (400 MHz, DMSO- $d_6$ , ppm):  $\delta$  = 11.99 (s, 3H, H<sup>1</sup>), 5.18 (tt,  $J$  = 7.0, 3.7 Hz, 1H, H<sup>2</sup>), 4.25 (dd,  $J$  = 12.0, 3.7 Hz, 2H, H<sup>3</sup>), 4.12 (dd,  $J$  = 12.0, 6.5 Hz, 2H, H<sup>3</sup>), 3.97 (d,  $J$  = 5.4 Hz, not further oxidized OH group), 2.30–2.24 (m, 6H, H<sup>4</sup>), 2.18 (td,  $J$  = 7.4, 3.7 Hz, 6H, H<sup>5</sup>), 1.57–1.42 (m, 16H, H<sup>6</sup>), 1.31–1.14 (m, 45H, H<sup>7</sup>), 0.85 (t,  $J$  = 6.8 Hz, 5H, H<sup>8</sup>).



**Figure S2:**  $^1H$  NMR spectrum of fraction 2 isolated by flash column chromatography in DMSO- $d_6$ .

**Fraction 3: Sunflower oil-based tricarboxylic acid****Representative Structures:**

$C_{30}H_{50}O_{12}$   
M = 602.72 g/mol



$C_{39}H_{70}O_{10}$   
M = 698.98 g/mol

$R_f$  (Fraction 3) = 0.14 (cyclohexane/ ethyl acetate, 2:1 + 1% formic acid).

$^1\text{H NMR}$  (400 MHz, DMSO- $d_6$ , ppm):  $\delta$  = 11.95 (s, 3H, H<sup>1</sup>), 5.18 (tt,  $J$  = 6.9, 3.7 Hz, 1H, H<sup>2</sup>), 4.25 (dd,  $J$  = 12.0, 3.7 Hz, 2H, H<sup>3</sup>), 4.12 (dd,  $J$  = 12.0, 6.5 Hz, 2H, H<sup>3</sup>), 2.34–2.22 (m, 6H, H<sup>4</sup>), 2.17 (t,  $J$  = 7.4 Hz, 6H, H<sup>5</sup>), 1.49 (ddd,  $J$  = 14.6, 9.6, 5.5 Hz, 12H, H<sup>6</sup>), 1.25 (d,  $J$  = 3.8 Hz, 18H, H<sup>7</sup>), 0.89–0.78 (m, 0.17H, H<sup>8</sup>).

$^{13}\text{C NMR}$  (126 MHz, DMSO- $d_6$ , ppm):  $\delta$  = 174.5 (C<sub>q</sub>, CO<sub>2</sub>H, C<sup>1</sup>), 174.4 (C<sub>q</sub>, CO<sub>2</sub>H, C<sup>1</sup>), 172.5 (C<sub>q</sub>, C<sub>Ester</sub>, C<sup>2</sup>), 172.2 (C<sub>q</sub>, C<sub>Ester</sub>, C<sup>2</sup>), 68.8 (CH, C<sub>Glycerol</sub>, C<sup>3</sup>), 61.8 (CH<sub>2</sub>, C<sub>Glycerol</sub>, C<sup>4</sup>), 33.6 (CH<sub>2</sub>, C<sup>5</sup>), 33.5 (CH<sub>2</sub>, C<sup>5</sup>), 33.3 (CH<sub>2</sub>, C<sup>5</sup>), 28.4 (CH<sub>2</sub>, C<sup>6</sup>), 28.3 (CH<sub>2</sub>, C<sup>6</sup>), 28.2 (CH<sub>2</sub>, C<sup>6</sup>), 24.4 (CH<sub>2</sub>, C<sup>6</sup>), 24.4 (CH<sub>2</sub>, C<sup>6</sup>), 24.3 (CH<sub>2</sub>, C<sup>6</sup>).

**IR** (ATR, cm<sup>-1</sup>):  $\tilde{\nu}$  = 3223 (vw), 2929 (m), 2857 (w), 1738 (vs), 1703 (vs), 1456 (w), 1413 (w), 1378 (w), 1232 (m), 1160 (vs), 1133 (s), 1094 (m), 1033 (w), 938 (w), 728 (w) cm<sup>-1</sup>.

**ESI-HRMS** ([M-H]<sup>-</sup>, C<sub>30</sub>H<sub>49</sub>O<sub>12</sub>, deprotonated triacid): calcd.: 601.3230, found: 601.3229.

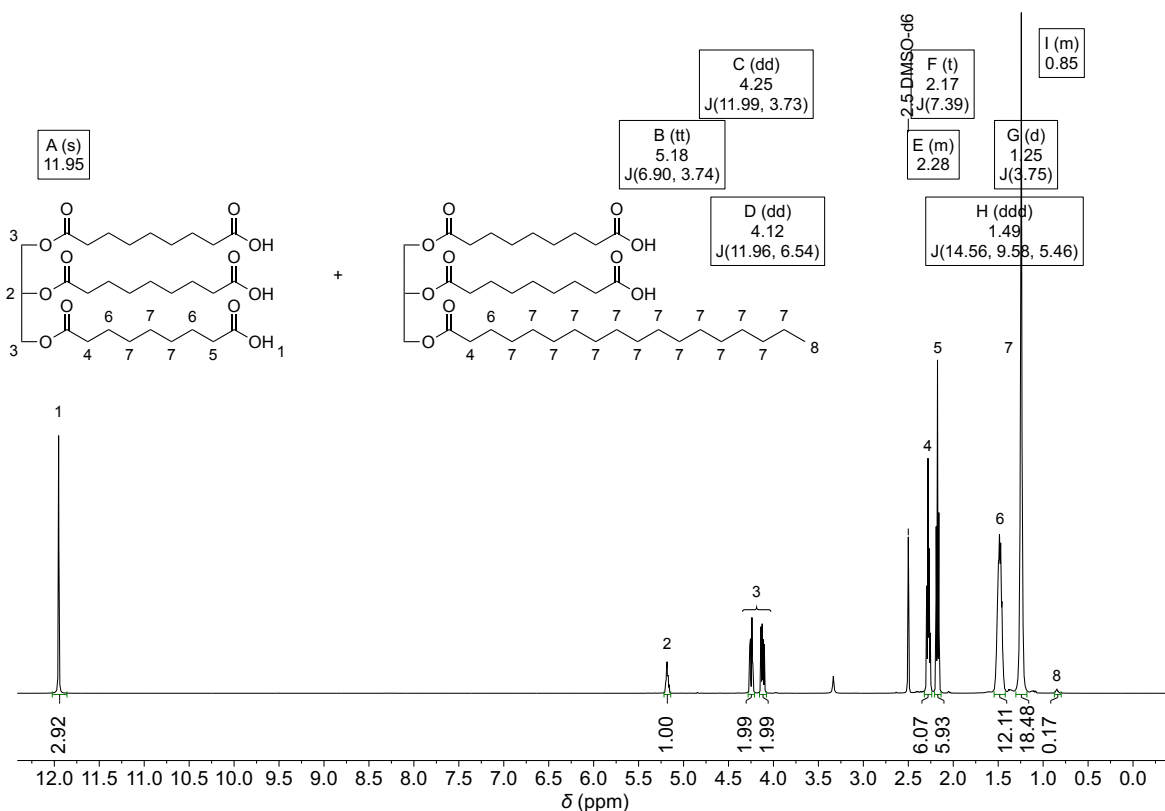


Figure S3:  $^1\text{H}$  NMR spectrum of sunflower oil-based triacid in  $\text{DMSO-}d_6$ .

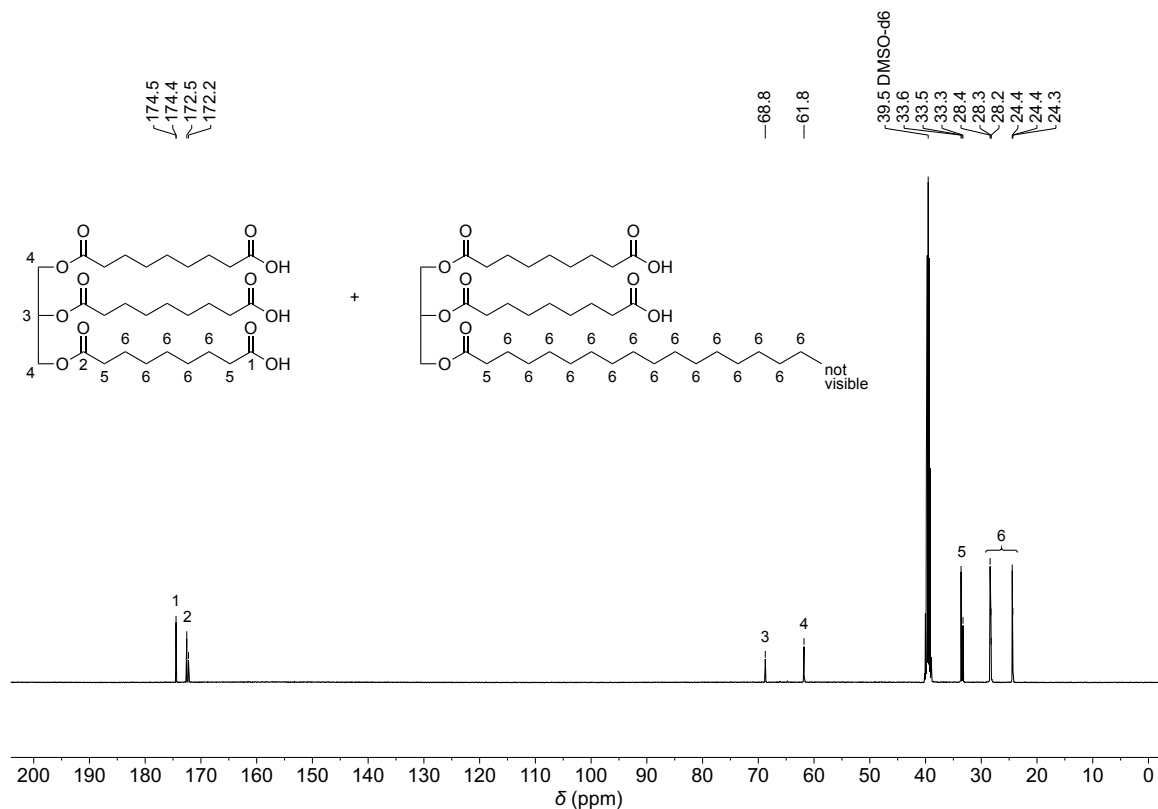


Figure S4:  $^{13}\text{C}$  NMR spectrum of sunflower oil-based triacid in  $\text{DMSO-}d_6$ .

## 2.2 <sup>31</sup>P NMR spectroscopy of sunflower oil based triacid

### 2.2.1 Calculation of carboxylic acid and hydroxyl content

The amount of carboxylic acids and hydroxyl groups in the samples was calculated in analogy to the calculation reported by ARGYROPOULOS *et al.*<sup>[2]</sup> The carboxylic acid and hydroxyl group content was then calculated using Equations (S3) and (S4). The first term in the numerator corresponds to the amount of IS in mmol and the second term corresponds to the molar ratio of carboxylic acids (or hydroxyl groups) to internal standard.

$$\frac{\text{mmol CO}_2\text{H}}{\text{mg sample}} = \frac{\frac{\text{mass of IS solution (in mg)} \times \text{wt\% (IS solution)}}{179.18 \frac{\text{g}}{\text{mol}} \text{ (Molar mass of IS)}} \times \frac{\text{Integral CO}_2\text{H}}{\text{Integral IS}}}{\text{mass of sample (in mg)}} \quad (\text{S3})$$

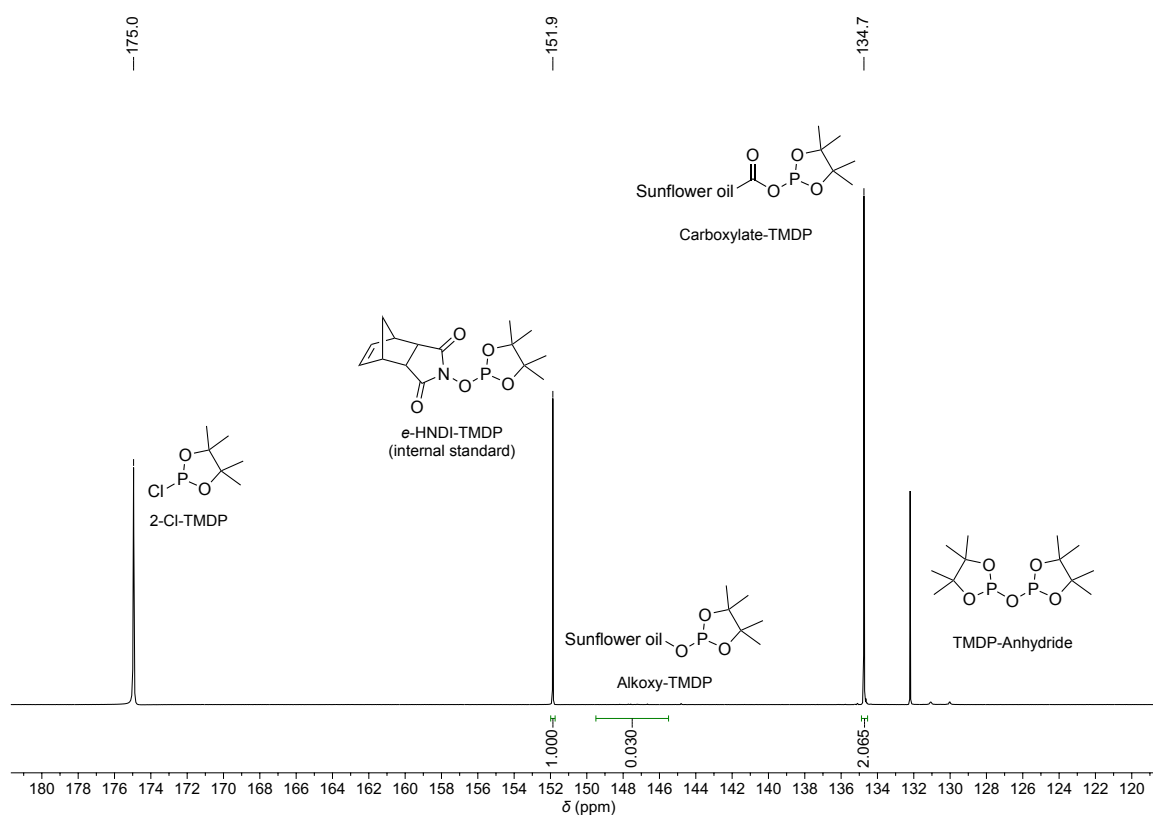
$$\frac{\text{mmol OH}}{\text{mg sample}} = \frac{\frac{\text{mass of IS solution (in mg)} \times \text{wt\% (IS solution)}}{179.18 \frac{\text{g}}{\text{mol}} \text{ (Molar mass of IS)}} \times \frac{\text{Integral OH}}{\text{Integral IS}}}{\text{mass of sample (in mg)}} \quad (\text{S4})$$

The final evaluation of the synthesized sunflower oil-based triacid is summarized in Table S2.

**Table S2:** Carboxylic acid and hydroxyl group content of sunflower oil-based triacid determined *via* <sup>31</sup>P NMR spectroscopy.

Sample	$\frac{\mu\text{mol CO}_2\text{H}}{\text{mg sample}}$	$\frac{\mu\text{mol OH}}{\text{mg sample}}$
<b>Sunflower oil-based triacid</b> (flash column Fraction 3)	4.952 ± 0.036	0.078 ± 0.005



**2.2.2  $^{31}\text{P}$  NMR spectrum of phosphitylated sunflower oil-based triacid**

**Figure S5:** Quantitative  $^{31}\text{P}$  NMR spectrum of phosphitylated sunflower oil-based triacid (measurement 1 as example).

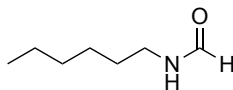
- Measurement 1: 30.2 mg sample, 813.8 mg IS solution (1.652 wt%);  
alkoxy integral: 0.03, carboxy integral: 2.065;  
result: 4.977  $\mu\text{mol CO}_2\text{H}$  per mg sample; 0.0745  $\mu\text{mol OH}$  per mg sample.
- Measurement 2: 28.5 mg sample, 813.4 mg IS solution (1.652 wt%);  
alkoxy integral: 0.031, carboxy integral: 1.93;  
result: 4.926  $\mu\text{mol CO}_2\text{H}$  per mg sample; 0.0816  $\mu\text{mol OH}$  per mg sample.

## 2.3 Isocyanides

All isocyanides were synthesized according to the procedure published by Meier *et al.*<sup>[3]</sup>

### 2.3.1 *n*-Hexylisocyanide:

*n*-Hexylformamide:



$C_7H_{15}NO$

$M = 129.20 \text{ g/mol}$

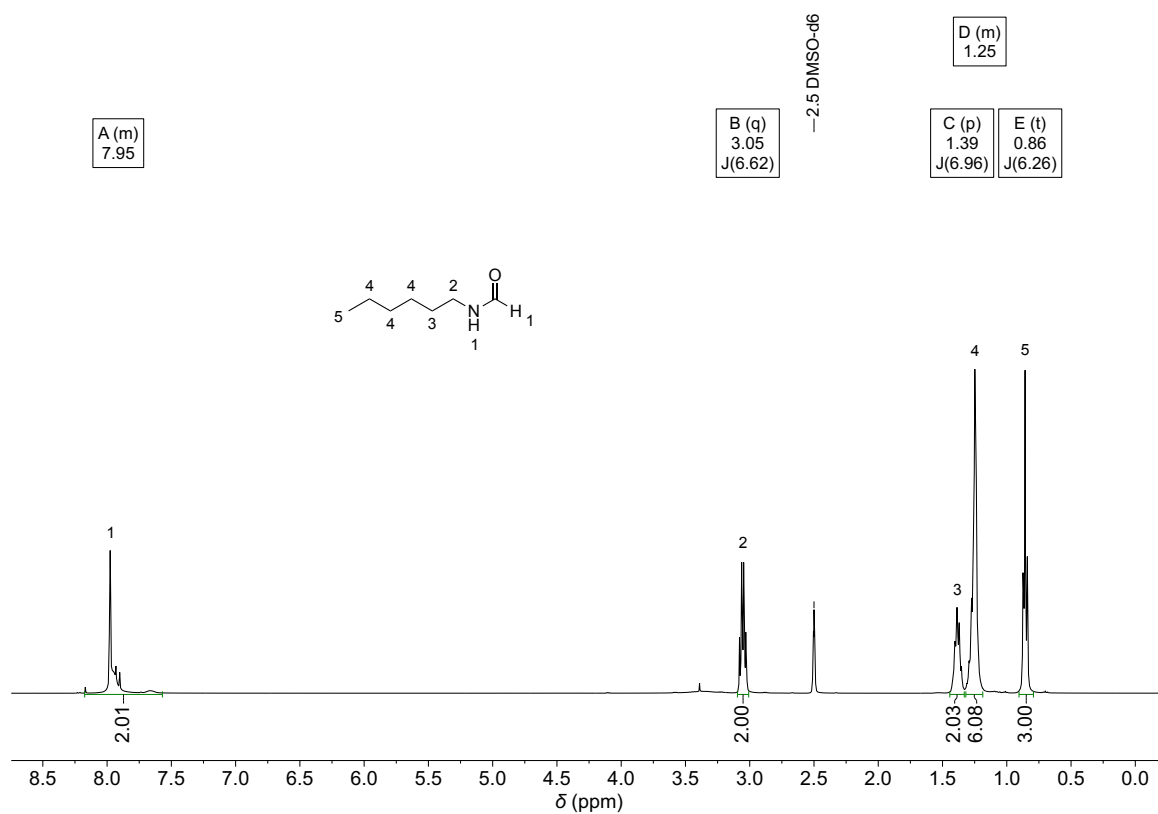
Hexyl amine (20.4 g, 200 mmol, 1.00 eq.) and ethyl formate (322 mL, 296 g, 4.00 mol, 20.0 eq.) were stirred at 54 °C for 16 h. Afterwards, the remaining ethyl formate and ethanol were removed under reduced pressure and the crude product (21.7 g, 168 mmol, 84%) was used without further purification.

**<sup>1</sup>H NMR** (400 MHz, CDCl<sub>3</sub>, ppm):  $\delta = 8.20 - 7.58$  (m, 2H, H<sup>1</sup>), 3.05 (q,  $J = 6.6$  Hz, 2H, H<sup>2</sup>), 1.39 (p,  $J = 7.0$  Hz, 2H, H<sup>3</sup>), 1.33–1.16 (m, 6H, H<sup>4</sup>), 0.86 (t,  $J = 6.3$  Hz, 3H, H<sup>5</sup>).

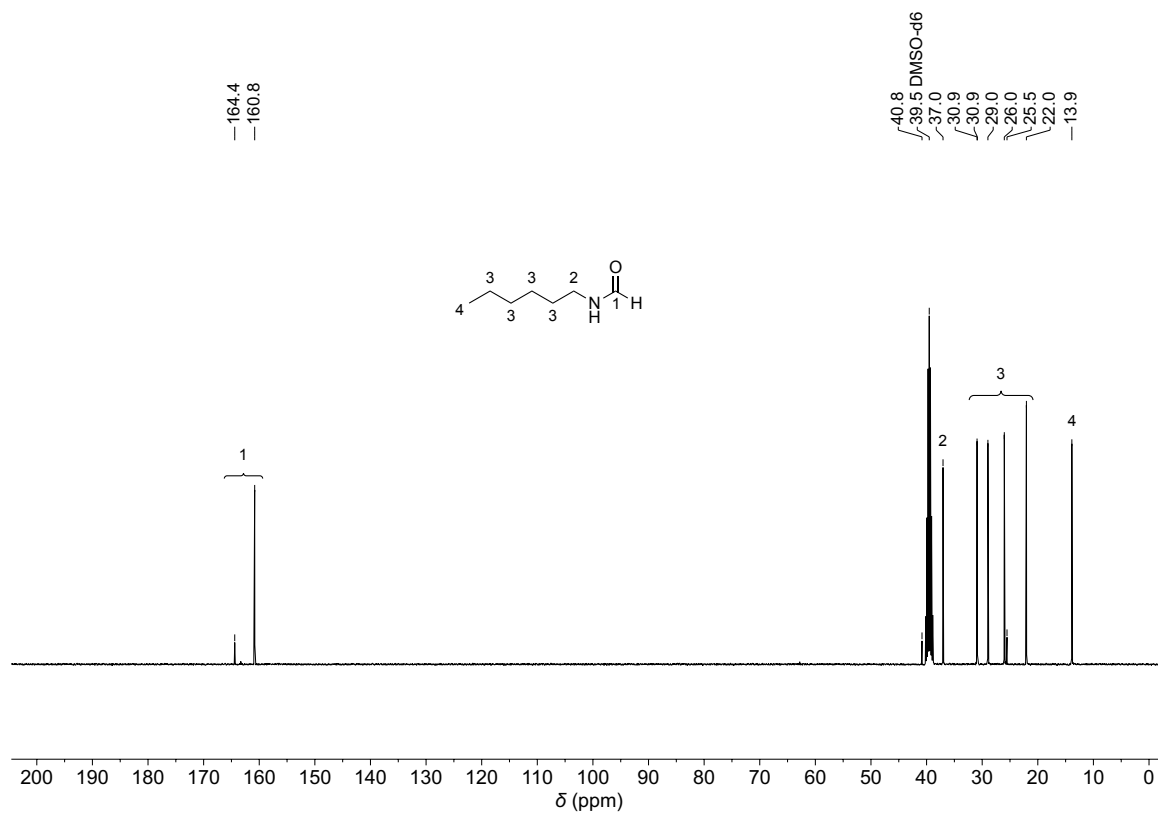
**<sup>13</sup>C NMR** (101 MHz, CDCl<sub>3</sub>, ppm):  $\delta = 164.4$  (CHO, C<sup>1</sup>), 160.8 (CHO, C<sup>1</sup>), 40.8 (CH<sub>2</sub>,  $\alpha$ -C<sub>Formamide</sub>, C<sup>2</sup>), 37.0 (CH<sub>2</sub>,  $\alpha$ -C<sub>Formamide</sub>, C<sup>2</sup>), 30.9 (CH<sub>2</sub>, C<sup>3</sup>), 30.9 (CH<sub>2</sub>, C<sup>3</sup>), 29.0 (CH<sub>2</sub>, C<sup>3</sup>), 26.0 (CH<sub>2</sub>, C<sup>3</sup>), 25.5 (CH<sub>2</sub>, C<sup>3</sup>), 22.0 (CH<sub>2</sub>, C<sup>3</sup>), 13.9 (CH<sub>3</sub>, C<sup>4</sup>).

**IR** (ATR, cm<sup>-1</sup>):  $\tilde{\nu} = 3276$  (w), 3055 (vw), 2956 (w), 2928 (m), 2857 (m), 1656 (vs), 1536 (m), 1466 (w), 1381 (s), 1306 (vw), 1241 (w), 1200 (w), 812 (vw), 762 (w), 724 (w), 652 (vw).

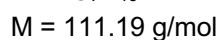
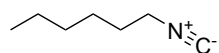
**ESI-HRMS** ([M+H]<sup>+</sup>, C<sub>7</sub>H<sub>16</sub>NO) calcd.: 130.1226; found: 130.1227.



**Figure S6:** <sup>1</sup>H NMR spectrum of *n*-hexylformamide in DMSO-*d*<sub>6</sub>.



**Figure S7** <sup>13</sup>C NMR spectrum of *n*-hexylformamide in DMSO-*d*<sub>6</sub>.

***n*-Hexylisocyanide:**

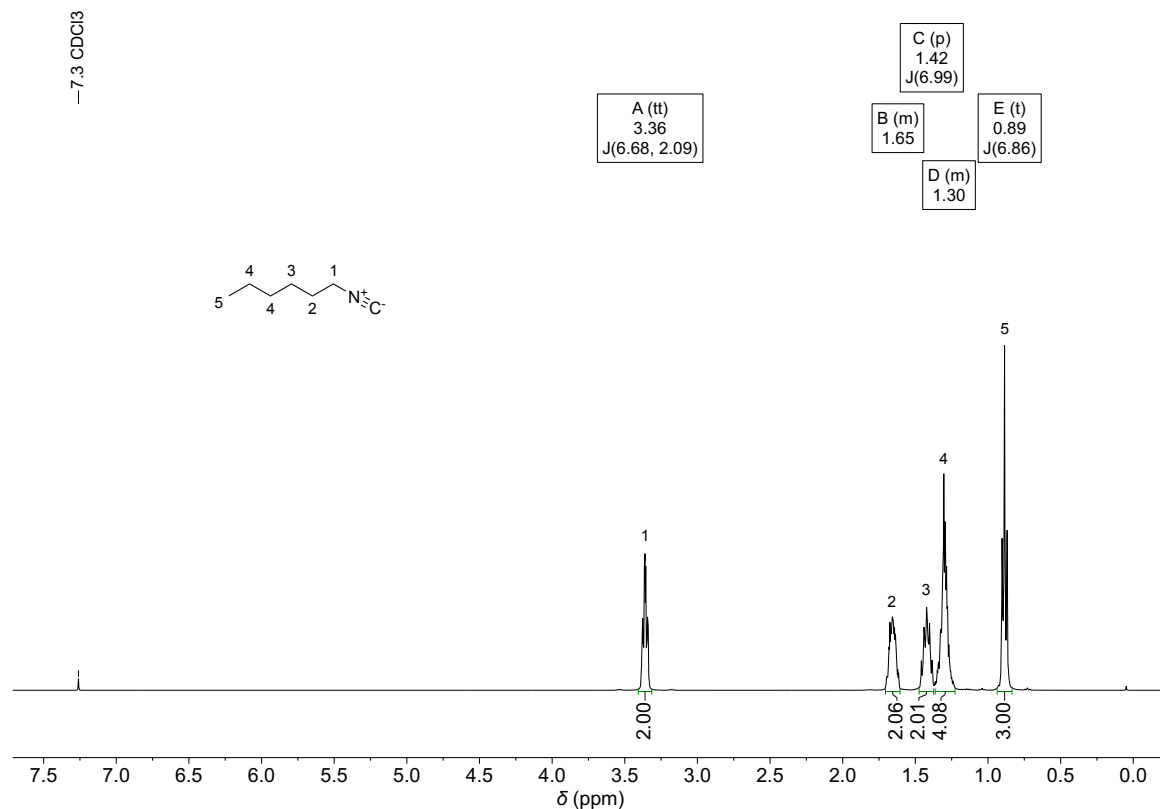
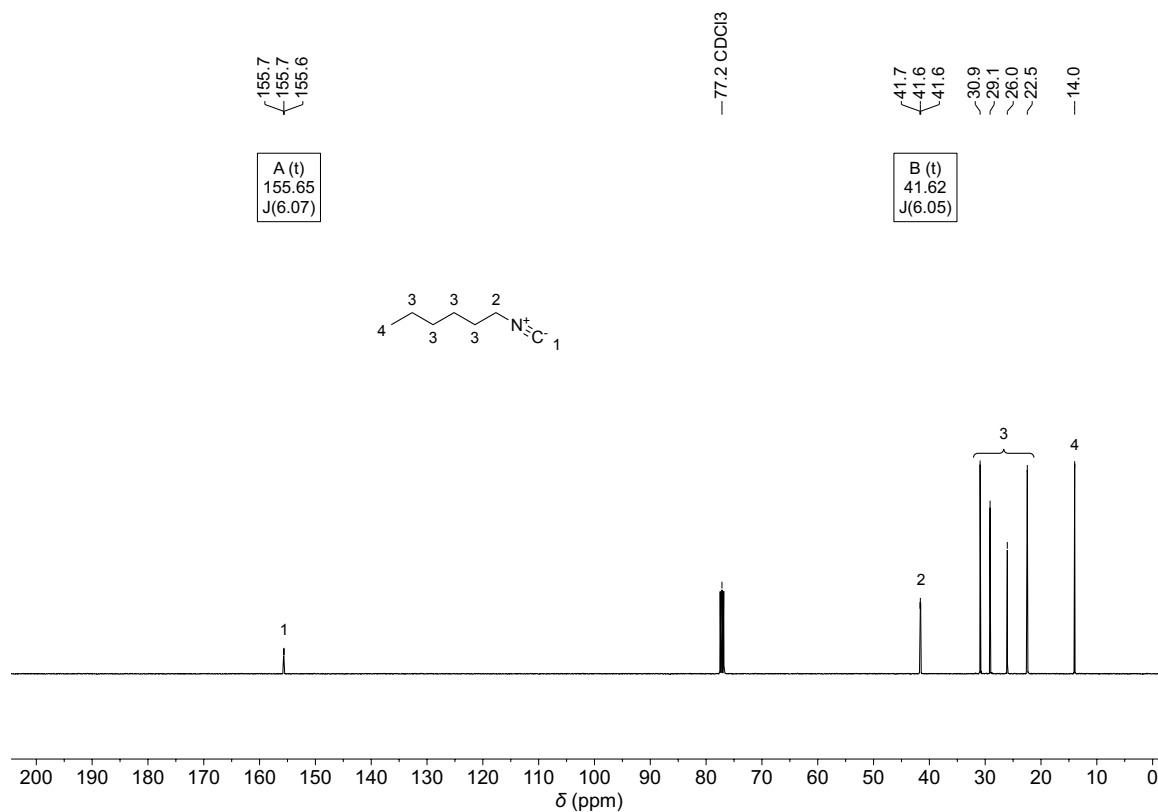
*n*-Hexylformamide (5.17 g, 40.0 mmol, 1.00 equiv.) was dissolved in dichloromethane (60 ml, 666 mmol/l) and pyridine (9.71 ml, 120 mmol, 3.00 equiv.) was added. Subsequently, *p*-toluenesulfonyl chloride (11.4 g, 60.0 mmol, 1.50 equiv.) was added under cooling with a water bath. The cooling was removed, and the reaction mixture was stirred for 24 h at room temperature. Afterwards, aqueous saturated sodium carbonate solution (40 ml) was added, and the biphasic mixture was stirred for another 60 minutes. Water (80 ml) and dichloromethane (80 ml) were added, and the organic phase was separated. The aqueous phase was extracted with dichloromethane (3 × 40 ml), the organic extracts were combined and washed with saturated sodium chloride solution (2 × 40 ml). The organic phase was dried over sodium sulfate, filtered and the solvent was removed under reduced pressure. The crude product was purified by vacuum distillation in a Kugelrohr oven (70 °C, 60 mbar) to obtain the title compound (2.50 g, 22.5 mmol, 56%).

**<sup>1</sup>H NMR** (400 MHz, CDCl<sub>3</sub>, ppm): δ = 3.36 (tt, *J* = 6.7, 2.1 Hz, 2H, H<sup>1</sup>), 1.74–1.57 (m, 2H, H<sup>2</sup>), 1.42 (p, *J* = 7.0 Hz, 2H, H<sup>3</sup>), 1.36–1.23 (m, 4H, H<sup>4</sup>), 0.89 (t, *J* = 6.9 Hz, 3H, H<sup>5</sup>).

**<sup>13</sup>C NMR** (101 MHz, CDCl<sub>3</sub>, ppm): δ = 155.65 (t, *J* = 6.1 Hz, C<sup>1</sup>), 41.62 (t, *J* = 6.1 Hz, CH<sub>2</sub>, C<sup>2</sup>), 30.9 (CH<sub>2</sub>, C<sup>3</sup>), 29.1 (CH<sub>2</sub>, C<sup>3</sup>), 26.0 (CH<sub>2</sub>, C<sup>3</sup>), 22.5 (CH<sub>2</sub>, C<sup>3</sup>), 14.0 (CH<sub>3</sub>, C<sup>4</sup>).

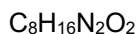
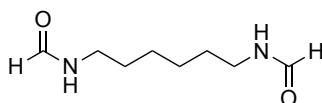
**IR** (ATR, cm<sup>-1</sup>):  $\tilde{\nu}$  = 2956 (m), 2929 (s), 2860 (m), 2146 (vs), 1456 (m), 1380 (w), 1351 (w), 892 (w), 727 (w).

**HRMS** (ESI, [M+H]<sup>+</sup>, C<sub>7</sub>H<sub>14</sub>N) calcd.: 112.1121; found: 112.1123.

**Figure S8:** <sup>1</sup>H NMR spectrum of *n*-hexylisocyanide in CDCl<sub>3</sub>.**Figure S9:** <sup>13</sup>C NMR spectrum of *n*-hexylisocyanide in CDCl<sub>3</sub>.

### 2.3.2 1,6-Diisocyanohexane:

1,6-diformamidohexane:



$$M = 172.23 \text{ g/mol}$$

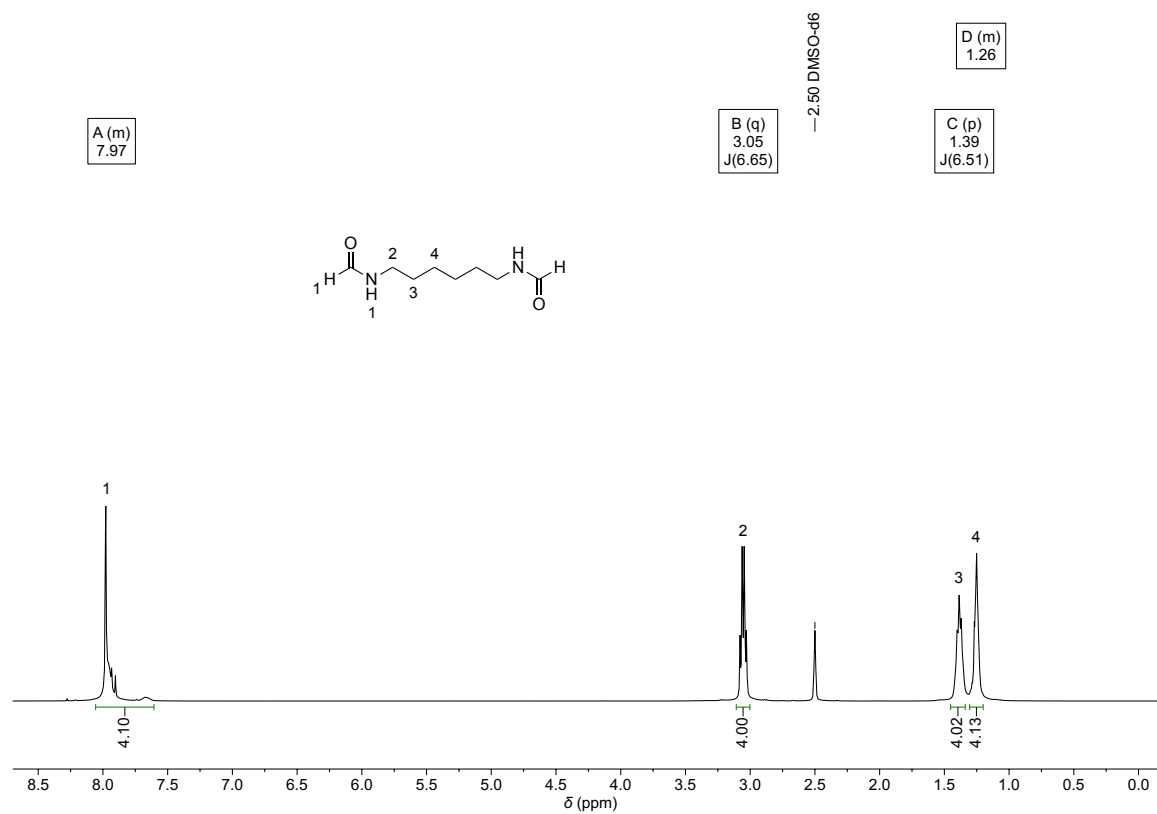
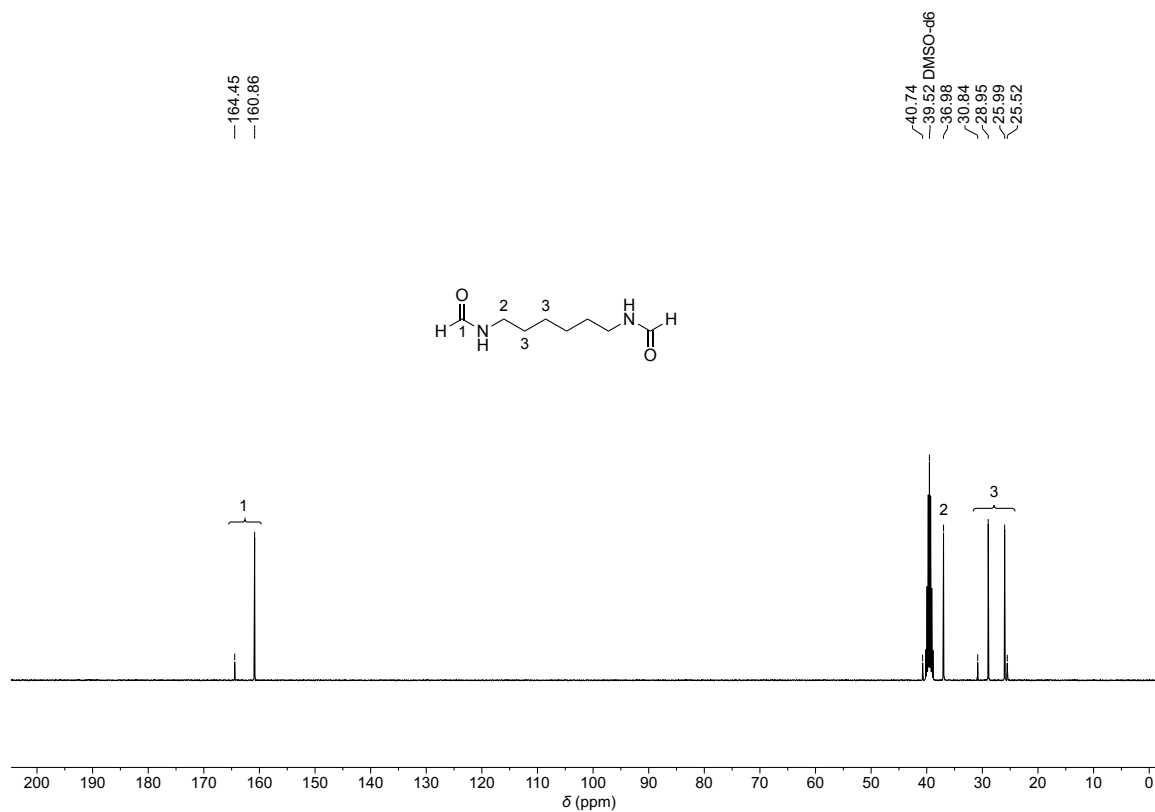
1,6-Diaminohexane (15.0 g, 129 mmol, 1.00 eq.) and ethyl formate (209 ml, 191 g, 2.58 mol, 20.0 eq.) were stirred at 54 °C for 16 h. Afterwards, the remaining ethyl formate and ethanol were removed under reduced pressure and the crude product (21.5 g, 125 mmol, 97%) was used without further purification.

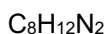
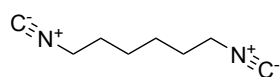
**<sup>1</sup>H NMR** (400 MHz, CDCl<sub>3</sub>, ppm):  $\delta$  = 8.04–7.63 (m, 4H, H<sup>1</sup>), 3.05 (q,  $J$  = 6.7 Hz, 4H, H<sup>2</sup>), 1.39 (p,  $J$  = 6.5 Hz, 4H, H<sup>3</sup>), 1.30–1.20 (m, 4H, H<sup>4</sup>).

**<sup>13</sup>C NMR** (101 MHz, CDCl<sub>3</sub>, ppm):  $\delta$  = 164.4 (CHO, C<sup>1</sup>), 160.9 (CHO, C<sup>1</sup>), 40.7 (CH<sub>2</sub>, C<sup>2</sup>), 37.0 (CH<sub>2</sub>, C<sup>2</sup>), 30.8 (CH<sub>2</sub>, C<sup>3</sup>), 28.9 (CH<sub>2</sub>, C<sup>3</sup>), 26.0 (CH<sub>2</sub>, C<sup>3</sup>), 25.5 (CH<sub>2</sub>, C<sup>3</sup>).

**IR** (ATR, cm<sup>-1</sup>):  $\tilde{\nu}$  = 3275 (s), 3182 (vw), 3030 (vw), 2943 (w), 2913 (w), 2863 (w), 2853 (w), 1641 (vs), 1627 (vs), 1528 (vs), 1475 (m), 1460 (w), 1442 (w), 1386 (vs), 1236 (s), 1212 (s), 1082 (w), 778 (s), 740 (w), 708 (vs), 461 (w).

**ESI-HRMS** ([M+H]<sup>+</sup>, C<sub>8</sub>H<sub>17</sub>N<sub>2</sub>O<sub>2</sub>) calcd.: 173.1285; found: 173.1283.

**Figure S10:**  $^1\text{H}$  NMR spectrum of 1,6-diformamidohexane in  $\text{DMSO-}d_6$ .**Figure S11:**  $^{13}\text{C}$  NMR spectrum of 1,6-diformamidohexane in  $\text{DMSO-}d_6$ .

**1,6-diisocyanohexane:**

$$M = 136.20 \text{ g/mol}$$

1,6-Diformamidohexane (30.0 mmol, 5.17 g, 1.00 eq.) was dissolved in dimethyl carbonate (60 ml) and pyridine (14.6 ml, 180 mmol, 6.00 eq.) was added. Subsequently, *p*-toluenesulfonyl chloride (17.2 g, 90.0 mmol, 3.00 eq.) was added under water bath cooling and the reaction mixture was stirred for 18 h at room temperature. Afterwards, aqueous saturated sodium carbonate solution (60 ml) was added, and the biphasic mixture was stirred for another 30 minutes. Water (100 ml) and dimethyl carbonate (100 ml) were added, and the organic phase was separated. The aqueous phase was extracted with dimethyl carbonate (3 × 60 ml), the organic extracts were combined and washed with water (2 × 50 ml) and saturated sodium chloride solution (2 × 50 mL). The organic extract was dried over sodium sulfate, filtered and the solvent was removed under reduced pressure. The crude product was purified by flash column chromatography (cyclohexane/ethyl acetate, 2:1) to obtain the title compound (4.30 g, 25.0 mmol, 83%).

$R_f$  (cyclohexane/ethyl acetate, 2:1) = 0.36.

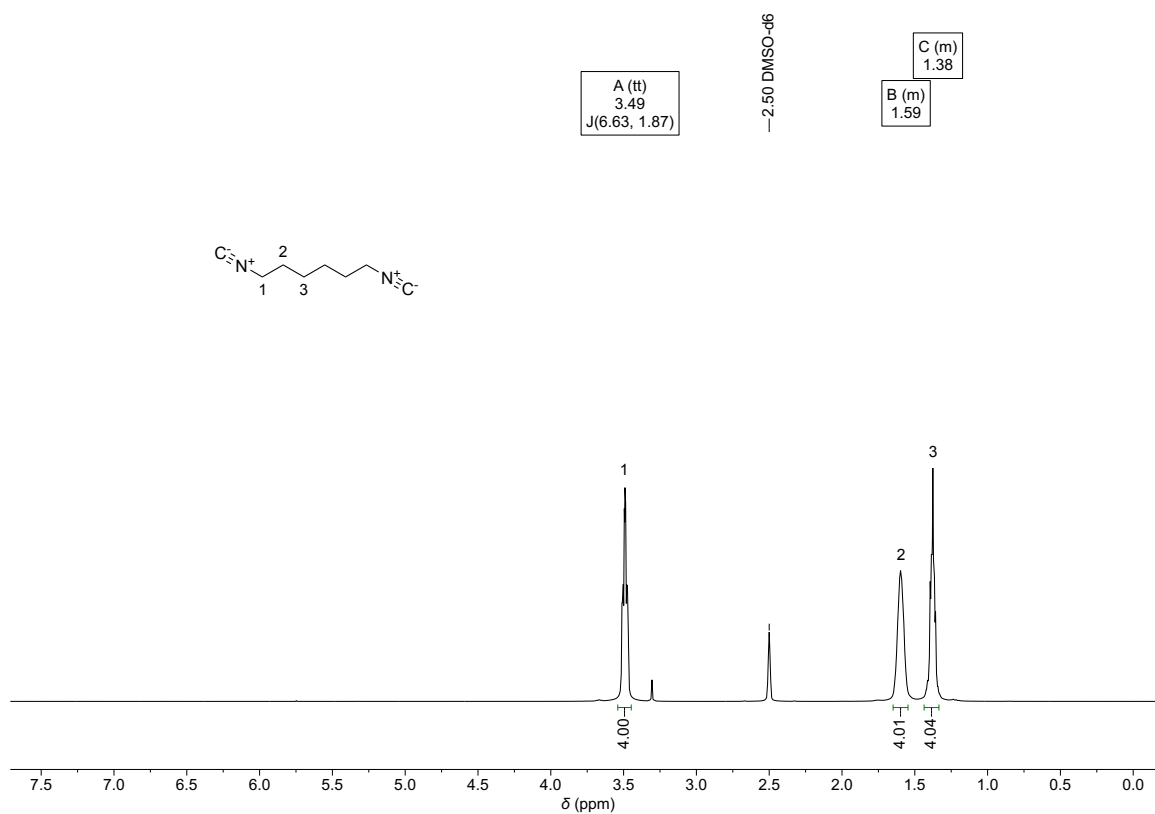
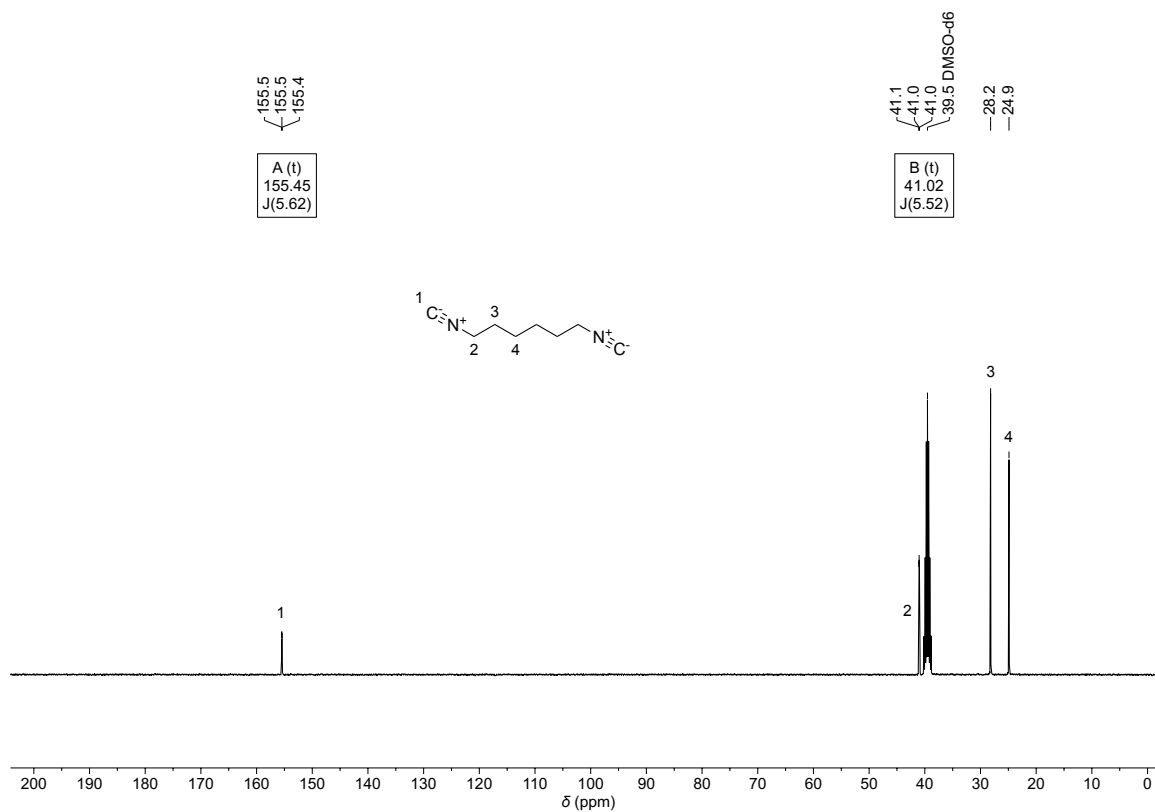
$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 3.49 (tt,  $J$  = 6.6, 1.9 Hz, 4H,  $\text{H}^1$ ), 1.72–1.53 (m, 4H,  $\text{H}^2$ ), 1.43–1.30 (m, 4H,  $\text{H}^3$ ).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 155.45 (t,  $J$  = 5.6 Hz,  $\text{C}^1$ ), 41.02 (t,  $J$  = 5.5 Hz,  $\text{C}^2$ ), 28.2 ( $\text{CH}_2$ ,  $\text{C}^3$ ), 24.9 ( $\text{CH}_2$ ,  $\text{C}^4$ ).

$\text{IR}$  (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu}$  = 2944 (w), 2863 (vw), 2146 (vs), 1453 (w), 1351 (w), 958 (vw), 935 (vw), 820 (vw), 728 (vw).

$\text{ESI-HRMS}$  ( $[\text{M}+\text{H}]^+$ ,  $\text{C}_8\text{H}_{13}\text{N}_2$ ) calcd.: 137.1073; found: 137.1073.



**Figure S12:**  $^1\text{H}$  NMR spectrum of 1,6-diisocyanohexane in  $\text{DMSO-}d_6$ .**Figure S13:**  $^{13}\text{C}$  NMR spectrum of 1,6-diisocyanohexane in  $\text{DMSO-}d_6$ .



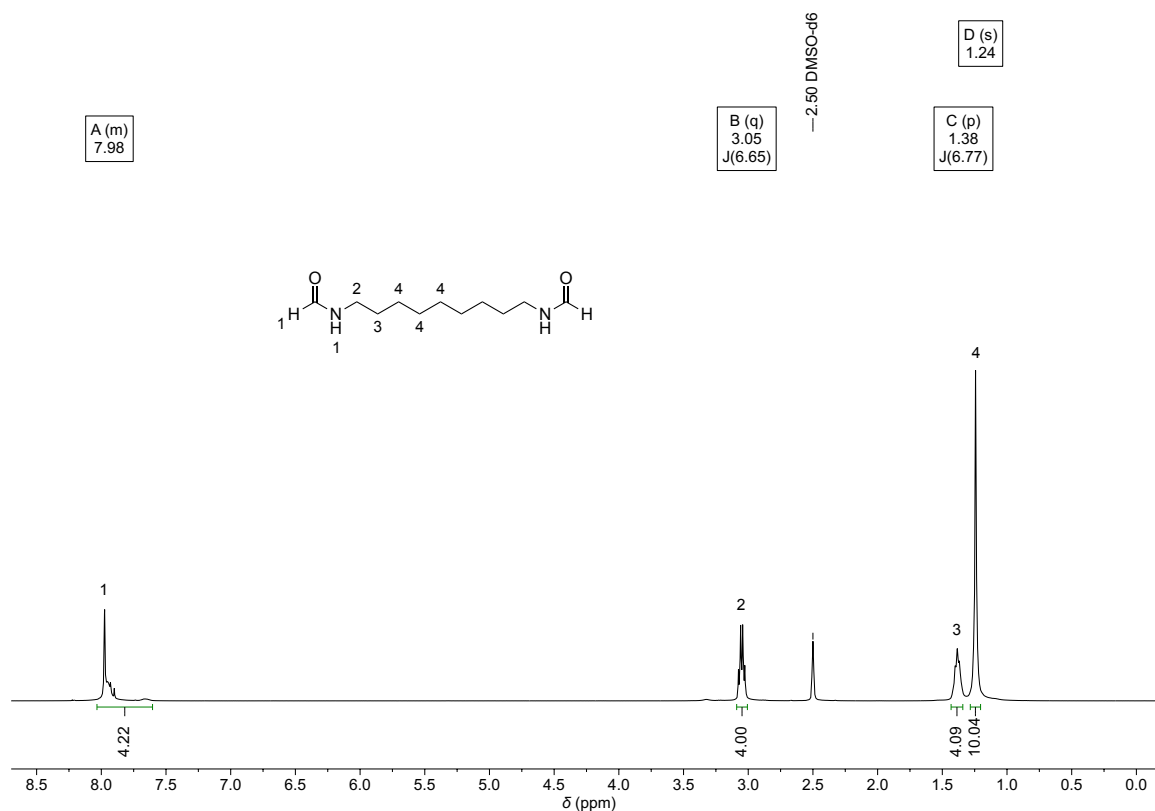


Figure S14:  $^1\text{H}$  NMR spectrum of 1,9-diformamidononane in  $\text{DMSO-}d_6$ .

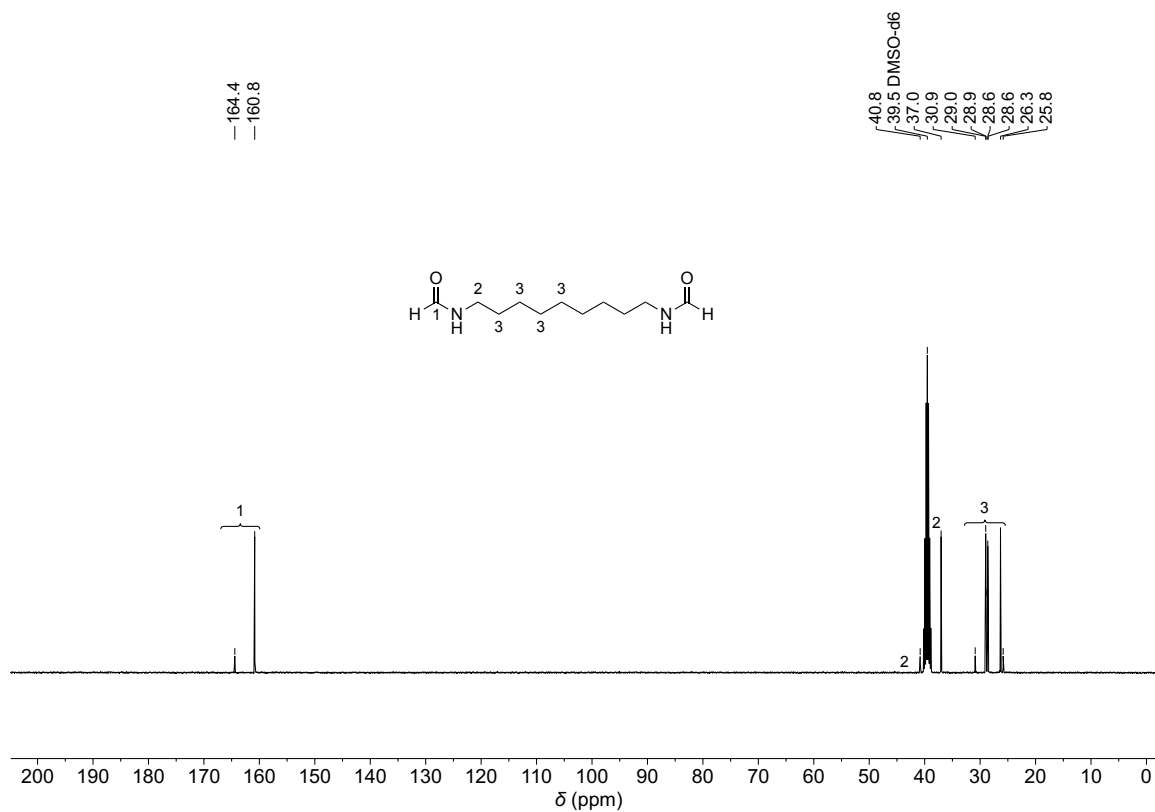
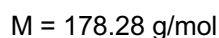
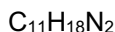
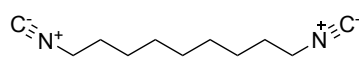


Figure S15:  $^{13}\text{C}$  NMR spectrum of 1,9-diformamidononane in  $\text{DMSO-}d_6$ .

**1,9-diisocyanononane:**

1,9-Diformamidononane (5.36 g, 25.0 mmol, 1.00 eq.) was dissolved in dimethyl carbonate (75 ml) and pyridine (12.1 ml, 150 mmol, 6.00 eq.) was added. Subsequently, *p*-toluenesulfonyl chloride (14.3 g, 75.0 mmol, 3.00 eq.) was added under cooling with a water bath. The cooling was removed, and the reaction mixture was stirred for 24 h at room temperature. Afterwards, aqueous sodium carbonate solution (30 ml, 20 wt%) was added and the biphasic mixture was stirred for another 60 minutes. Water (60 ml) and dimethyl carbonate (60 ml) were added, and the organic phase was separated. The aqueous phase was extracted with dimethyl carbonate (3 × 30 ml), the organic extracts were combined and washed with water (2 × 50 ml) and saturated sodium chloride solution (50 ml). The organic extract was dried over sodium sulfate, filtered and the solvent was removed under reduced pressure. The crude product was purified by flash column chromatography (cyclohexane/ethyl acetate, 10:1 until 5:1) to obtain the title compound (4.20 g, 23.6 mmol, 94%) as a colorless liquid.

$R_f$  (cyclohexane/ethyl acetate, 4:1) = 0.34.

$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 3.37 (tt,  $J$  = 6.7, 2.0 Hz, 4H,  $\text{H}^1$ ), 1.73–1.58 (m, 4H,  $\text{H}^2$ ), 1.48–1.38 (m, 4H,  $\text{H}^3$ ), 1.36–1.27 (m, 6H,  $\text{H}^4$ ).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 155.7 (t,  $J$  = 5.8 Hz,  $\text{C}^1$ ), 41.62 (t,  $J$  = 6.6 Hz,  $\text{C}^2$ ), 29.2 ( $\text{CH}_2$ ,  $\text{C}^3$ ), 29.1 ( $\text{CH}_2$ ,  $\text{C}^3$ ), 28.6 ( $\text{CH}_2$ ,  $\text{C}^3$ ), 26.3 ( $\text{CH}_2$ ,  $\text{C}^3$ ).

$\text{IR}$  (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu}$  = 2928 (m), 2857 (w), 2146 (vs), 1455 (w), 1351 (w), 939 (vw), 836 (vw), 722 (vw), 534 (vw).

$\text{ESI-HRMS}$  ( $[\text{M}+\text{H}]^+$ ,  $\text{C}_{11}\text{H}_{19}\text{N}_2$ ) calcd.: 179.1543; found: 179.1543.

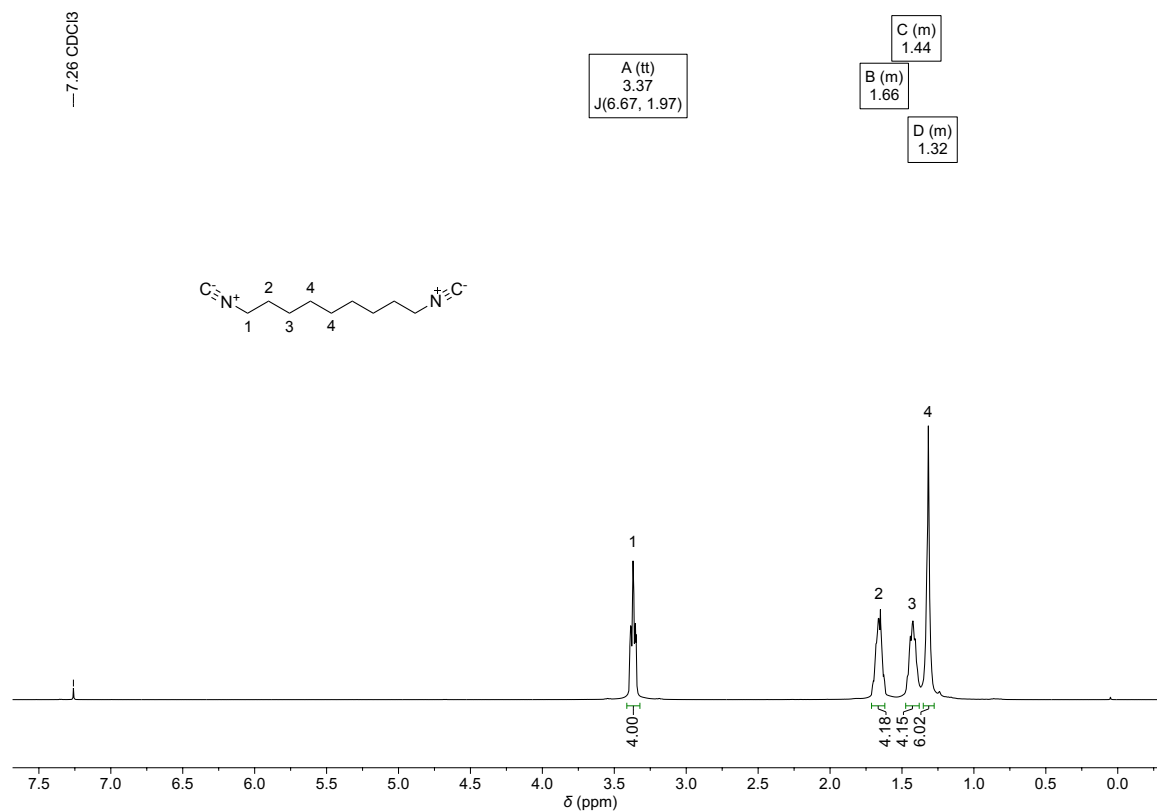


Figure S16: <sup>1</sup>H NMR spectrum of 1,9-diisocyanononane in CDCl<sub>3</sub>.

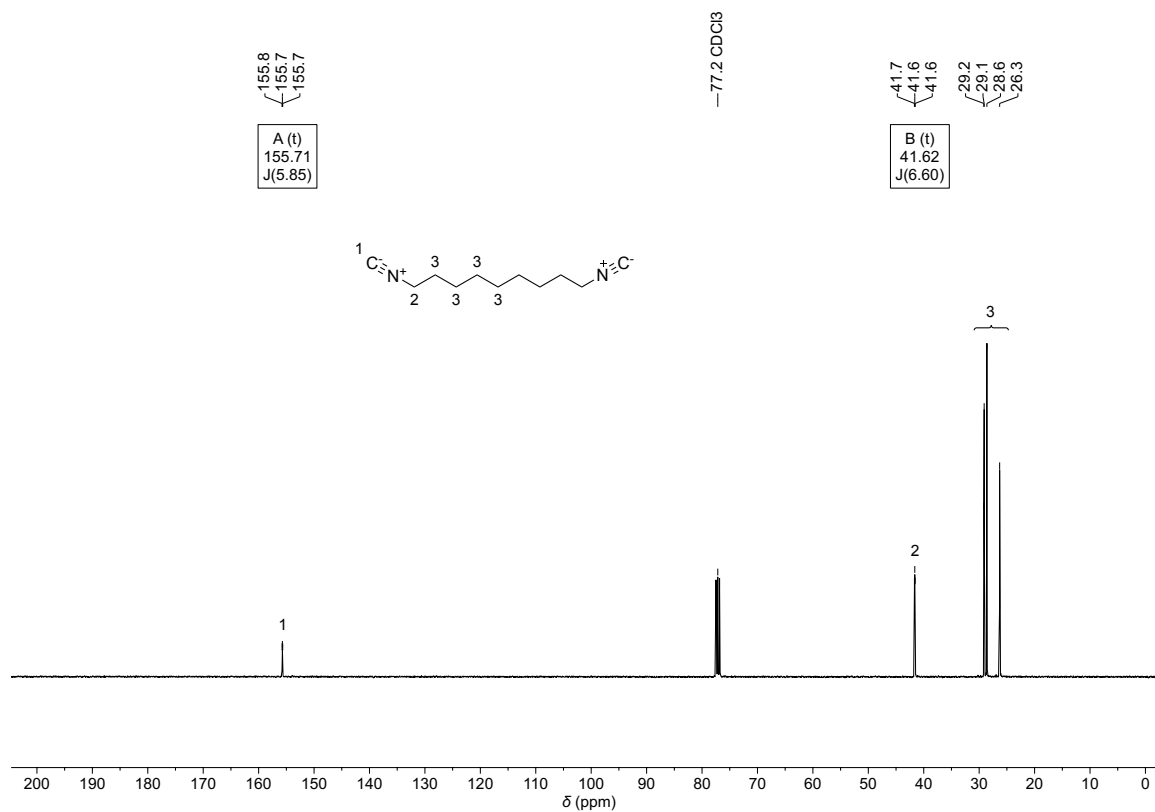
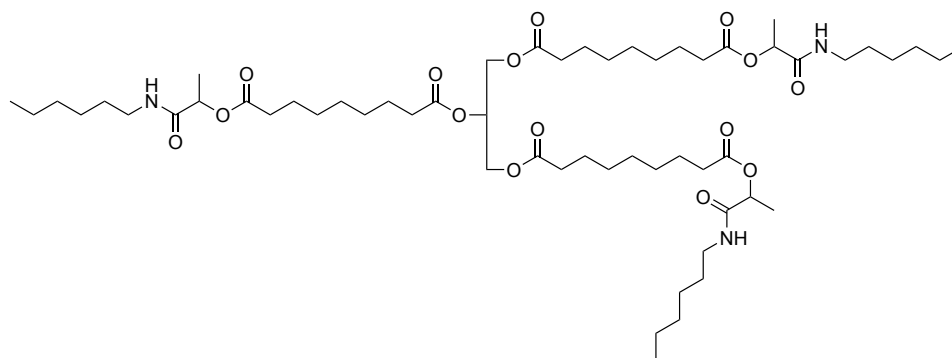


Figure S17: <sup>13</sup>C NMR spectrum of 1,9-diisocyanononane in CDCl<sub>3</sub>.

## 2.4 Model compounds M1 to M5

**Model Compound M1:** Passerini reaction of triacid, acetaldehyde, and *n*-hexylisocyanide



$C_{57}H_{101}N_3O_{15}$   
 M = 1068.44 g/mol

Sunflower oil-based triacid (200 mg, 990  $\mu\text{mol}$   $\text{CO}_2\text{H}$ , 1.00 equiv.) and *n*-hexylisocyanide (132 mg, 1.19 mmol, 1.20 equiv. based on  $\text{CO}_2\text{H}$ ) were weighed into a glass vial. The vial was then cooled to  $-20^\circ\text{C}$  and acetaldehyde (87.3 mg, 1.98 mmol, 2.00 equiv. based on  $\text{CO}_2\text{H}$ ) was weighed into the vial and the vial was sealed. Then, dichloromethane (1 ml) was added, and the reaction was stirred at room temperature for 2 days. The solvent was removed under reduced pressure and the crude product was purified *via* flash column chromatography (cyclohexane/ethyl acetate, 2:1, then 1:1) to obtain the title compound as colorless oi (229 mg, 214  $\mu\text{mol}$ , 64%).

$R_f$  (cyclohexane/ethyl acetate, 1:1) = 0.2.

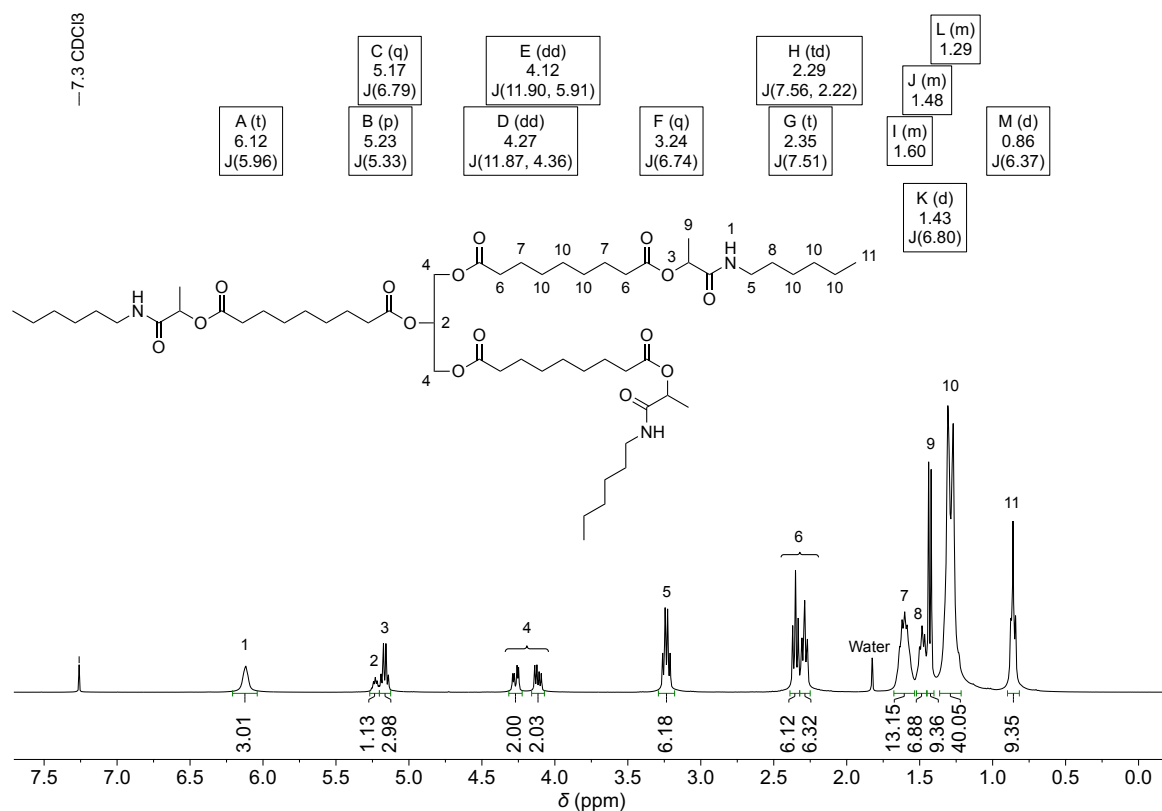
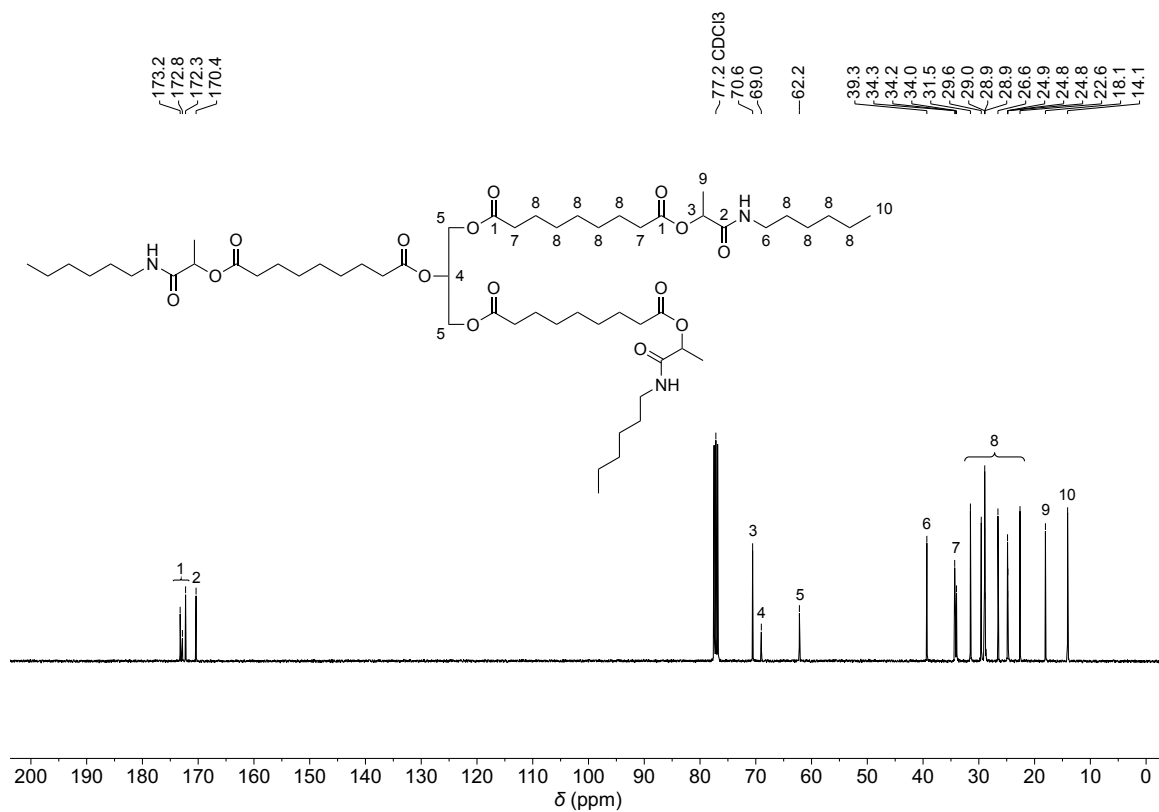
$T_{d,5\%}$ :  $342^\circ\text{C}$ .

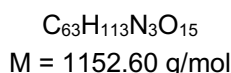
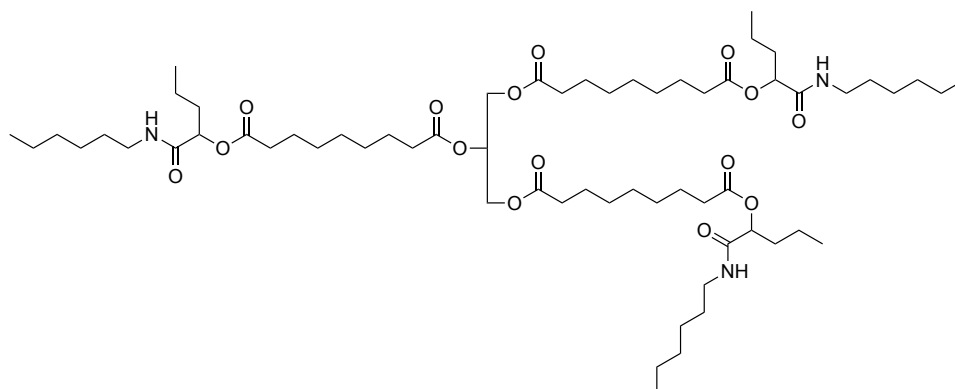
$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 6.12 (t,  $J$  = 6.0 Hz, 3H,  $\text{H}^1$ ), 5.23 (p,  $J$  = 5.3 Hz, 1H,  $\text{H}^2$ ), 5.17 (q,  $J$  = 6.8 Hz, 3H,  $\text{H}^3$ ), 4.27 (dd,  $J$  = 11.9, 4.4 Hz, 2H,  $\text{H}^4$ ), 4.12 (dd,  $J$  = 11.9, 5.9 Hz, 2H,  $\text{H}^4$ ), 3.24 (q,  $J$  = 6.7 Hz, 6H,  $\text{H}^5$ ), 2.35 (t,  $J$  = 7.5 Hz, 6H,  $\text{H}^6$ ), 2.29 (td,  $J$  = 7.6, 2.2 Hz, 6H,  $\text{H}^6$ ), 1.67–1.54 (m, 12H,  $\text{H}^7$ ), 1.52–1.46 (m, 6H,  $\text{H}^8$ ), 1.43 (d,  $J$  = 6.8 Hz, 9H,  $\text{H}^9$ ), 1.36–1.21 (m, 36H,  $\text{H}^{10}$ ), 0.86 (d,  $J$  = 6.4 Hz, 9H,  $\text{H}^{11}$ ).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 173.2 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 172.8 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 172.3 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 170.4 ( $\text{C}_q$ ,  $\text{C}_{\text{Amide}}$ ,  $\text{C}^2$ ), 70.6 (CH,  $\text{C}^3$ ), 69.0 (CH,  $\text{C}_{\text{Glycerol}}$ ,  $\text{C}^4$ ), 62.2 (CH<sub>2</sub>,  $\text{C}_{\text{Glycerol}}$ ,  $\text{C}^5$ ), 39.3 (CH<sub>2</sub>,  $\text{C}^6$ ), 34.3 (CH<sub>2</sub>,  $\text{C}^7$ ), 34.2 (CH<sub>2</sub>,  $\text{C}^7$ ), 34.0 (CH<sub>2</sub>,  $\text{C}^7$ ), 31.5 (CH<sub>2</sub>,  $\text{C}^8$ ), 29.6 (CH<sub>2</sub>,  $\text{C}^8$ ), 29.0 (CH<sub>2</sub>,  $\text{C}^8$ ), 28.9 (CH<sub>2</sub>,  $\text{C}^8$ ), 28.9 (CH<sub>2</sub>,  $\text{C}^8$ ), 26.6 (CH<sub>2</sub>,  $\text{C}^8$ ), 24.9 (CH<sub>2</sub>,  $\text{C}^8$ ), 24.8 (CH<sub>2</sub>,  $\text{C}^8$ ), 24.8 (CH<sub>2</sub>,  $\text{C}^8$ ), 22.6 (CH<sub>2</sub>,  $\text{C}^8$ ), 18.1 (CH<sub>3</sub>,  $\text{C}^9$ ), 14.1 (CH<sub>3</sub>,  $\text{C}^{10}$ ).

**IR** (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu}$  = 3308 (vw), 2929 (s), 2857 (w), 1738 (vs), 1657 (vs), 1537 (m), 1456 (w), 1418 (w), 1371 (w), 1300 (w), 1238 (m), 1160 (vs), 1132 (vs), 1094 (vs), 1040 (w), 725 (w), 645 (vw).

**ESI-HRMS** ( $[\text{M}+\text{H}]^+$ ,  $\text{C}_{57}\text{H}_{102}\text{N}_3\text{O}_{15}$ ): calcd.: 1068.7305, found: 1068.7312.

**Figure S18:** <sup>1</sup>H NMR spectrum of **M1** in CDCl<sub>3</sub>.**Figure S19:** <sup>13</sup>C NMR spectrum of **M1** in CDCl<sub>3</sub>.

**Model Compound M2:** Passerini reaction of triacid, butanal, and *n*-hexylisocyanide

Sunflower oil-based triacid (200 mg, 990  $\mu\text{mol}$   $\text{CO}_2\text{H}$ , 1.00 equiv.) and *n*-hexylisocyanide (165 mg, 1.49 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) were weighed into a glass vial. The vial was then cooled to 0  $^\circ\text{C}$  and butanal (107 mg, 1.49 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) was weighed into the vial and the vial was sealed. Then, dichloromethane (1 ml) was added, and the reaction was stirred at room temperature for 3 days. Then, the solvent was removed under reduced pressure and the crude product was purified *via* flash column chromatography (cyclohexane/ethyl acetate, 2:1, then 1:1) to obtain the title compound as colorless oil (230 mg, 200  $\mu\text{mol}$ , 60%).

$R_f$  (cyclohexane/ethyl acetate, 2:1) = 0.2.

$T_{d,5\%}$ : 337  $^\circ\text{C}$ .

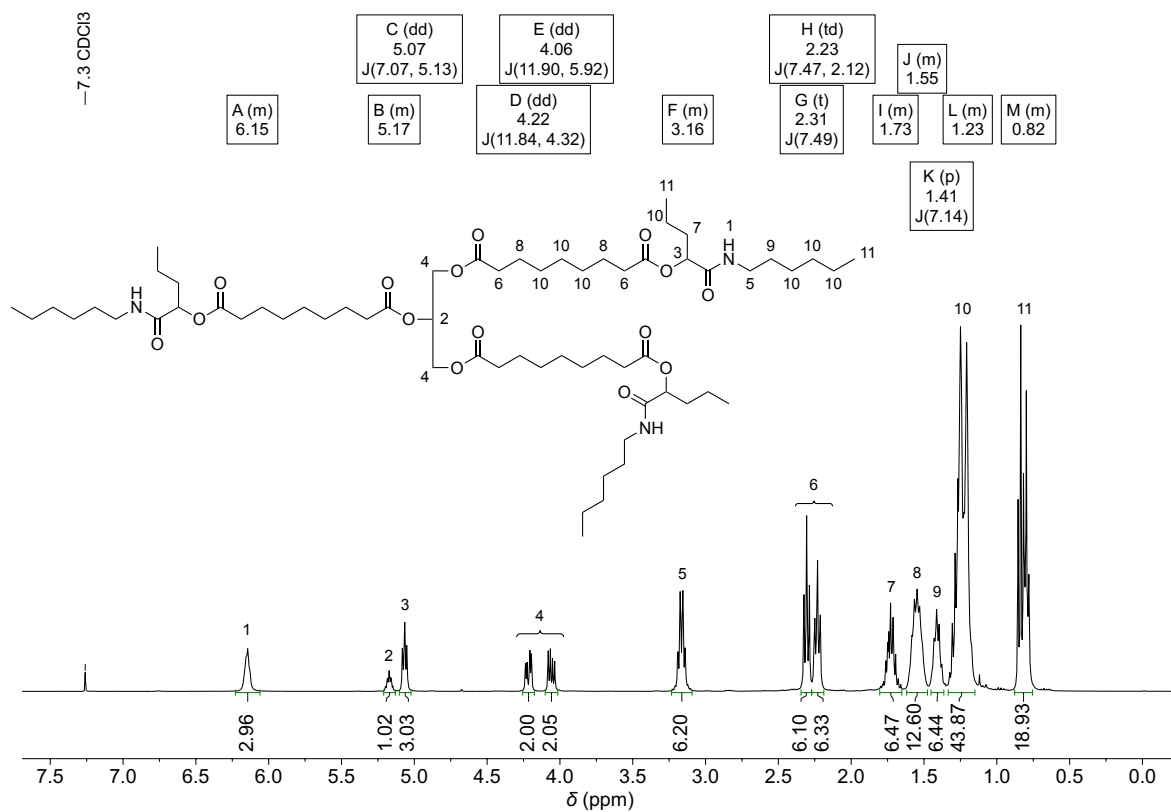
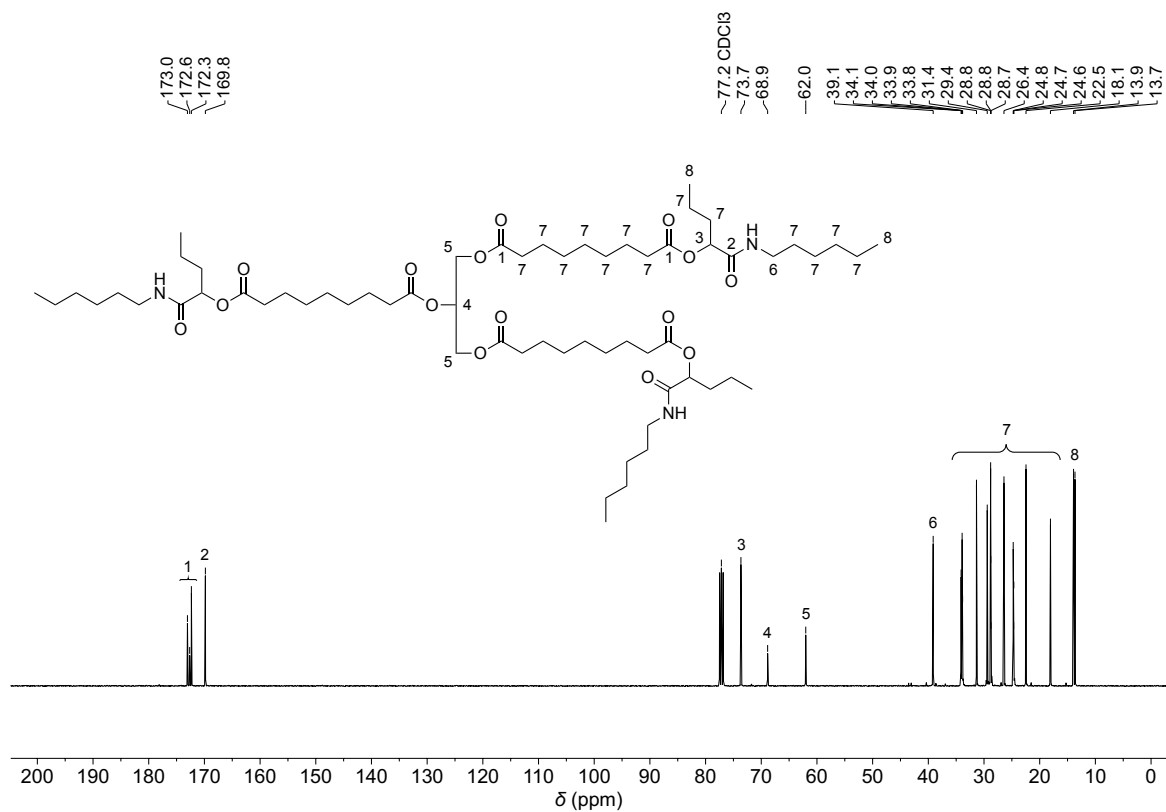
$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 6.21–6.08 (m, 3H,  $\text{H}^1$ ), 5.22–5.12 (m, 1H,  $\text{H}^2$ ), 5.07 (dd,  $J$  = 7.1, 5.1 Hz, 3H,  $\text{H}^3$ ), 4.22 (dd,  $J$  = 11.8, 4.3 Hz, 2H,  $\text{H}^4$ ), 4.06 (dd,  $J$  = 11.9, 5.9 Hz, 2H,  $\text{H}^4$ ), 3.24–3.07 (m, 6H,  $\text{H}^5$ ), 2.31 (t,  $J$  = 7.5 Hz, 6H,  $\text{H}^6$ ), 2.23 (td,  $J$  = 7.5, 2.1 Hz, 6H,  $\text{H}^6$ ), 1.81–1.64 (m, 6H,  $\text{H}^7$ ), 1.61–1.48 (m, 12H,  $\text{H}^8$ ), 1.41 (p,  $J$  = 7.1 Hz, 6H,  $\text{H}^9$ ), 1.34–1.14 (m, 42H,  $\text{H}^{10}$ ), 0.88–0.75 (m, 18H,  $\text{H}^{11}$ ).

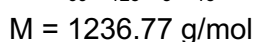
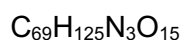
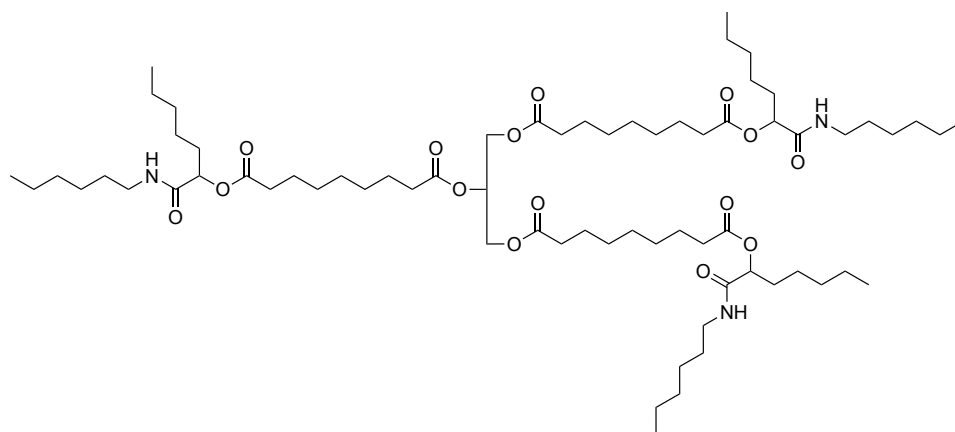
$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 173.0 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 172.6 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 172.3 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 169.8 ( $\text{C}_q$ ,  $\text{C}_{\text{Amide}}$ ,  $\text{C}^2$ ), 73.7 (CH,  $\text{C}^3$ ), 68.9 (CH,  $\text{C}_{\text{Glycerol}}$ ,  $\text{C}^4$ ), 62.0 ( $\text{CH}_2$ ,  $\text{C}_{\text{Glycerol}}$ ,  $\text{C}^5$ ), 39.1 ( $\text{CH}_2$ ,  $\text{C}^6$ ), 34.1 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 34.0 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 33.9 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 33.8 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 31.4 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 29.4 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 28.8 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 28.8 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 28.7 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 26.4 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 24.8 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 24.7 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 24.6 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 22.5 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 18.1 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 13.9 ( $\text{CH}_3$ ,  $\text{C}^8$ ), 13.7 ( $\text{CH}_3$ ,  $\text{C}^8$ ).

$\text{IR}$  (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu}$  = 3305 (w), 2956 (m), 2929 (s), 2857 (m), 1740 (vs), 1656 (vs), 1536 (m), 1460 (w), 1441 (w), 1418 (w), 1377 (w), 1299 (w), 1234 (m), 1160 (vs), 1132 (vs), 1109 (s), 1094 (s), 1026 (w), 977 (w), 727 (w), 656 (vw).

$\text{ESI-HRMS}$  ( $[\text{M}+\text{H}]^+$ ,  $\text{C}_{63}\text{H}_{114}\text{N}_3\text{O}_{15}$ ) calcd.: 1152.8245; found: 1152.8242.



Figure S20: <sup>1</sup>H NMR spectrum of **M2** in CDCl<sub>3</sub>.Figure S21: <sup>13</sup>C NMR spectrum of **M2** in CDCl<sub>3</sub>.

**Model Compound M3:** Passerini reaction of triacid, hexanal, and *n*-hexylisocyanide

Sunflower oil-based triacid (200 mg, 990  $\mu\text{mol}$   $\text{CO}_2\text{H}$ , 1.00 equiv.), *n*-hexylisocyanide (165 mg, 1.49 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) and hexanal (149 mg, 1.49 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) were weighed into a glass vial. Then, dichloromethane (1 ml) was added and the reaction was stirred at room temperature for 3 days. The solvent was removed under reduced pressure and the crude product was purified *via* flash column chromatography (cyclohexane/ethyl acetate, 2:1, then 1:1) to obtain the title compound as colorless oil (282 mg, 0.228 mmol, 69%).

$R_f$  (cyclohexane/ethyl acetate, 2:1) = 0.36.

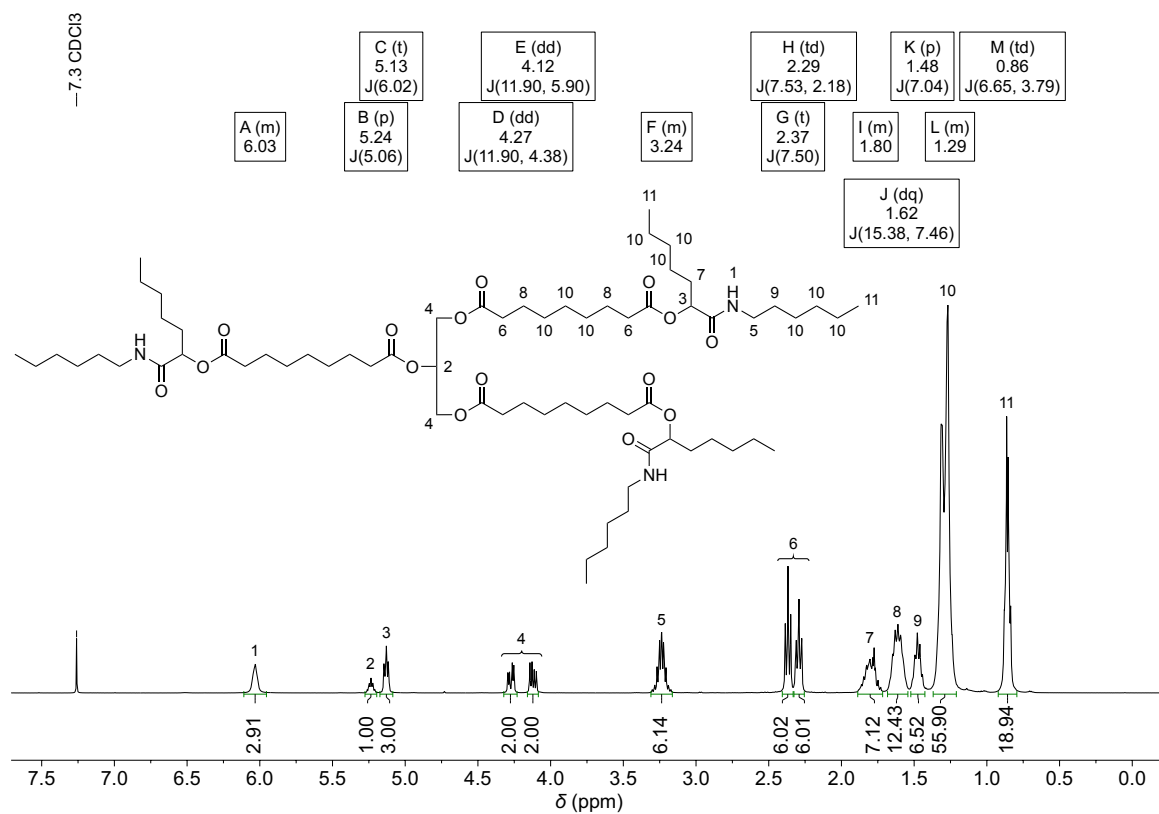
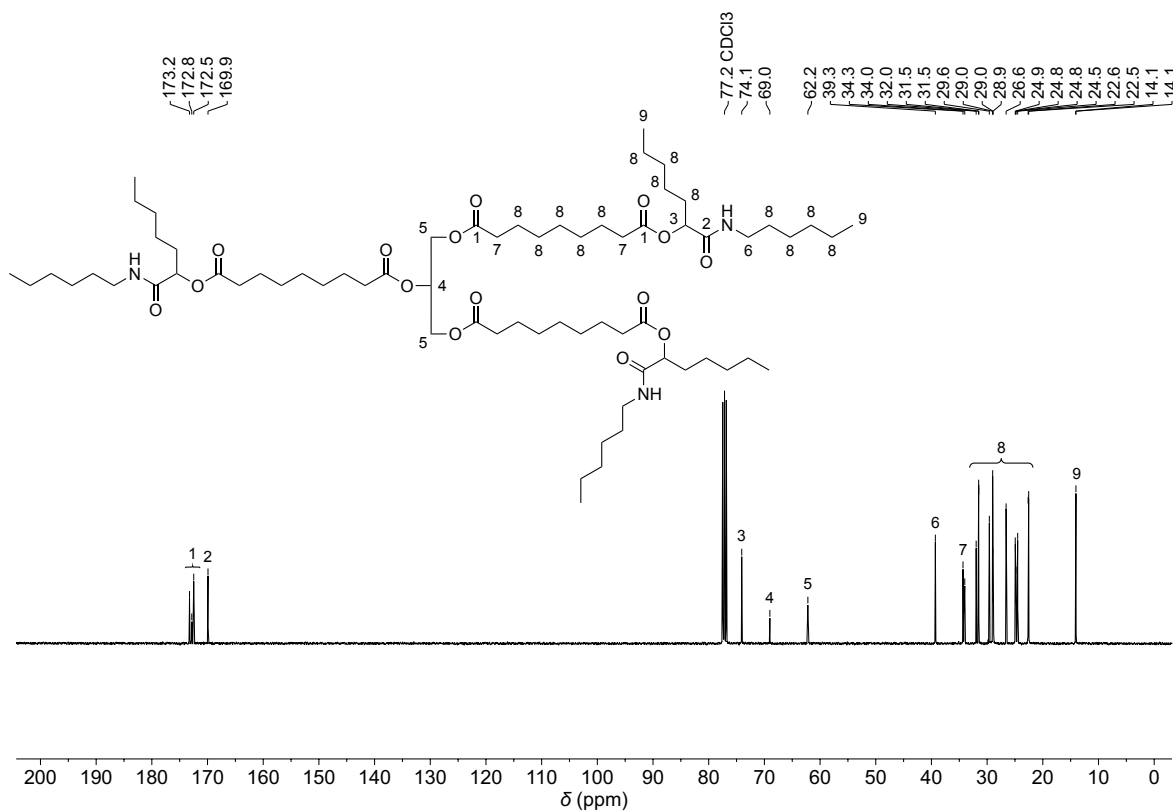
$T_{d,5\%}$ : 344  $^\circ\text{C}$ .

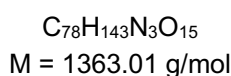
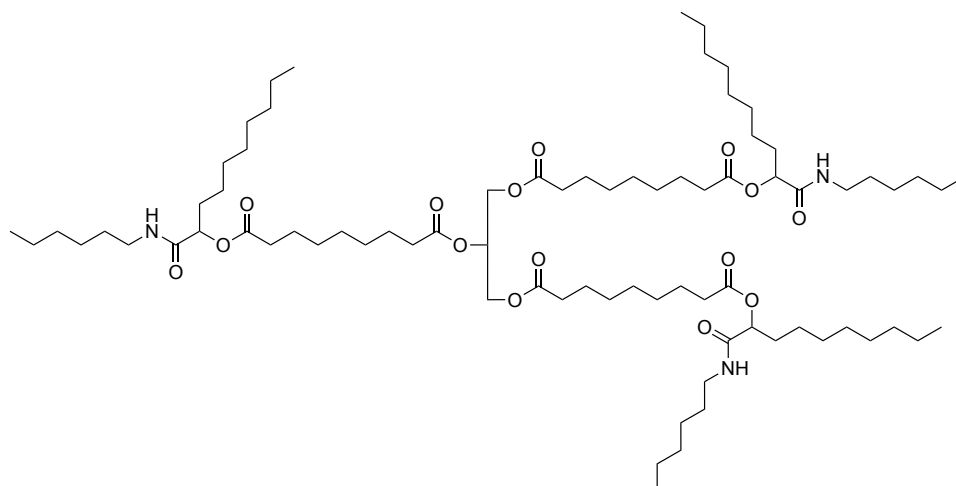
$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 6.09–5.93 (m, 3H,  $\text{H}^1$ ), 5.24 (p,  $J$  = 5.1 Hz, 1H,  $\text{H}^2$ ), 5.13 (t,  $J$  = 6.0 Hz, 3H,  $\text{H}^3$ ), 4.27 (dd,  $J$  = 11.9, 4.4 Hz, 2H,  $\text{H}^4$ ), 4.12 (dd,  $J$  = 11.9, 5.9 Hz, 4H,  $\text{H}^4$ ), 3.32–3.15 (m, 6H,  $\text{H}^5$ ), 2.37 (t,  $J$  = 7.5 Hz, 6H,  $\text{H}^6$ ), 2.29 (td,  $J$  = 7.5, 2.2 Hz, 6H,  $\text{H}^6$ ), 1.89–1.71 (m, 6H,  $\text{H}^7$ ), 1.62 (dq,  $J$  = 15.4, 7.5 Hz, 12H,  $\text{H}^8$ ), 1.48 (p,  $J$  = 7.0 Hz, 6H,  $\text{H}^9$ ), 1.37–1.19 (m, 54H,  $\text{H}^{10}$ ), 0.86 (td,  $J$  = 6.6, 3.8 Hz, 18H,  $\text{H}^{11}$ ).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ , ppm):  $\delta$  = 173.2 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 172.8 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 172.5 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 169.9 ( $\text{C}_q$ ,  $\text{C}_{\text{Amide}}$ ,  $\text{C}^2$ ), 74.1 (CH,  $\text{C}^3$ ), 69.0 (CH,  $\text{C}_{\text{Glycerol}}$ ,  $\text{C}^4$ ), 62.2 ( $\text{CH}_2$ ,  $\text{C}_{\text{Glycerol}}$ ,  $\text{C}^5$ ), 39.3 ( $\text{CH}_2$ ,  $\text{C}^6$ ), 34.3 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 34.2 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 34.0 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 32.0 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 31.5 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 31.5 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 29.6 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 29.0 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 29.0 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 28.9 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 26.6 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 24.9 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 24.8 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 24.8 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 24.5 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 22.6 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 22.5 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 14.1 ( $\text{CH}_3$ ,  $\text{C}^9$ ), 14.1 ( $\text{CH}_3$ ,  $\text{C}^9$ ).

**IR** (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu}$  = 3306 (vw), 2953 (m), 2927 (s), 2857 (m), 1740 (vs), 1656 (vs), 1537 (m), 1459 (w), 1418 (w), 1377 (w), 1299 (w), 1235 (m), 1160 (vs), 1132 (vs), 1094 (s), 1062 (w), 1021 (w), 725 (w)

**ESI-HRMS** ( $[\text{M}+\text{H}]^+$ ,  $\text{C}_{69}\text{H}_{126}\text{N}_3\text{O}_{15}$ ) calcd.: 1236.9184; found: 1236.9183.

**Figure S22:** <sup>1</sup>H NMR spectrum of **M3** in CDCl<sub>3</sub>.**Figure S23:** <sup>13</sup>C NMR spectrum of **M3** in CDCl<sub>3</sub>.

**Model Compound M4:** Passerini reaction of triacid, nonanal, and *n*-hexylisocyanide

Sunflower oil-based triacid (300 mg, 1.49 mmol  $\text{CO}_2\text{H}$ , 1.00 equiv.) and hexylisocyanide (248 mg, 2.23 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) were dissolved in dichloromethane (1.5 ml). Then, nonanal (95% purity, 404  $\mu\text{l}$ , 334 mg, 2.23 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) was added and the solution was stirred for 72 h at room temperature. Afterwards, the solvent was removed under reduced pressure. The crude product was purified by flash column chromatography (cyclohexane/ethyl acetate) to obtain the title compound (358 mg, 263  $\mu\text{mol}$ , 53%).

$R_f$  (cyclohexane/ethyl acetate, 2:1): 0.29.

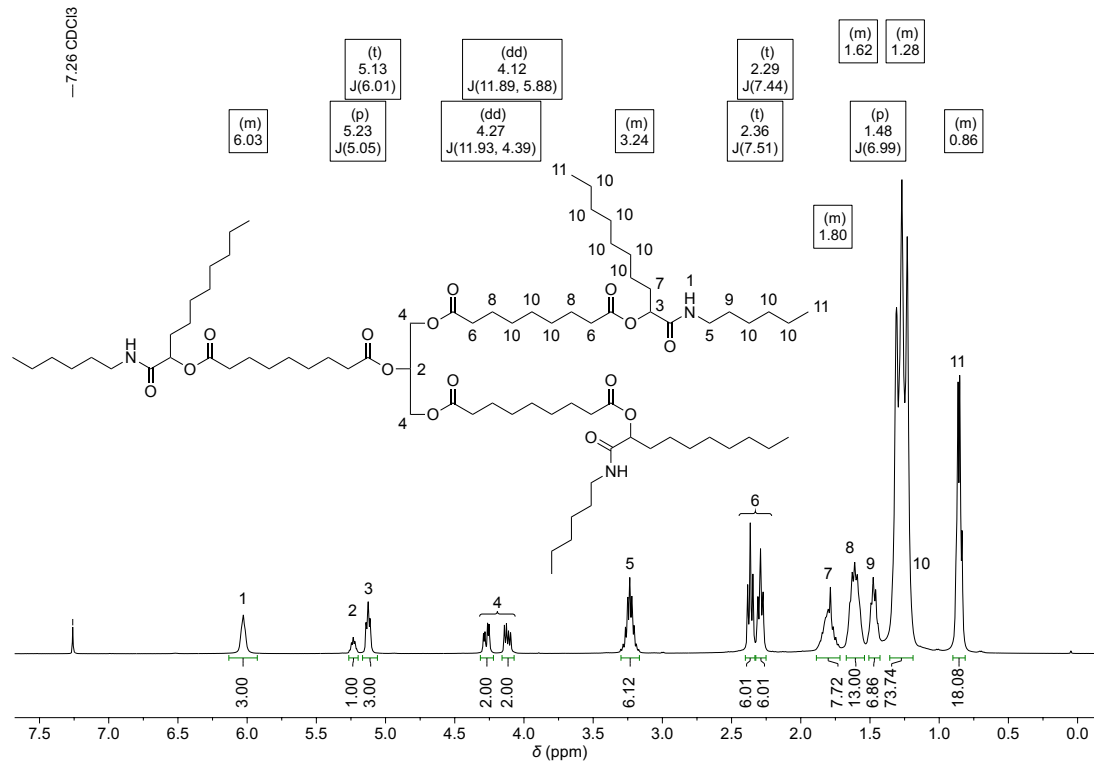
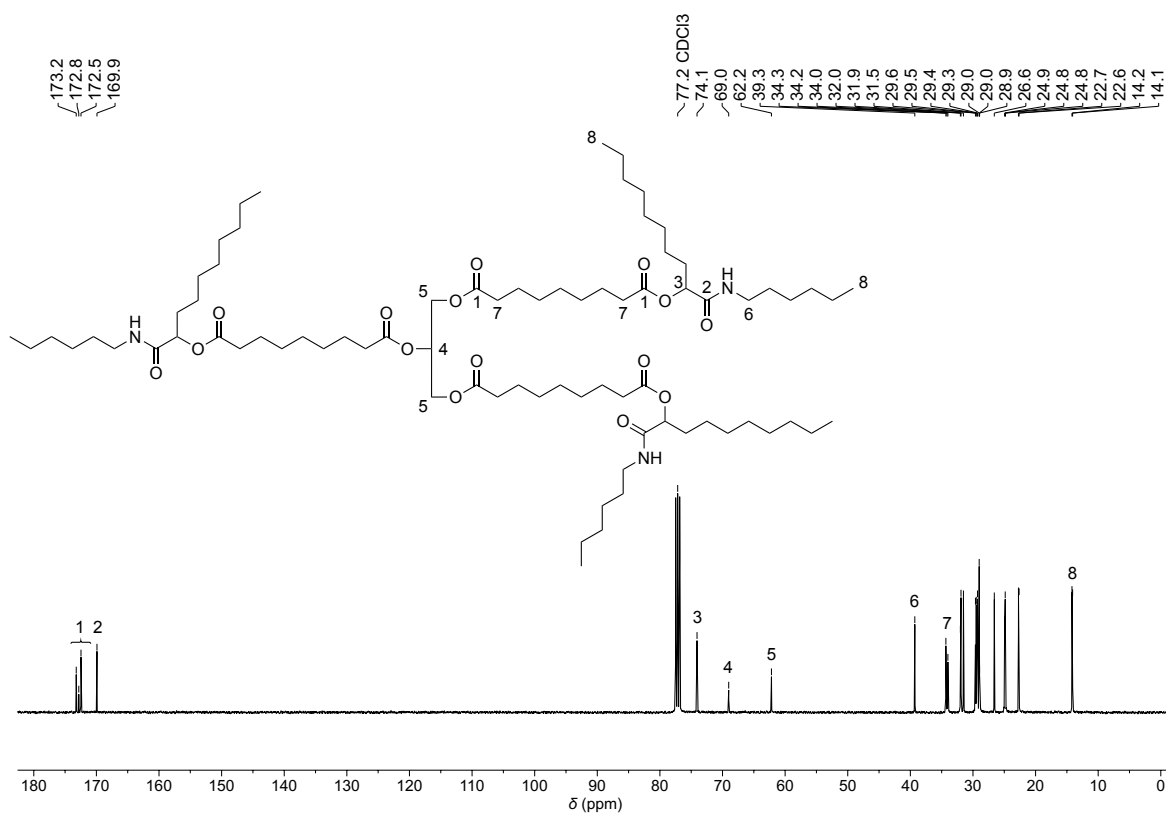
$T_{d,5\%}$ : 338 °C.

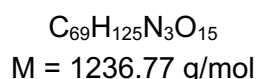
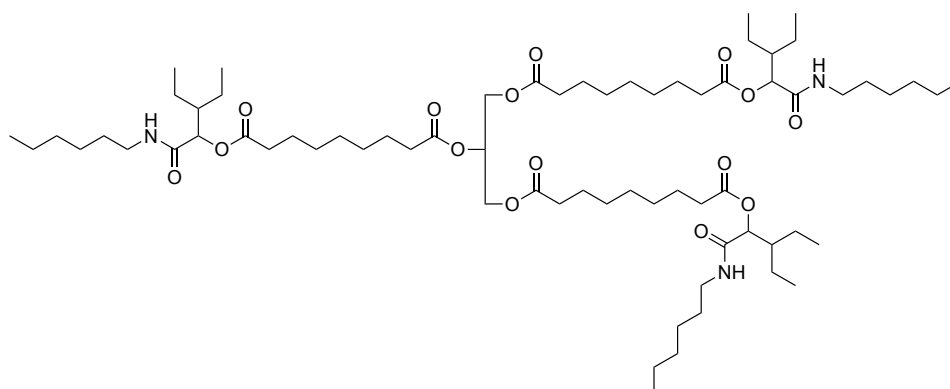
$^1\text{H NMR}$  (400 MHz,  $\text{CDCl}_3$ , ppm):  $\delta = 6.10\text{--}5.89$  (m, 3H, NH,  $\text{H}^1$ ), 5.23 (p,  $J = 5.0$  Hz, CH,  $H_{\text{Glycerol}}$ , 1H,  $\text{H}^2$ ), 5.13 (t,  $J = 6.0$  Hz, 3H, CH,  $\text{H}^3$ ), 4.27 (dd,  $J = 11.9, 4.4$  Hz, 2H,  $H_{\text{Glycerol}}$ ,  $\text{H}^4$ ), 4.12 (dd,  $J = 11.9, 5.9$  Hz, 2H,  $H_{\text{Glycerol}}$ ,  $\text{H}^4$ ), 3.34–3.13 (m, 6H,  $\text{CH}_2$ ,  $\text{H}^5$ ), 2.36 (t,  $J = 7.5$  Hz, 6H,  $\text{CH}_2$ ,  $\alpha\text{-HEster}$ ,  $\text{H}^6$ ), 2.29 (t,  $J = 7.4$  Hz, 6H,  $\text{CH}_2$ ,  $\alpha\text{-HEster}$ ,  $\text{H}^6$ ), 1.89–1.72 (m, 6H,  $\text{CH}_2$ ,  $\text{H}^7$ ), 1.69–1.54 (m, 12H,  $\text{CH}_2$ ,  $\beta\text{-HEster}$ ,  $\text{H}^8$ ), 1.48 (p,  $J = 7.0$  Hz, 6H,  $\text{CH}_2$ ,  $\text{H}^9$ ), 1.34–1.00 (m, 72H,  $\text{CH}_2$ ,  $\text{H}^{10}$ ), 0.95–0.78 (m, 18H,  $\text{CH}_3$ ,  $\text{H}^{11}$ ).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CDCl}_3$ , ppm):  $\delta = 173.2$  (2C,  $\text{C}_q$ ,  $\text{CEster}$ ,  $\text{C}^1$ ), 172.8 ( $\text{C}_q$ ,  $\text{CEster}$ ,  $\text{C}^1$ ), 172.5 (3C,  $\text{C}_q$ ,  $\text{CEster}$ ,  $\text{C}^1$ ), 169.9 (3C,  $\text{C}_q$ ,  $\text{CAmide}$ ,  $\text{C}^2$ ), 74.1 (3C, CH,  $\text{C}^3$ ), 69.0 (CH,  $\text{CGlycerol}$ ,  $\text{C}^4$ ), 62.2 (2C,  $\text{CH}_2$ ,  $\text{CGlycerol}$ ,  $\text{C}^5$ ), 39.3 (3C,  $\text{CH}_2$ ,  $\text{C}^6$ ), 34.3 (3C,  $\text{CH}_2$ ,  $\alpha\text{-CEster}$ ,  $\text{C}^7$ ), 34.2 ( $\text{CH}_2$ ,  $\alpha\text{-CEster}$ ,  $\text{C}^7$ ), 34.0 (2C,  $\text{CH}_2$ ,  $\alpha\text{-CEster}$ ,  $\text{C}^7$ ), 32.0 ( $\text{CH}_2$ ), 31.9 ( $\text{CH}_2$ ), 31.5 ( $\text{CH}_2$ ), 29.6 ( $\text{CH}_2$ ), 29.5 ( $\text{CH}_2$ ), 29.4 ( $\text{CH}_2$ ), 29.3 ( $\text{CH}_2$ ), 29.0 ( $\text{CH}_2$ ), 29.0 ( $\text{CH}_2$ ), 28.9 ( $\text{CH}_2$ ), 26.6 ( $\text{CH}_2$ ), 24.9 ( $\text{CH}_2$ ), 24.8 ( $\text{CH}_2$ ), 24.8 ( $\text{CH}_2$ ), 22.7 ( $\text{CH}_2$ ), 22.6 ( $\text{CH}_2$ ), 14.2 (3C,  $\text{CH}_3$ ,  $\text{C}^8$ ), 14.1 (3C,  $\text{CH}_3$ ,  $\text{C}^8$ ).

**IR** (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu} = 3303$  (w), 2952 (m), 2924 (vs), 2854 (s), 1741 (vs), 1656 (vs), 1537 (m), 1460 (m), 1418 (w), 1377 (w), 1299 (w), 1237 (m), 1159 (vs), 1132 (s), 1094 (s), 724 (w).

**ESI-HRMS** ( $[\text{M}+\text{H}]^+$ ,  $\text{C}_{78}\text{H}_{144}\text{N}_3\text{O}_{15}$ ): calcd.: 1363.0592, found: 1363.0494.

Figure S24:  $^1\text{H}$  NMR spectrum of **M4** in  $\text{CDCl}_3$ .Figure S25:  $^{13}\text{C}$  NMR spectrum of **M4** in  $\text{CDCl}_3$ .

**Model Compound M5:** Passerini reaction of triacid, 2-ethylbutyraldehyde, and *n*-hexylisocyanide

Sunflower oil-based triacid (200 mg, 990  $\mu\text{mol}$   $\text{CO}_2\text{H}$ , 1.00 equiv.), *n*-hexylisocyanide (165 mg, 1.49 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) and 2-ethylbutyraldehyde (149 mg, 1.49 mmol, 1.50 equiv. based on  $\text{CO}_2\text{H}$ ) were weighed into a glass vial. Then, dichloromethane (1.0 ml) was added and the reaction was stirred at room temperature for 3 days. The solvent was removed under reduced pressure and the crude product was purified *via* flash column chromatography (cyclohexane/ethyl acetate, 2:1, then 1:1) to obtain the title compound as colorless oil (220 mg, 178  $\mu\text{mol}$ , 54%).

$R_f$  (cyclohexane/ethyl acetate, 2:1) = 0.36.

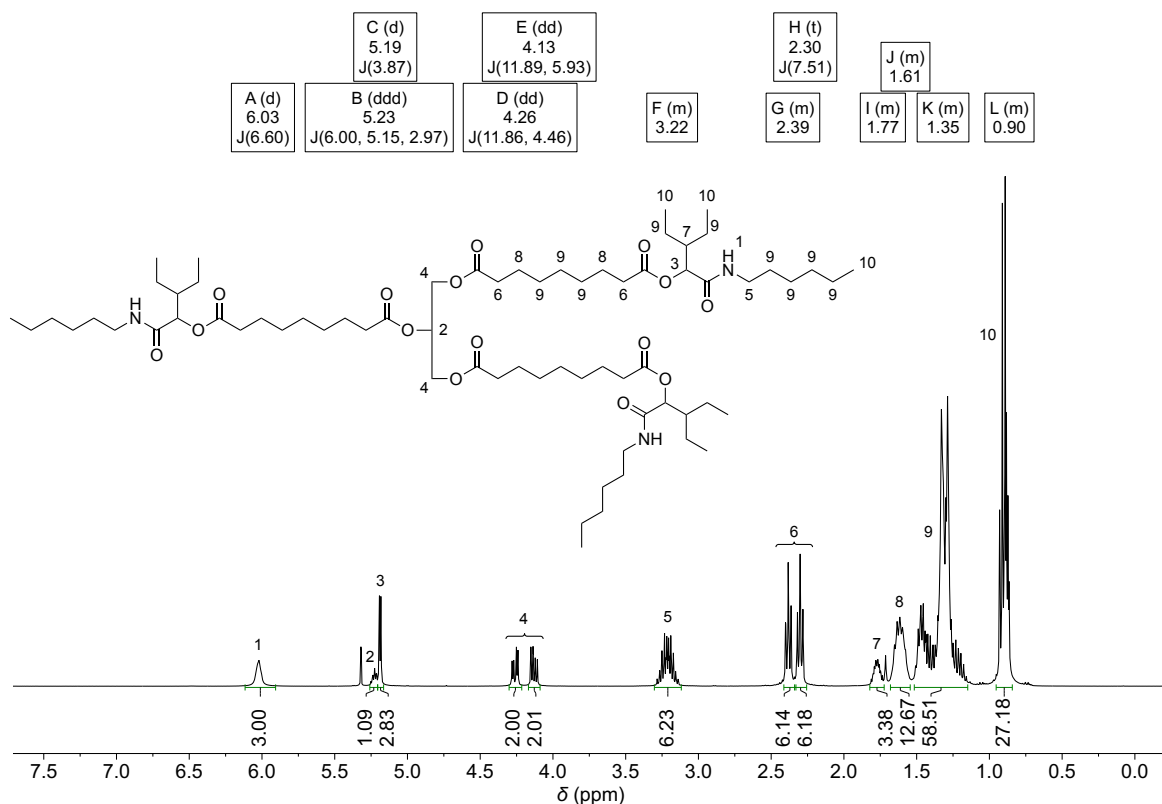
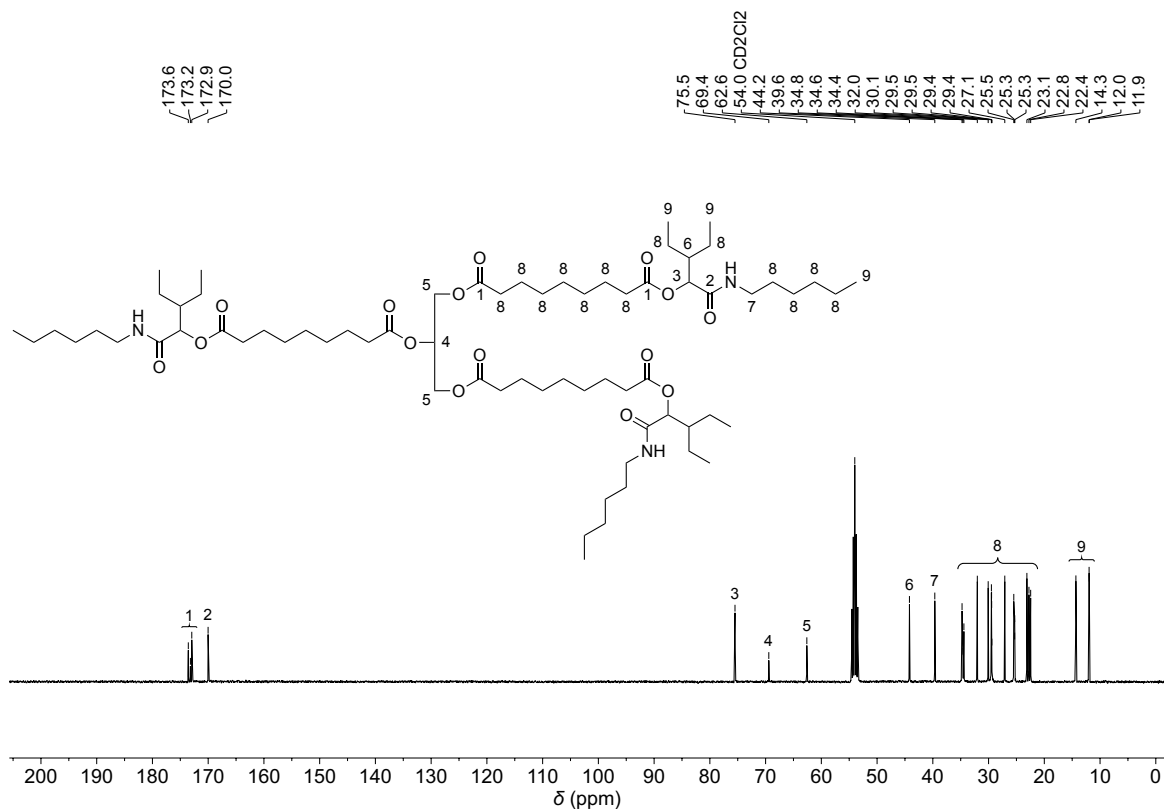
$T_{d,5\%}$ : 313  $^\circ\text{C}$ .

$^1\text{H NMR}$  (400 MHz,  $\text{CD}_2\text{Cl}_2$ , ppm):  $\delta$  = 6.03 (d,  $J$  = 6.6 Hz, 3H,  $\text{H}^1$ ), 5.23 (ddd,  $J$  = 6.0, 5.1, 3.0 Hz, 1H,  $\text{H}^2$ ), 5.19 (d,  $J$  = 3.9 Hz, 3H,  $\text{H}^3$ ), 4.26 (dd,  $J$  = 11.9, 4.5 Hz, 2H,  $\text{H}^4$ ), 4.13 (dd,  $J$  = 11.9, 5.9 Hz, 2H,  $\text{H}^4$ ), 3.31–3.07 (m, 6H,  $\text{H}^5$ ), 2.44–2.34 (m, 6H,  $\text{H}^6$ ), 2.30 (t,  $J$  = 7.5 Hz, 6H,  $\text{H}^6$ ), 1.85–1.73 (m, 3H,  $\text{H}^7$ ), 1.69–1.54 (m, 12H,  $\text{H}^8$ ), 1.52–1.15 (m, 54H,  $\text{H}^9$ ), 0.97–0.68 (m, 27H,  $\text{H}^{10}$ ).

$^{13}\text{C NMR}$  (101 MHz,  $\text{CD}_2\text{Cl}_2$ , ppm):  $\delta$  = 173.6 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 173.2 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 172.9 ( $\text{C}_q$ ,  $\text{C}_{\text{Ester}}$ ,  $\text{C}^1$ ), 170.0 ( $\text{C}_q$ ,  $\text{C}_{\text{Amide}}$ ,  $\text{C}^2$ ), 75.5 (CH,  $\text{C}^3$ ), 69.4 (CH,  $\text{C}_{\text{Glyceryl}}$ ,  $\text{C}^4$ ), 62.6 ( $\text{CH}_2$ ,  $\text{C}_{\text{Glyceryl}}$ ,  $\text{C}^5$ ), 44.2 (CH,  $\text{C}^6$ ), 39.6 ( $\text{CH}_2$ ,  $\text{C}^7$ ), 34.8 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 34.6 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 34.4 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 32.0 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 30.1 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 29.5 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 29.5 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 29.4 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 29.4 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 27.1 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 25.5 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 25.3 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 25.3 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 23.1 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 22.8 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 22.4 ( $\text{CH}_2$ ,  $\text{C}^8$ ), 14.3 ( $\text{CH}_3$ ,  $\text{C}^9$ ), 12.0 ( $\text{CH}_3$ ,  $\text{C}^9$ ), 11.9 ( $\text{CH}_3$ ,  $\text{C}^9$ ).

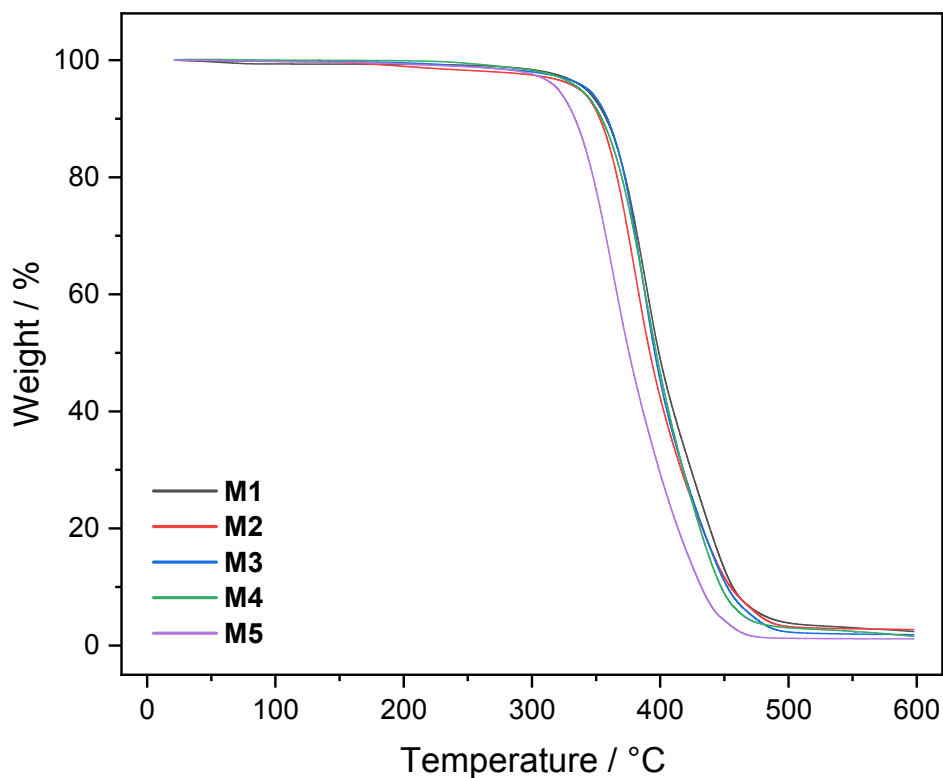
$\text{IR}$  (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu}$  = 3323 (vw), 2958 (w), 2929 (s), 2859 (w), 1740 (vs), 1653 (s), 1531 (m), 1460 (w), 1417 (w), 1377 (w), 1237 (m), 1157 (vs), 1126 (vs), 1095 (m), 1047 (w), 1007 (w), 727 (w), 652 (vw).

$\text{ESI-HRMS}$  ( $[\text{M}+\text{H}]^+$ ,  $\text{C}_{69}\text{H}_{126}\text{N}_3\text{O}_{15}$ ) calcd.: 1236.9184; found: 1236.9180.

Figure S26:  $^1\text{H}$  NMR spectrum of M5 in  $\text{CD}_2\text{Cl}_2$ .Figure S27:  $^{13}\text{C}$  NMR spectrum of M5 in  $\text{CD}_2\text{Cl}_2$ .

**TGA of compounds M1 to M5:**

The conducted TGA measurements and the determined  $T_{d,5\%}$  values of compounds **M1–M5** are depicted in Figure S28 and Table S3, respectively.



**Figure S28:** TGA Measurements of compounds **M1** to **M5**.

**Table S3:** Determined degradation temperatures  $T_{d,5\%}$  of compounds **M1** to **M5**.

Compound	$T_{d,5\%}$
<b>M1</b>	342
<b>M2</b>	337
<b>M3</b>	344
<b>M4</b>	338
<b>M5</b>	321



## 2.5 Polymerization of sunflower oil-based triacid

### 2.5.1 General procedure for P-3CR polymerization

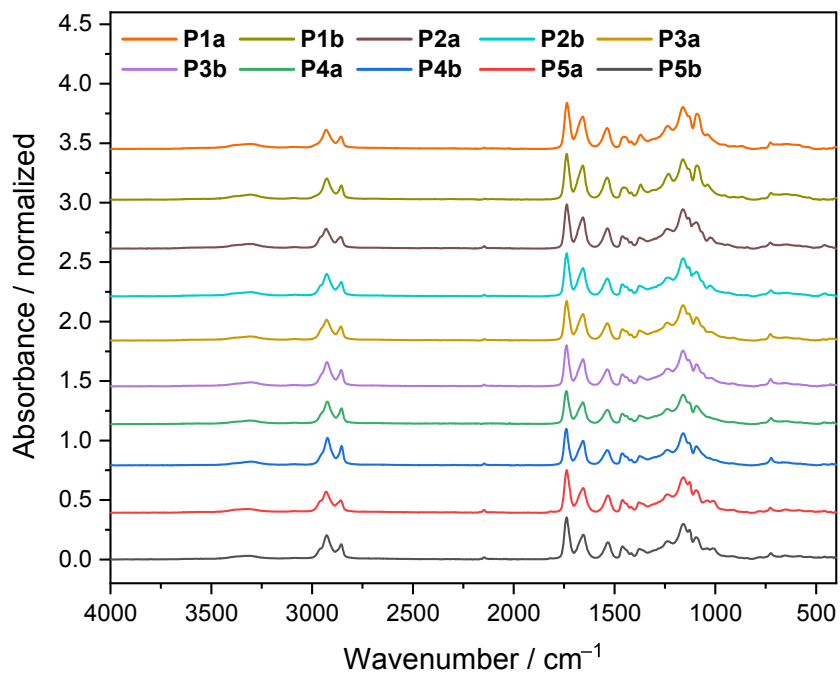
The exact amount of all compounds used for the respective polymers is listed in Table S4. Acetaldehyde and butanal were used in excess due to their low boiling points leading to loss of substance during the curing time.

**Table S4:** Amount of monomer compounds used for all Passerini-3CR polymerization.

Polymer	Tricarboxylic acid	Aldehyde	Diisocyanide
<b>P1a</b>	600 mg (2.97 mmol CO <sub>2</sub> H)	Acetaldehyde (170 mg, 3.86 mmol, 1.30 equiv.)	1,6-Diisocyanidohexane (202 mg, 1.49 mmol, 0.50 equiv.)
<b>P1b</b>	600 mg (2.97 mmol CO <sub>2</sub> H)	Acetaldehyde (170 mg, 3.86 mmol, 1.30 equiv.)	1,9-Diisocyanidononane (265 mg, 1.49 mmol, 0.50 equiv.)
<b>P2a</b>	600 mg (2.97 mmol CO <sub>2</sub> H)	Butanal (236 mg, 3.27 mmol, 1.10 equiv.)	1,6-Diisocyanidohexane (202 mg, 1.49 mmol, 0.50 equiv.)
<b>P2b</b>	600 mg (2.97 mmol CO <sub>2</sub> H)	Butanal (236 mg, 3.27 mmol, 1.10 equiv.)	1,9-Diisocyanidononane (265 mg, 1.49 mmol, 0.50 equiv.)
<b>P3a</b>	550 mg (2.72 mmol CO <sub>2</sub> H)	Hexanal (273 mg, 2.72 mmol, 1.00 equiv.)	1,6-Diisocyanidohexane (186 mg, 1.36 mmol, 0.50 equiv.)
<b>P3b</b>	550 mg (2.72 mmol CO <sub>2</sub> H)	Hexanal (273 mg, 2.72 mmol, 1.00 equiv.)	1,9-Diisocyanidononane (243 mg, 1.36 mmol, 0.50 equiv.)
<b>P4a</b>	600 mg (2.97 mmol CO <sub>2</sub> H)	Nonanal (423 mg, 2.97 mmol, 1.00 equiv.)	1,6-Diisocyanidohexane (202 mg, 1.49 mmol, 0.50 equiv.)
<b>P4b</b>	600 mg (2.97 mmol CO <sub>2</sub> H)	Nonanal (423 mg, 2.97 mmol, 1.00 equiv.)	1,9-Diisocyanidononane (265 mg, 1.49 mmol, 0.50 equiv.)
<b>P5a</b>	550 mg (2.72 mmol CO <sub>2</sub> H)	2-Ethylbutyraldehyde (273 mg, 2.72 mmol, 1.00 equiv.)	1,6-Diisocyanidohexane (186 mg, 1.36 mmol, 0.50 equiv.)
<b>P5b</b>	500 mg (2.48 mmol CO <sub>2</sub> H)	2-Ethylbutyraldehyde (248 mg, 2.48 mmol, 1.00 equiv.)	1,9-Diisocyanidononane (221 mg, 1.24 mmol, 0.50 equiv.)

## 2.5.2 Infrared Spectroscopy (IR)

All P-3CR polymers were characterized via IR spectroscopy. All spectra are depicted in Figure S29.



**Figure S29:** IR spectra of all P-3CR polymers.

### 2.5.3 Thermogravimetric analysis (TGA)

TGA measurements of all P-3CR polymers are depicted in Figure S30 and the corresponding  $T_{d,5\%}$  values are listed in Table S5.

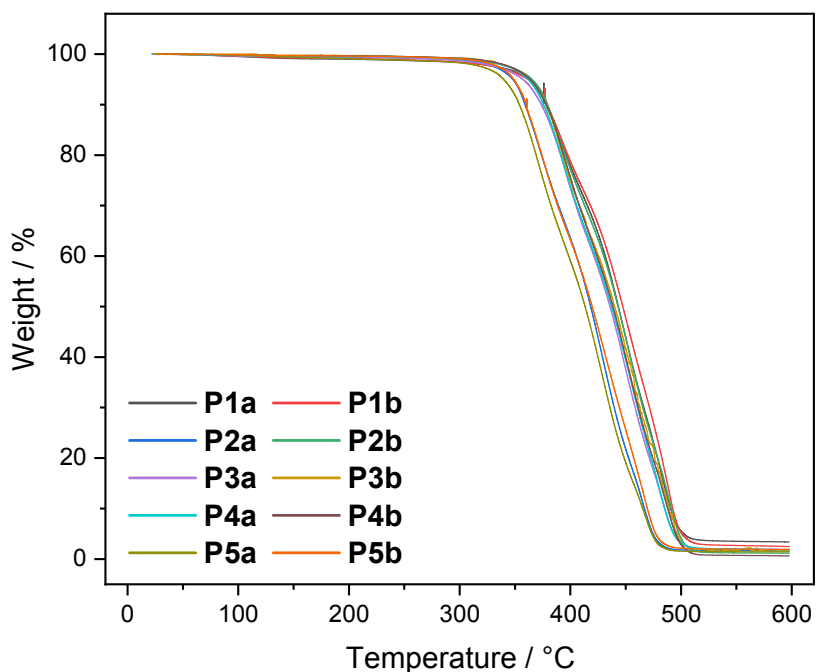


Figure S30: TGA Measurements of all P-3CR polymers.

Table S5: Determined degradation temperatures  $T_{d,5\%}$  of all polymers.

Polymer	$T_{d,5\%}$
1a	363
1b	362
2a	348
2b	365
3a	357
3b	363
4a	362
4b	364
5a	340
5b	349

## 2.5.4 Differential Scanning Calorimetry (DSC)

DSC measurements of all P-3CR polymers are depicted in Figure S31 and the corresponding  $T_g$  values are listed in Table S6.

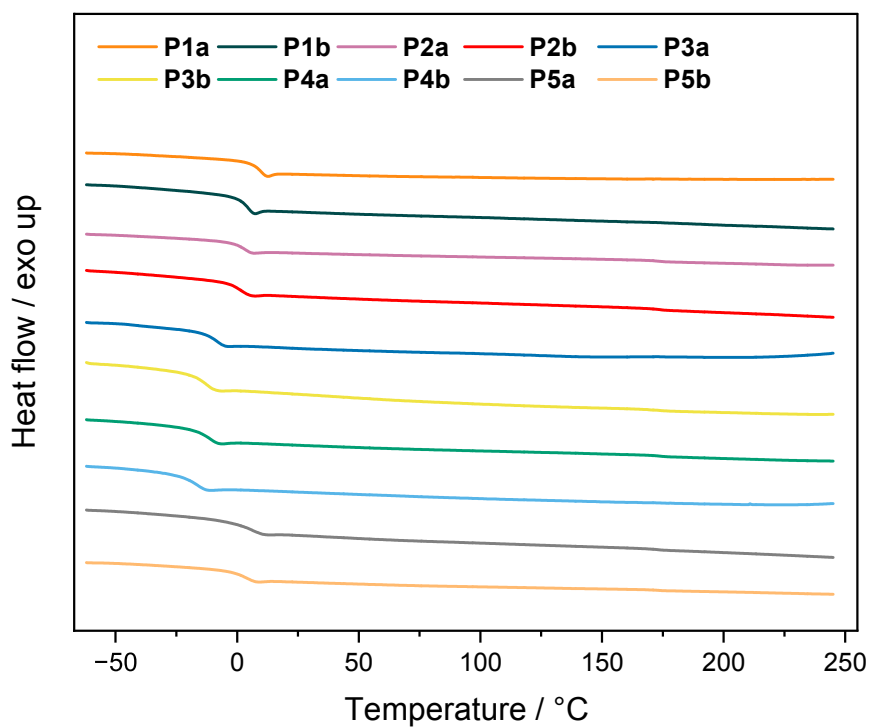


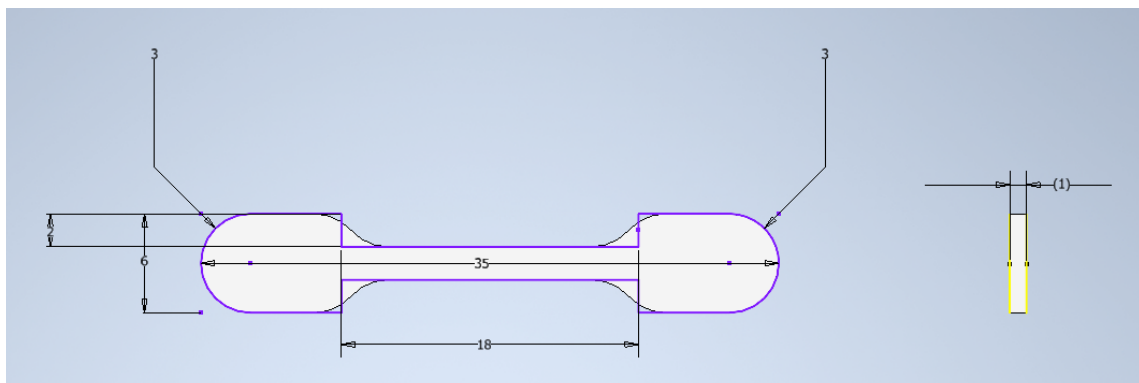
Figure S31: DSC Measurements of all P-3CR polymers.

Table S6: Determined glass transition temperatures  $T_g$  of all P-3CR polymers.

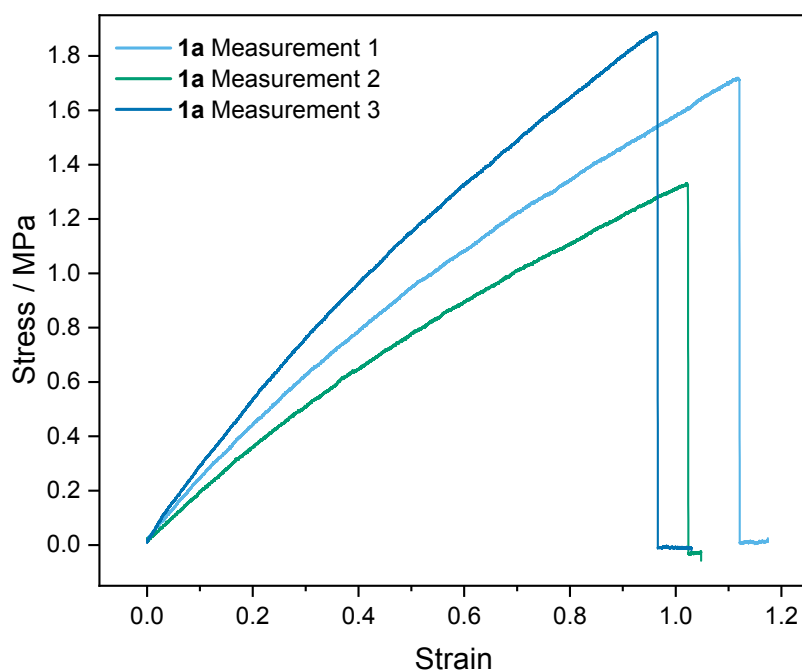
Polymer	$T_g / ^\circ\text{C}$
1a	9
1b	4
2a	3
2b	1
3a	- 8
3b	- 12
4a	- 12
4b	- 18
5a	3
5b	0

### 2.5.5 Tensile Strength Measurements

A poly(tetrafluoroethylene) form was manufactured to allow casting of customized tensile test samples. The dimensions of the prepared samples are depicted in Figure S32 and are given in millimeters. For each polymer, three samples were measured to determine the average young's modulus, ultimate tensile strength, elongation at break and their standard deviations. All tensile strength measurements are depicted in Figures S33–S42.



**Figure S32:** Dimensions of the manufactured tensile test samples (in millimeters). This drawing was made with Autodesk Inventor.



**Figure S33:** Tensile strength measurements of P1a.

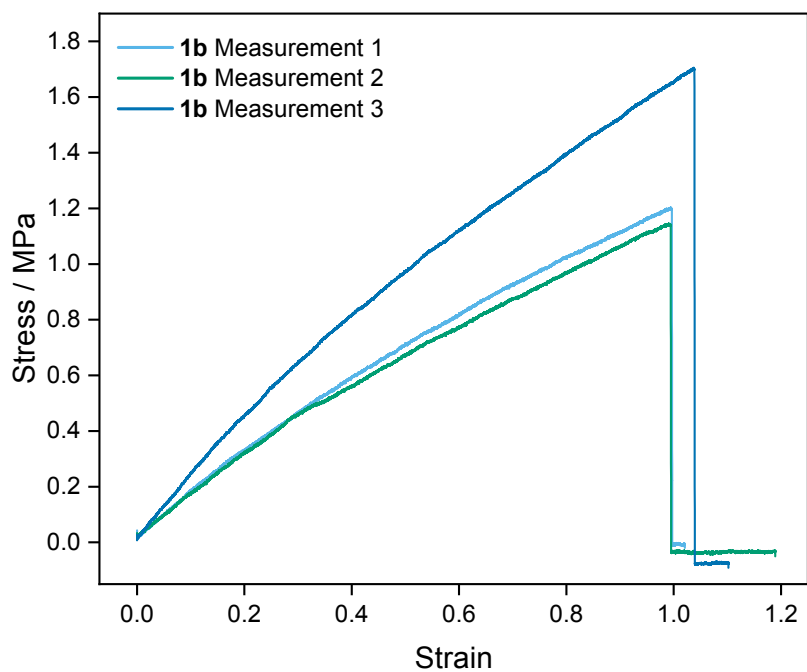


Figure S34: Tensile strength measurements of P1b.

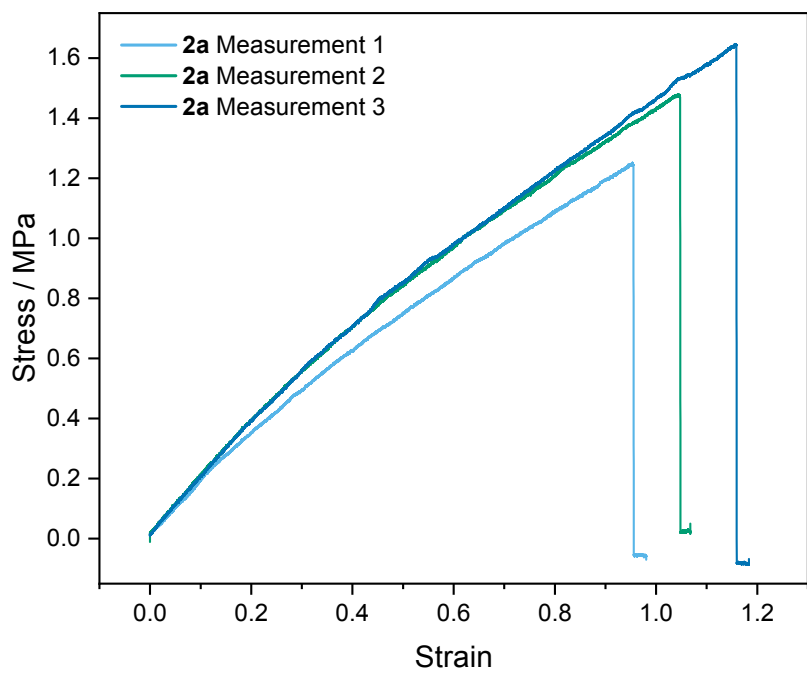


Figure S35: Tensile strength measurements of P2a.

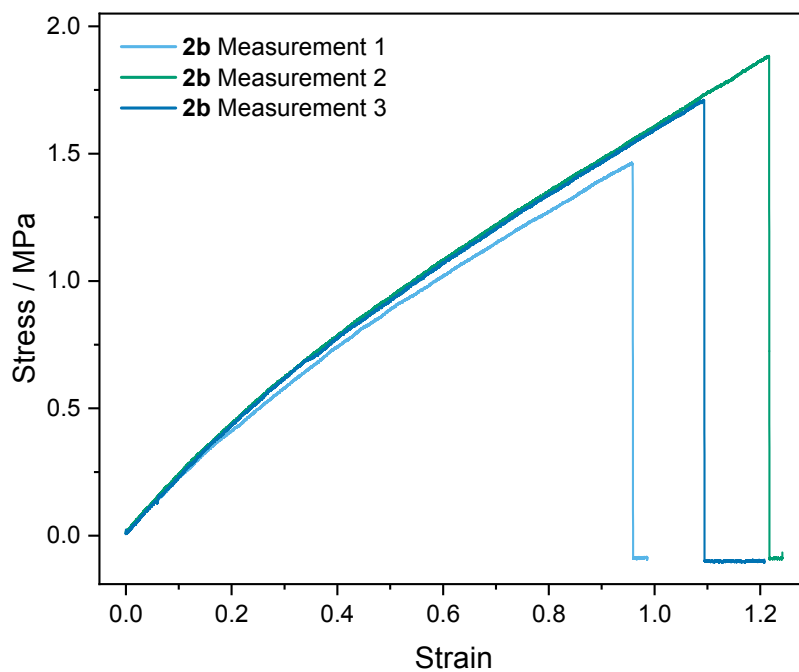


Figure S36: Tensile strength measurements of P2b.

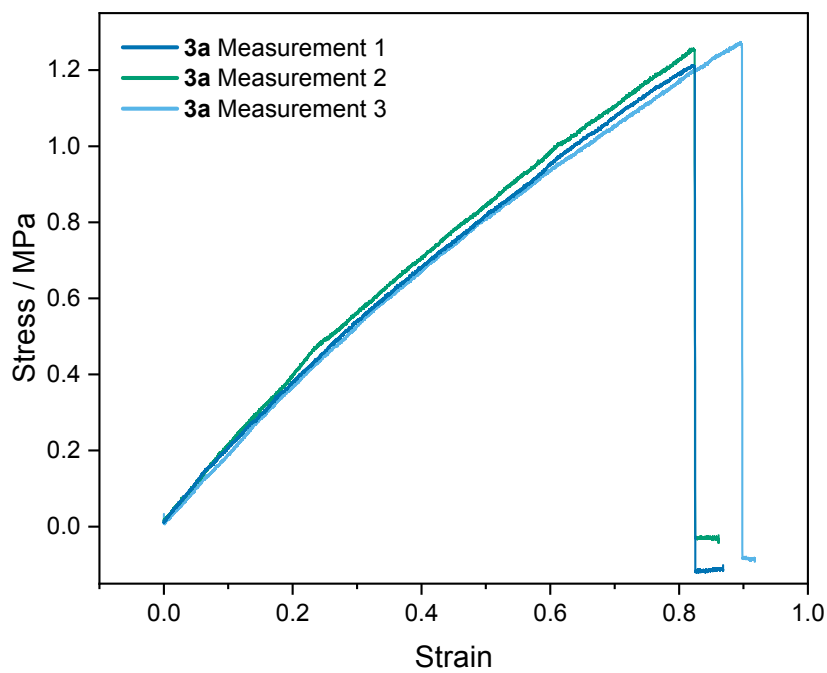


Figure S37: Tensile strength measurements of P3a.

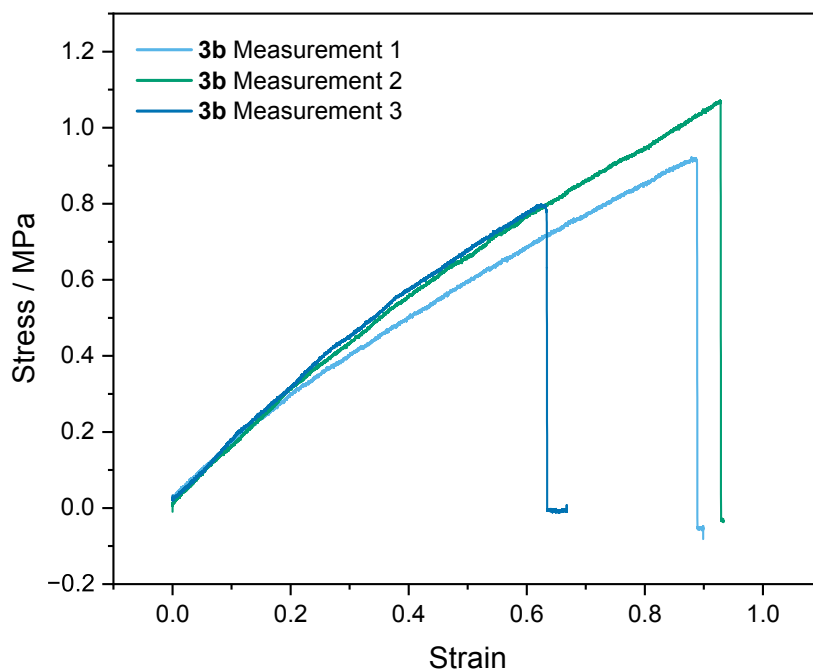


Figure S38: Tensile strength measurements of P3b.

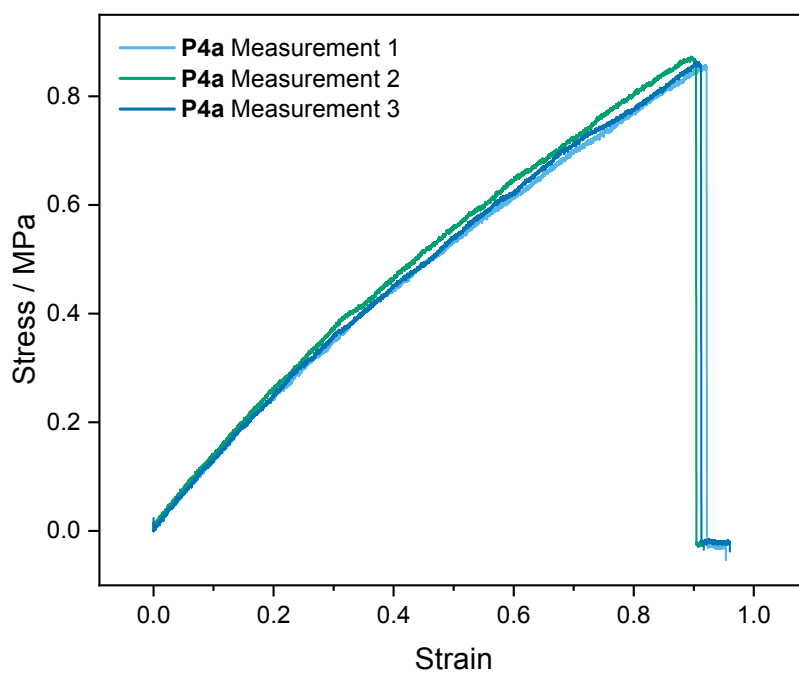


Figure S39: Tensile strength measurements of P4a.



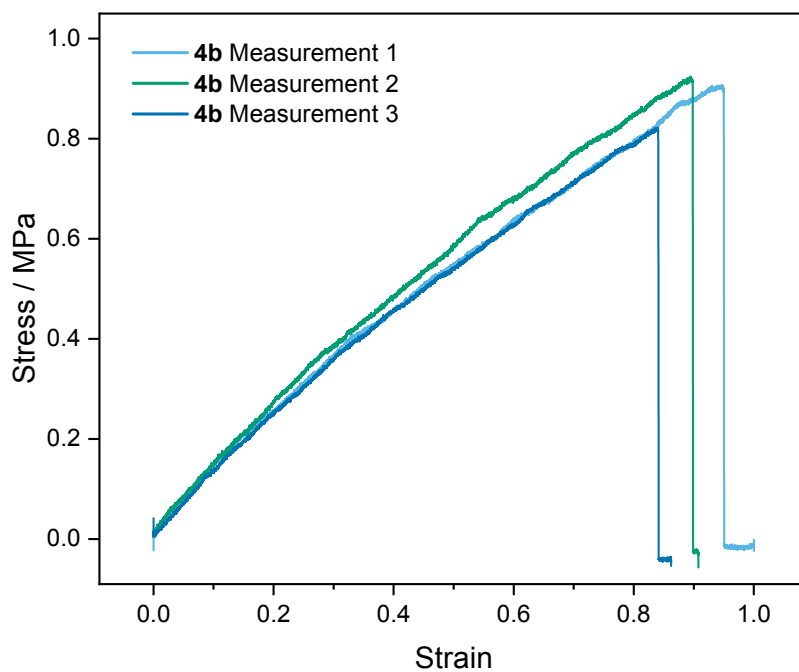


Figure S40: Tensile strength measurements of P4b.

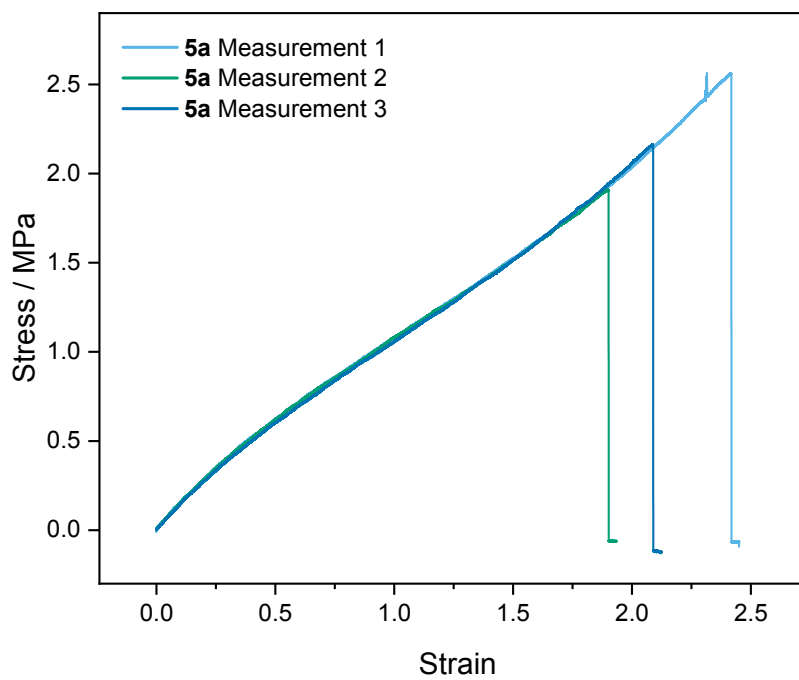
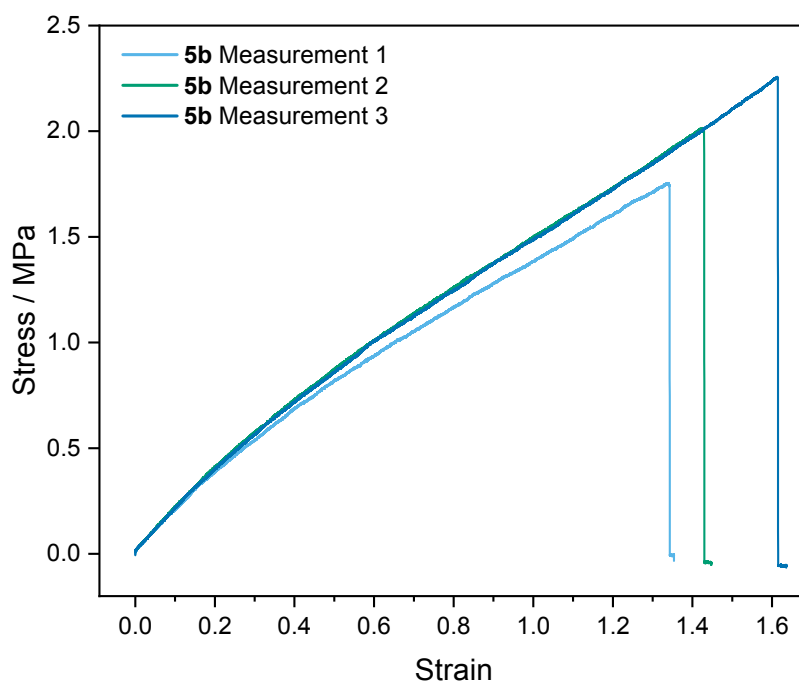


Figure S41: Tensile strength measurements of P5a.



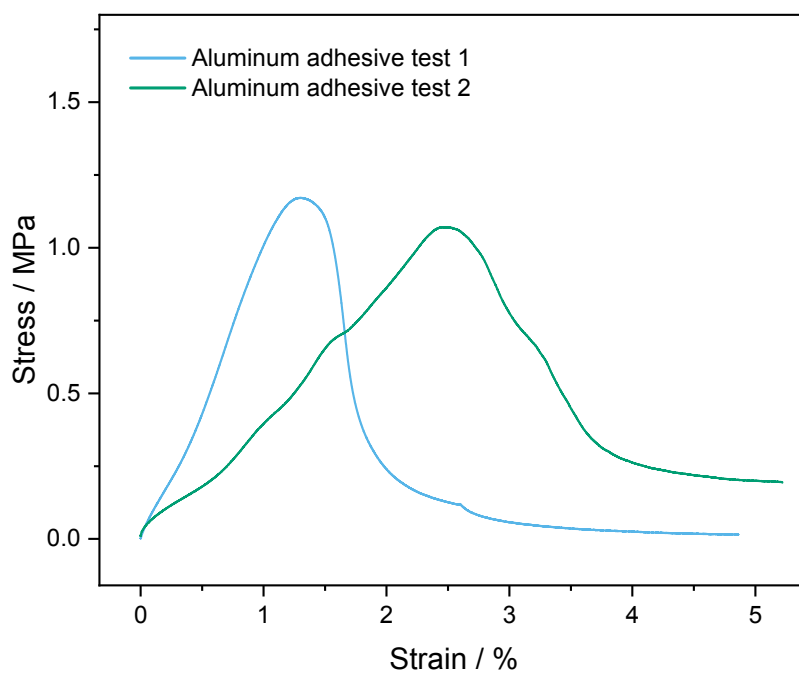
**Figure S42:** Tensile strength measurements of **P5b**.

### 2.5.6 Lap shear force adhesive tests

Testing samples were prepared by cutting each test substrate into rectangular pieces.

1. Aluminum alloy (5754, or AlMg<sub>3</sub>): 6 cm × 1.5 cm × 0.1 cm
2. Stainless-steel (S235JR): 6 cm × 1.5 cm × 0.1 cm
3. Wood (common ash): 6 cm × 1.5 cm × 0.5 cm
4. Poly(methyl methacrylate): 6 cm × 1.5 cm × 0.4 cm
5. Borosilicate glass: 6 cm × 1.5 cm × 0.4 cm

All adhesive test measurements are depicted in Figures S43–S48.



**Figure S43:** Adhesive test measurements of **P5a** on aluminum.

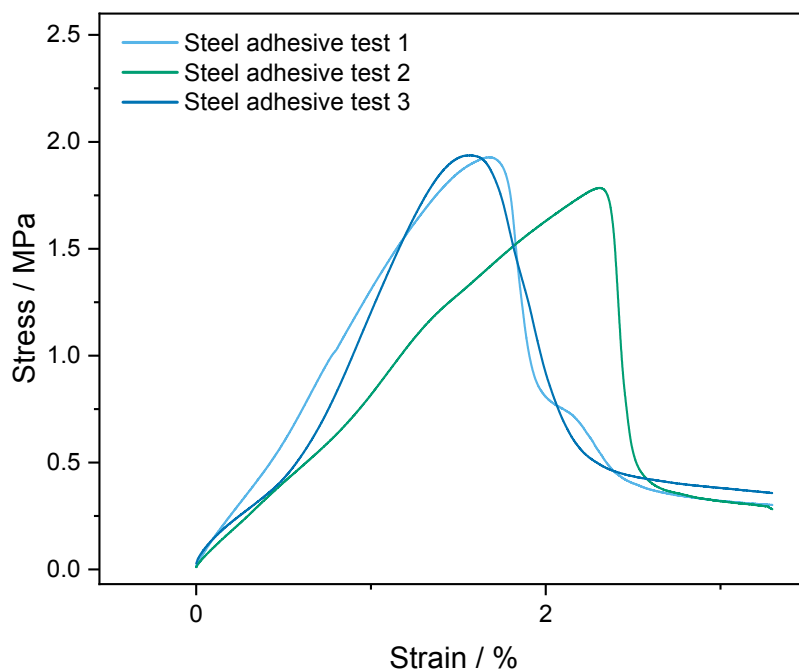


Figure S44: Adhesive test measurements of **P5a** on stainless-steel.

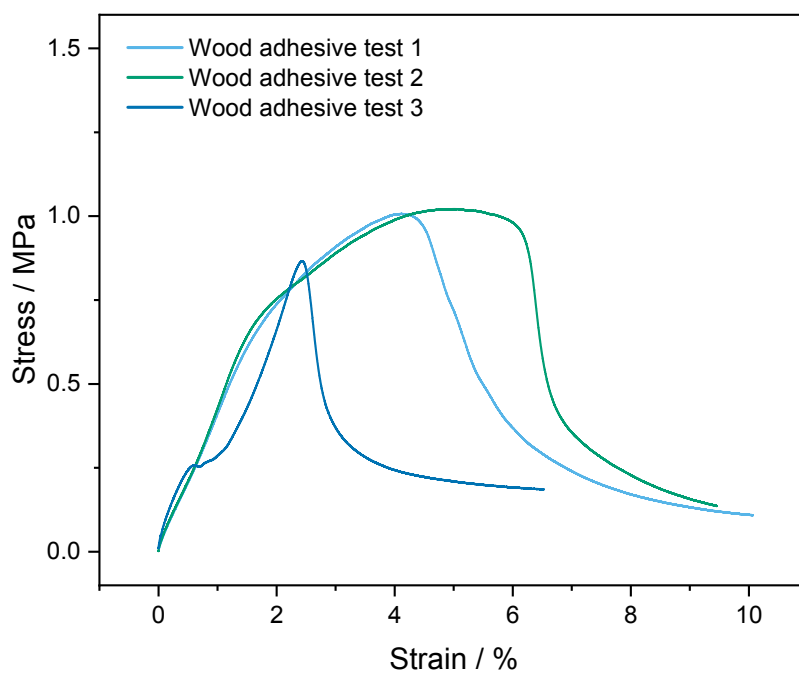


Figure S45: Adhesive test measurements of **P5a** on wood.

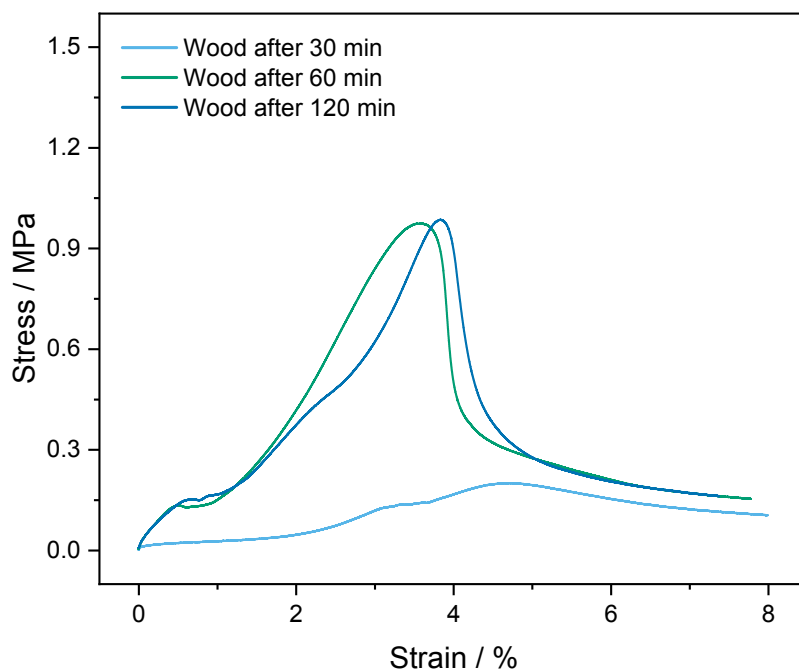


Figure S46: Adhesive test measurements of P5a on wood with different curing times.

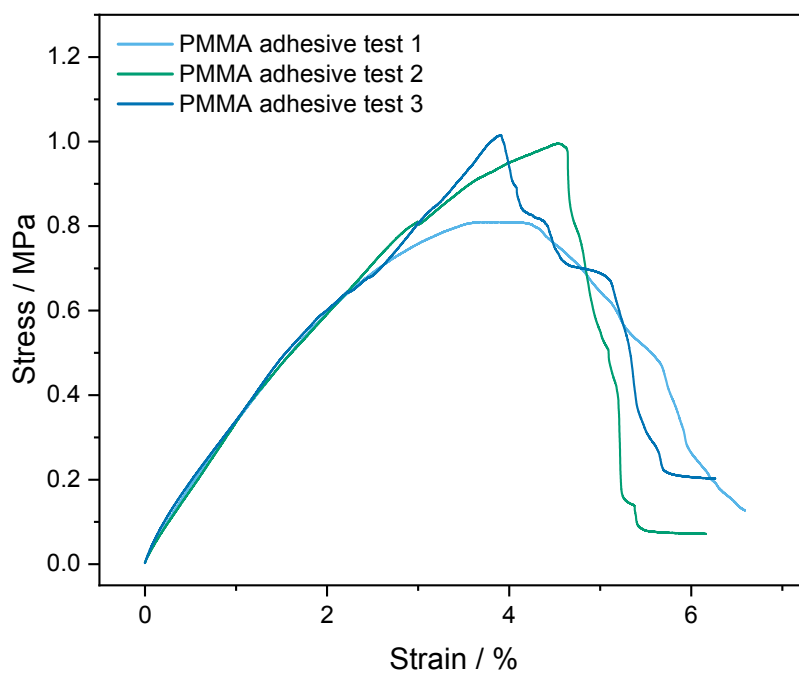
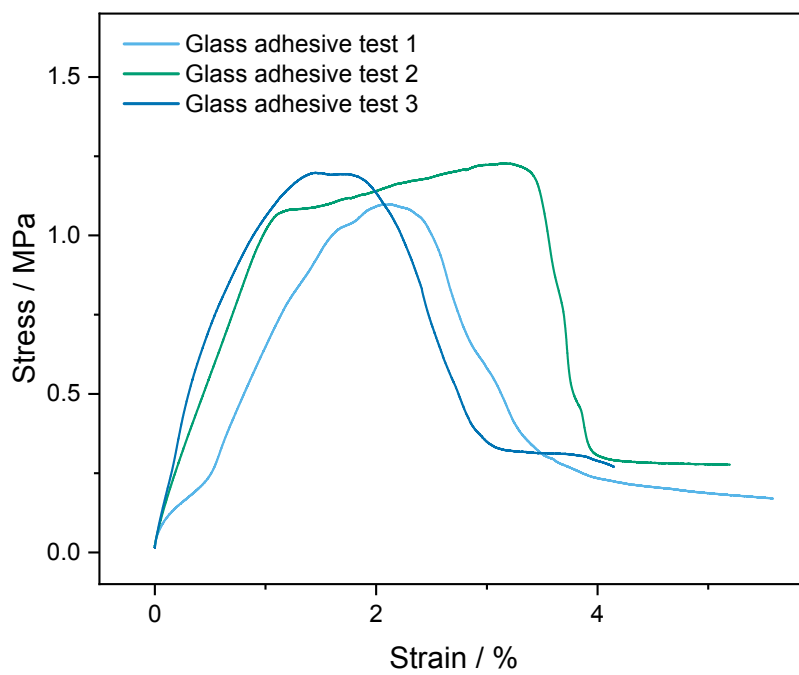
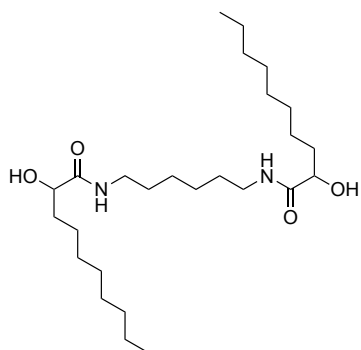


Figure S47: Adhesive test measurements of P5a on PMMA.

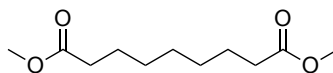


**Figure S48:** Adhesive test measurements of **P5a** on glass.

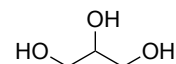
## 2.6 Chemical recycling of polymer P4a

**Diol 6**

$C_{26}H_{52}N_2O_4$   
M = 456.71 g/mol

**Azelaic acid dimethyl ester**

$C_{11}H_{20}O_4$   
M = 216.28 g/mol

**Glycerol**

$C_3H_8O_3$   
M = 92.09 g/mol

### **Diol 6:**

$T_m$ : 162 °C

**$^1H$  NMR** (500 MHz, TFA-*d*, ppm):  $\delta$  = 4.63 (dd,  $J$  = 8.7, 3.5 Hz, 2H, H<sup>1</sup>), 3.44 (t,  $J$  = 7.3 Hz, 4H, H<sup>2</sup>), 1.96–1.83 (m, 2H, H<sup>3</sup>), 1.81–1.68 (m, 2H, H<sup>3</sup>), 1.68–1.56 (m, 4H, H<sup>4</sup>), 1.48–1.39 (m, 4H, H<sup>5</sup>), 1.39 (s, 4H, H<sup>6</sup>), 1.34–1.15 (m, 20H, H<sup>7</sup>), 0.79 (t,  $J$  = 6.6 Hz, 6H, H<sup>8</sup>).

**$^{13}C$  NMR** (126 MHz, TFA-*d*, ppm):  $\delta$  = 180.7 (C<sub>q</sub>, C<sub>Amide</sub>, C<sup>1</sup>), 73.8 (CH, C<sup>2</sup>), 43.4 (CH<sub>2</sub>, C<sup>3</sup>), 35.9 (CH<sub>2</sub>, C<sup>3</sup>), 33.6 (CH<sub>2</sub>, C<sup>3</sup>), 31.1 (CH<sub>2</sub>, C<sup>3</sup>), 30.9 (CH<sub>2</sub>, C<sup>3</sup>), 30.8 (CH<sub>2</sub>, C<sup>3</sup>), 29.9 (CH<sub>2</sub>, C<sup>3</sup>), 27.9 (CH<sub>2</sub>, C<sup>3</sup>), 26.7 (CH<sub>2</sub>, C<sup>3</sup>), 24.3 (CH<sub>2</sub>, C<sup>3</sup>), 14.7 (CH<sub>3</sub>, C<sup>4</sup>).

**IR** (ATR, cm<sup>-1</sup>):  $\tilde{\nu}$  = 3242 (s), 2953 (m), 2918 (vs), 2873 (w), 2849 (vs), 1638 (vs), 1622 (vs), 1543 (vs), 1468 (s), 1441 (w), 1373 (s), 1334 (m), 1327 (m), 1268 (w), 1176 (w), 1136 (w), 1082 (vs), 1034 (w), 815 (w), 802 (w), 722 (m), 704 (w), 679 (s), 552 (w), 507 (w), 480 (w), 466 (w).

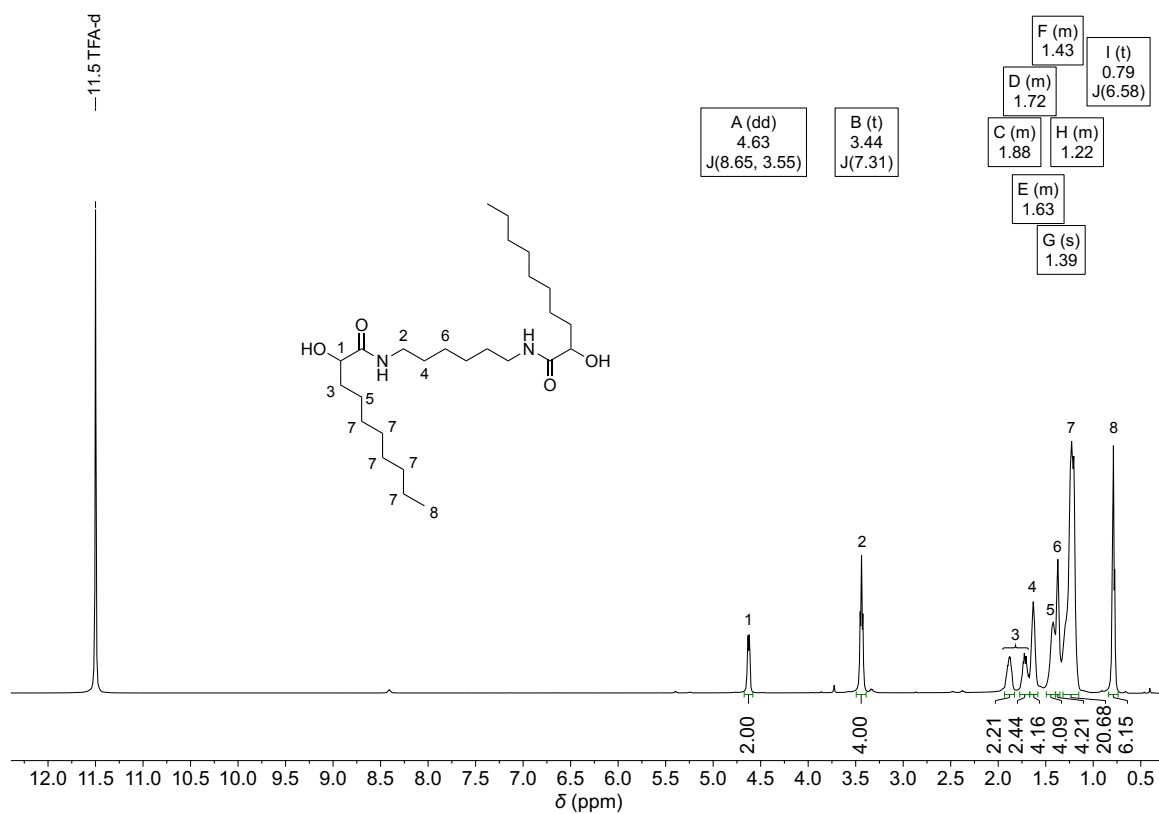
**ESI-HRMS** ([M+H]<sup>+</sup>, C<sub>26</sub>H<sub>53</sub>N<sub>2</sub>O<sub>4</sub>): calcd.: 457.4000, found: 457.3996.

### **Dimethyl azelate:**

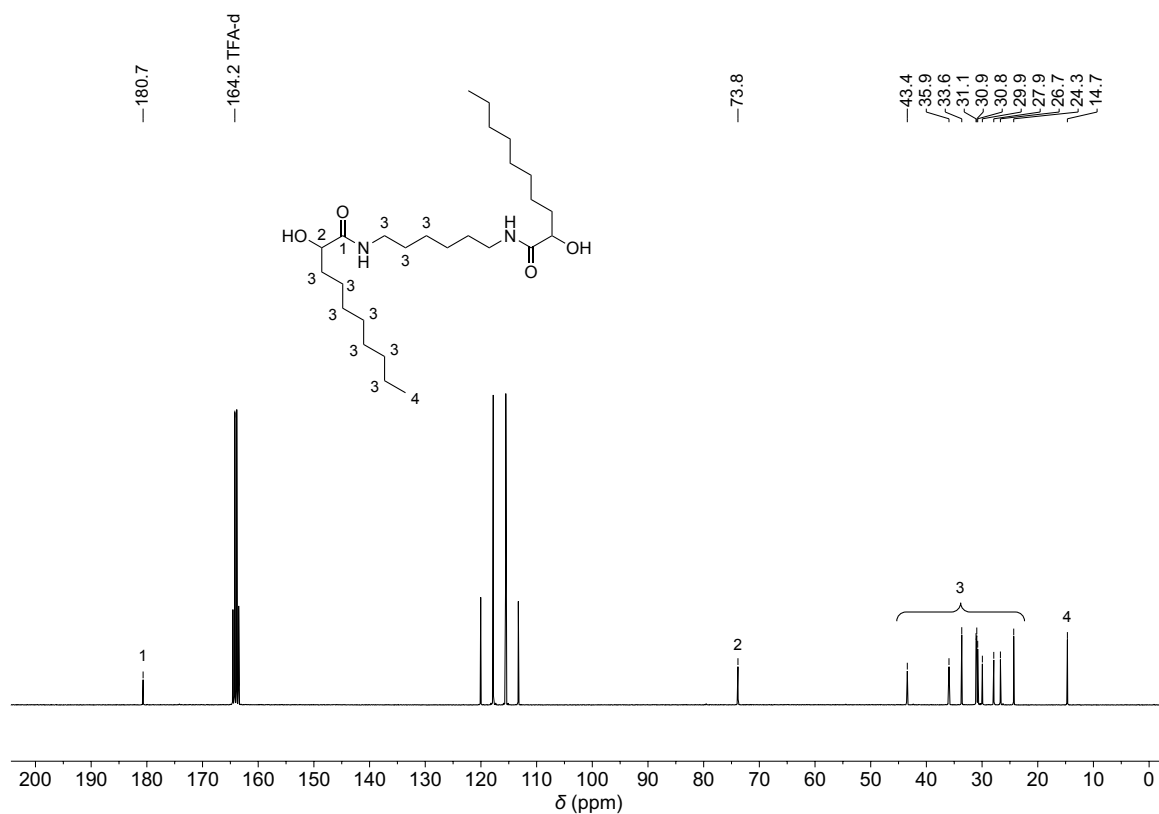
**$^1H$  NMR** (400 MHz, CDCl<sub>3</sub>, ppm):  $\delta$  = 3.65 (s, 6H, H<sup>1</sup>), 2.29 (t,  $J$  = 7.5 Hz, 4H, H<sup>2</sup>), 1.61 (qd,  $J$  = 7.6, 4.1 Hz, 4H, H<sup>3</sup>), 1.31 (d,  $J$  = 4.5 Hz, 6H, H<sup>4</sup>).

### **Glycerol:**

**$^1H$  NMR** (400 MHz, DMSO-*d*<sub>6</sub>, ppm):  $\delta$  = 4.45 (d,  $J$  = 4.7 Hz, 1H, H<sup>1</sup>), 4.38 (t,  $J$  = 5.6 Hz, 2H, H<sup>2</sup>), 3.49–3.17 (m, 5H, H<sup>3</sup>).

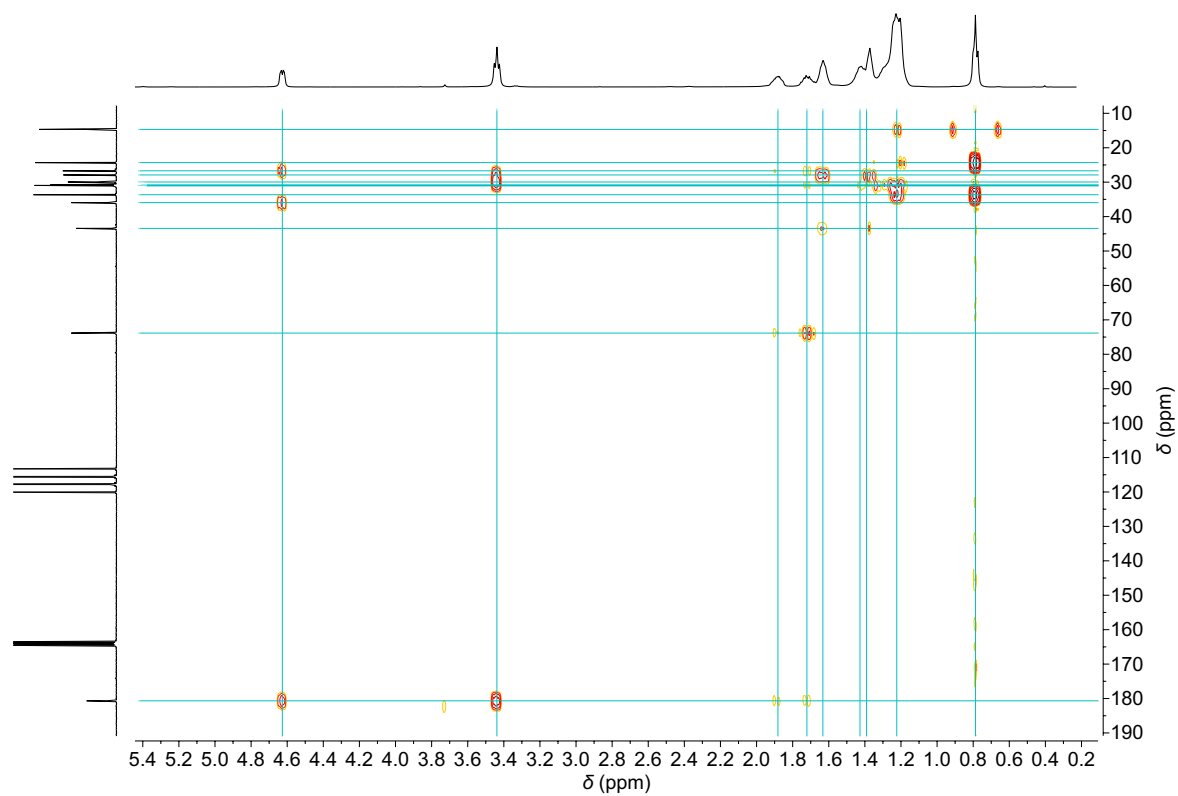
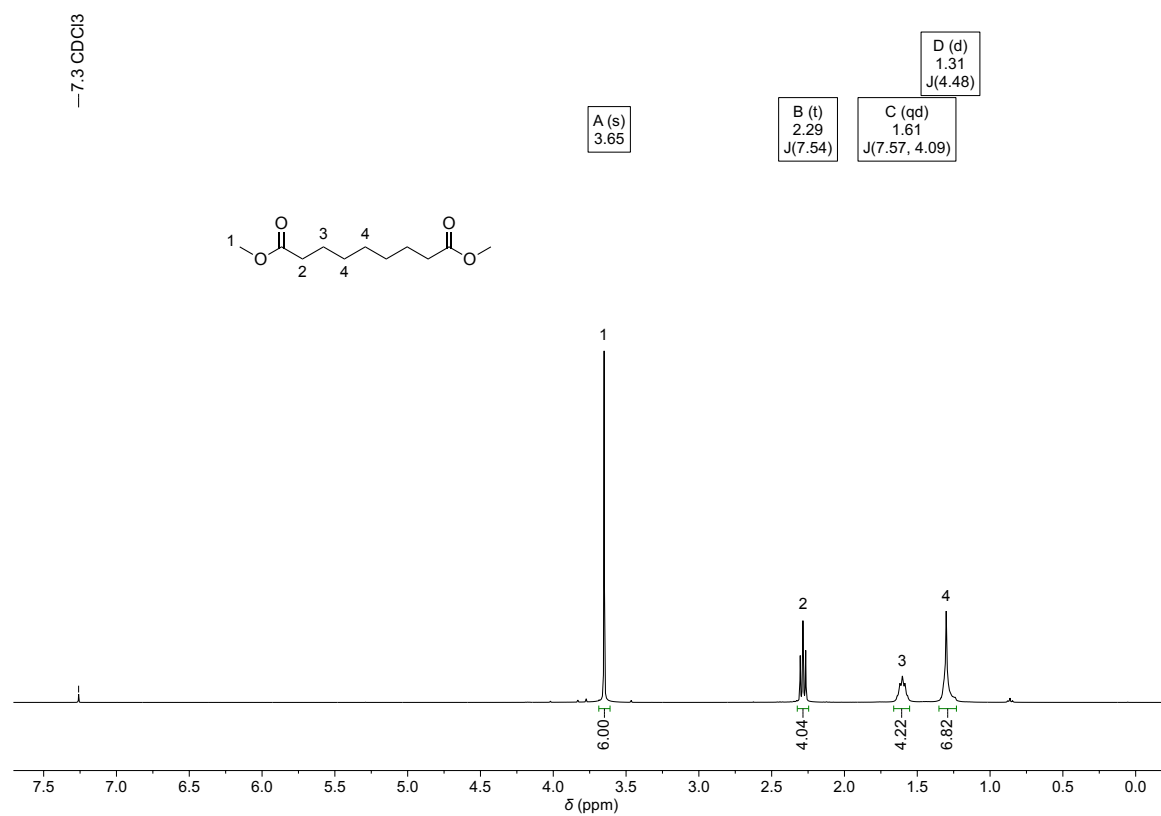


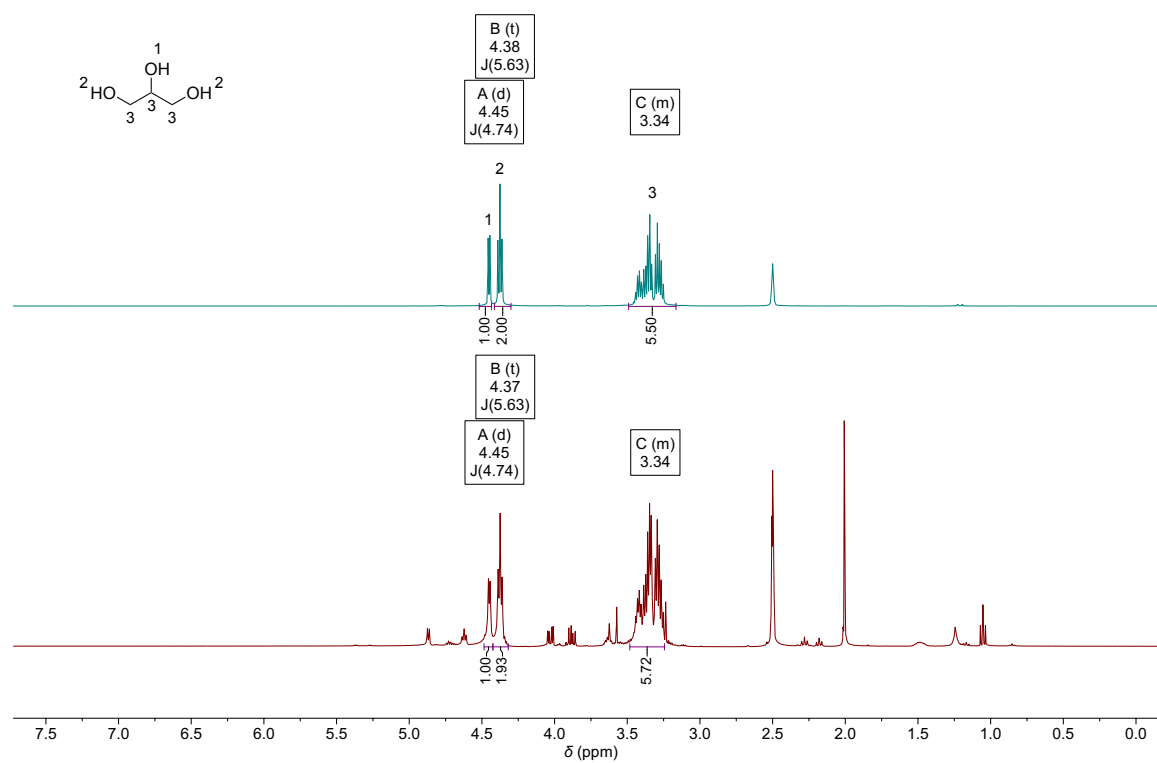
**Figure S49:** <sup>1</sup>H NMR spectrum of 6 in TFA-d.



**Figure S50:** <sup>13</sup>C NMR spectrum of 6 in TFA-d.



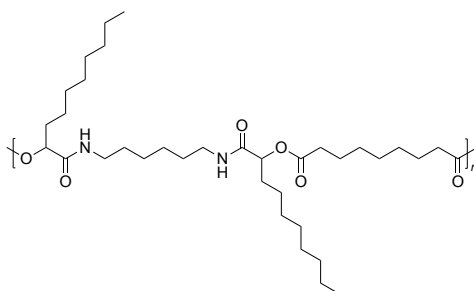
**Figure S51:** HMBC NMR spectrum of **6** in TFA-*d*.**Figure S52:** <sup>1</sup>H NMR spectrum of distilled dimethyl azelate in CDCl<sub>3</sub>.



**Figure S53:** <sup>1</sup>H NMR spectrum of pure glycerol (**top**) and distilled glycerol (**bottom**) in DMSO-*d*<sub>6</sub>.

## 2.7 Repolymerization of diol 6

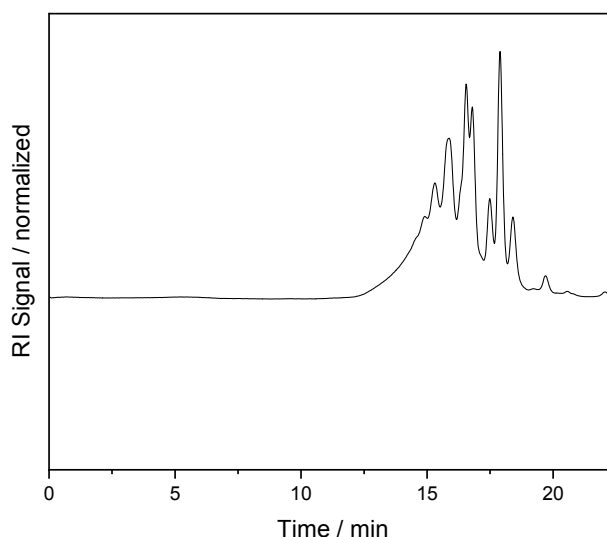
### 2.7.1 Polymerization attempt with azelaic acid dimethyl ester



Repeating unit:  
 $C_{35}H_{64}N_2O_6$   
 $M = 608.91 \text{ g/mol}$

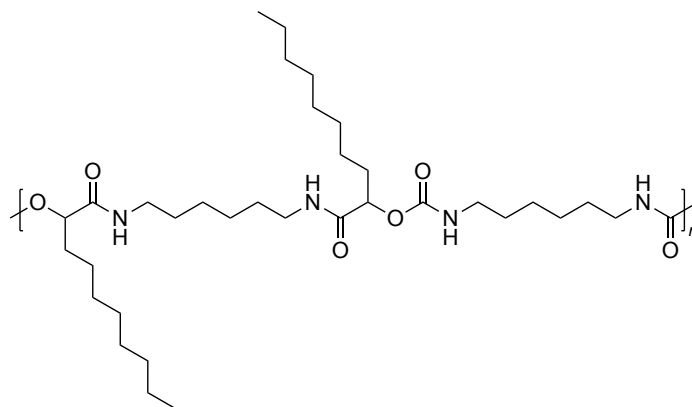
Diol **6** (200 mg, 438  $\mu\text{mol}$ , 1.00 equiv.), dimethyl azelate (94.7 mg, 438  $\mu\text{mol}$ , 1.00 equiv.) and 1,5,7-triazabicyclo[4.4.0]dec-5-ene (3.05 mg, 21.9  $\mu\text{mol}$ , 5 mol%) were added into a 1.5 ml screw cap vial. The mixture was heated to 160  $^{\circ}\text{C}$  for 16 h and the pressure was reduced to 800 mbar to remove the condensation product methanol. Afterwards, the pressure was further reduced to 10 mbar and the reaction was stirred for another 6 h at 160  $^{\circ}\text{C}$ . After cooling to room temperature, the residue was dissolved in tetrahydrofuran and precipitated into cold methanol. The precipitate was filtrated, washed with methanol and dried at 70  $^{\circ}\text{C}$  and 10 mbar to obtain the oligomer.

SEC (DMAc):  $M_n = 1900 \text{ Da}$ ,  $M_w = 3600 \text{ Da}$ ,  $D = 1.90$ .



**Figure S54:** SEC (THF) after precipitation of polymerization attempt of diol **6** with azelaic acid dimethyl ester and TBD catalysis.

## 2.7.2 Polymerization with hexamethylene diisocyanate



Repeating unit:  
 $C_{34}H_{64}N_4O_6$   
 $M = 624.91 \text{ g/mol}$

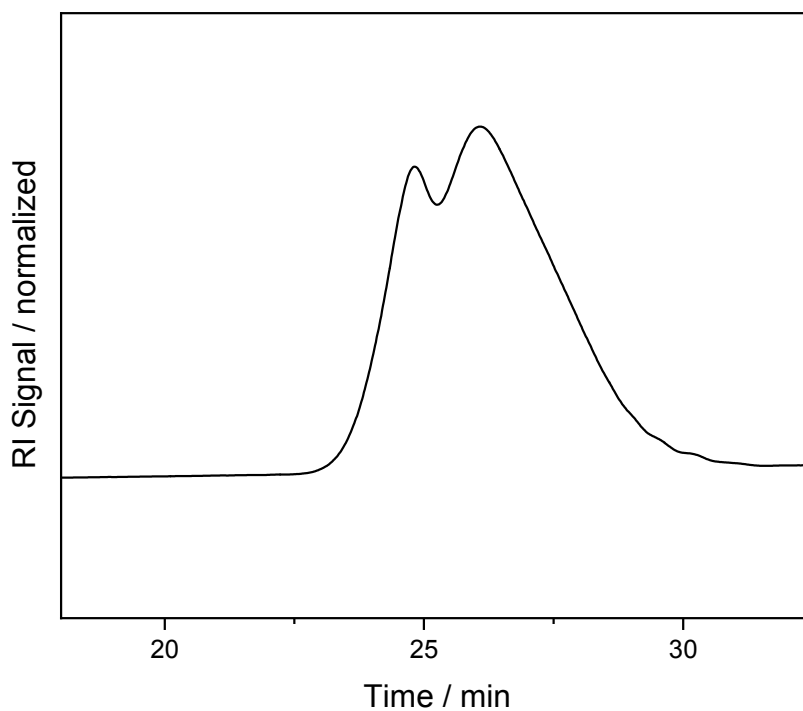
**SEC** (DMAc):  $M_n = 16700 \text{ Da}$ ,  $M_w = 53000 \text{ Da}$ ,  $D = 3.17$ .

**$^1\text{H NMR}$**  (500 MHz,  $\text{CDCl}_3$ , ppm):  $\delta = 7.09\text{--}6.27$  (m, 2H,  $\text{H}^1$ ),  $6.02\text{--}5.33$  (m, 2H,  $\text{H}^2$ ),  $5.09\text{--}4.91$  (m, 2H,  $\text{H}^3$ ),  $3.33\text{--}3.18$  (m, 4H,  $\text{H}^4$ ),  $3.18\text{--}3.00$  (m, 4H,  $\text{H}^4$ ),  $1.88\text{--}1.78$  (m, 2H,  $\text{H}^5$ ),  $1.74$  (m, 2H,  $\text{H}^5$ ),  $1.49$  (s, 8H,  $\text{H}^6$ ),  $1.39\text{--}1.09$  (m, 32H,  $\text{H}^7$ ),  $0.86$  (t,  $J = 6.8 \text{ Hz}$ , 6H,  $\text{H}^8$ ).

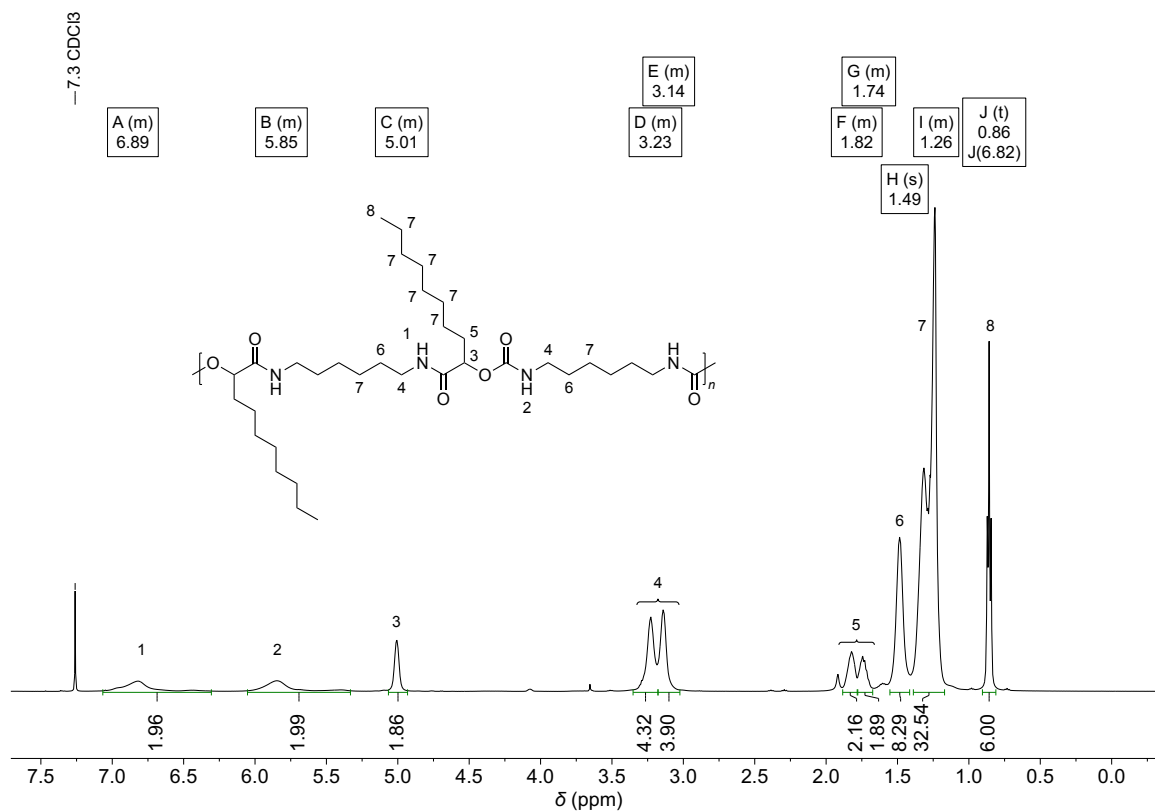
**$^{13}\text{C NMR}$**  (126 MHz,  $\text{CDCl}_3$ , ppm):  $\delta = 171.5$  ( $\text{C}_q$ ,  $\text{C}_{\text{Amide}}$ ,  $\text{C}^1$ ),  $155.8$  ( $\text{C}_q$ ,  $\text{C}_{\text{Carbamate}}$ ,  $\text{C}^2$ ),  $74.4$  (CH,  $\text{C}^3$ ),  $41.0$  ( $\text{CH}_2$ ,  $\text{C}^4$ ),  $38.3$  ( $\text{CH}_2$ ,  $\text{C}^4$ ),  $32.5$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $32.0$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $29.8$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $29.6$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $29.5$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $29.4$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $29.3$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $26.3$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $26.1$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $25.6$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $25.1$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $22.8$  ( $\text{CH}_2$ ,  $\text{C}^5$ ),  $14.2$  ( $\text{CH}_3$ ,  $\text{C}^6$ ).

**IR** (ATR,  $\text{cm}^{-1}$ ):  $\tilde{\nu} = 3302$  (w),  $2922$  (vs),  $2853$  (m),  $1700$  (vs),  $1656$  (vs),  $1530$  (vs),  $1465$  (m),  $1438$  (w),  $1375$  (w),  $1306$  (w),  $1252$  (vs),  $1181$  (w),  $1136$  (s),  $1102$  (w),  $1074$  (w),  $1037$  (w),  $982$  (w),  $781$  (w),  $721$  (w),  $650$  (w),  $595$  (w).

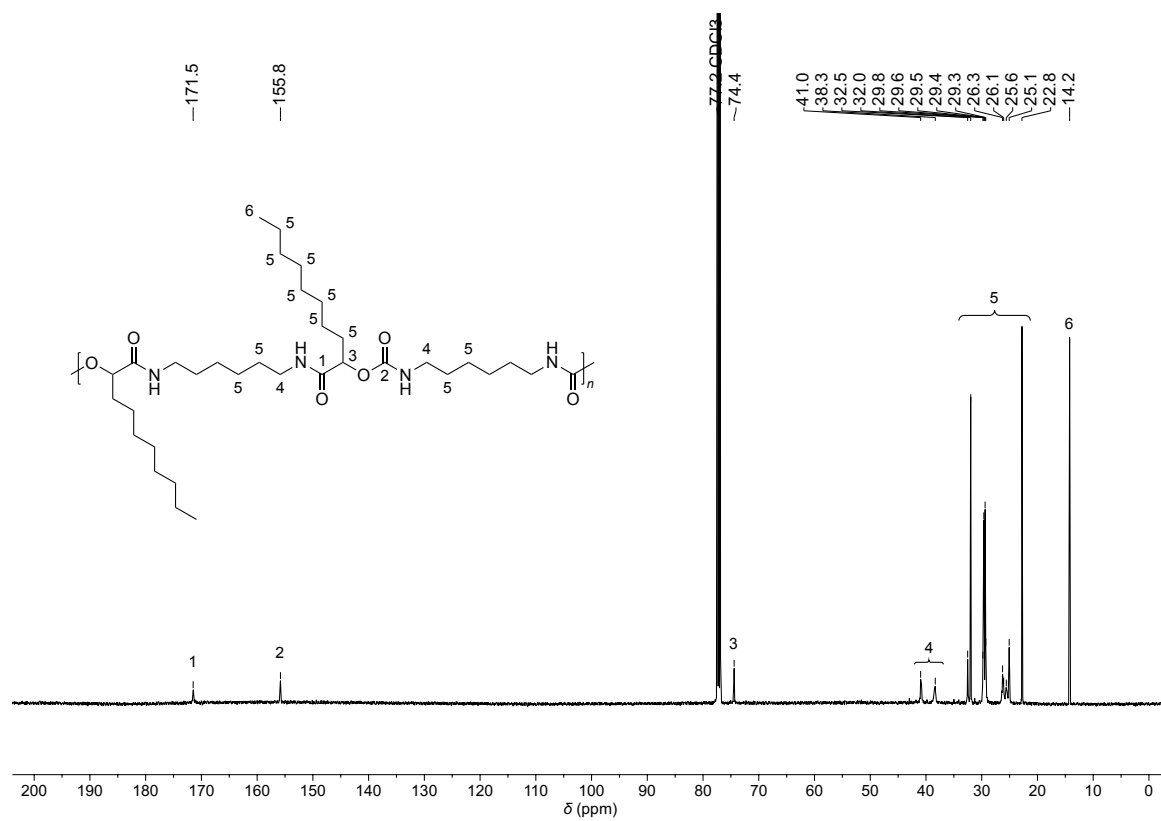
**TGA** ( $T_{d,5\%}$ ):  $280 \text{ }^\circ\text{C}$ .



**Figure S55:** SEC (DMAc) of polyurethane made from diol **6** and hexamethylene diisocyanate.



**Figure S56:**  $^1\text{H}$  NMR spectrum of polyurethane made from diol **6** and hexamethylene diisocyanate in  $\text{CDCl}_3$ .



**Figure S57:** <sup>13</sup>C NMR spectrum of polyurethane made from diol **6** and hexamethylene diisocyanate in CDCl<sub>3</sub>.

# A References

- [1] L. Santos Correa, M. A. R. Meier, *Eur. J. Lipid Sci. Technol.*, **2023**, 125, 2200171.
- [2] X. Meng, C. Crestini, H. Ben, N. Hao, Y. Pu, A. J. Ragauskas, D. S. Argyropoulos, *Nature Protocols*, **2019**, 14, 2627-2647.
- [3] K. A. Waibel, R. Nickisch, N. Möhl, R. Seim, M. A. R. Meier, *Green Chem.*, **2020**, 22, 933-941.