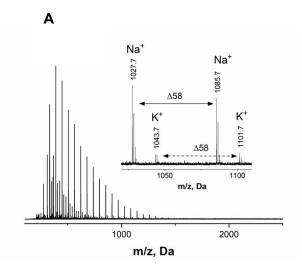
Electronic Supplementary Material (ESI) for Polymer Chemistry. This journal is © The Royal Society of Chemistry 2021

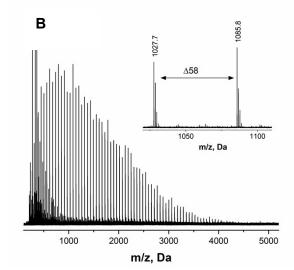
## **Supplementary information**

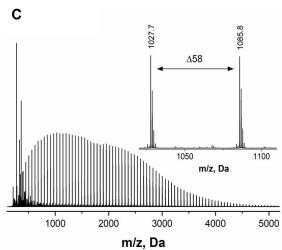
 Table S1: Overview of all product and semi-products mentioned in the manuscript

| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                | Number | Chemical structure                       |
|--|--------|--|
| 10 HO OF                         | 1      | CI                                       |
| 10 HO OF                         |        |  |
| 2  |        | но                                       |
| 3  4  CI  HO  CI  TO  CI  TO  TO  TO  TO  TO  TO  TO  TO  TO  T      |        |  |
| 3  4  CI  HO  O  CI  T  CI  OH  HO  OH  OH  OH  OH  OH  OH  OH  O    | 2      |  |
| 4 CI                             |        |  |
| 4 CI                             | 3      |  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                |        | $\frac{1}{2}$                            |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                |        |  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$                 |        |  |
| 5 CI                             | 4      | CI                                       |
| 5 CI                             |        |  |
| 6  |        |  |
| 6 CI                             | 5      | CICI                                     |
| 6 CI                             |        |  |
| 6  7  CI  OH  OH  OH  OH  OH  OH  OH  OH  OH  O                      |        | HO CI                                    |
| 7 CI CI CI OH OH OH OH OH OH OH OH                                   |        | Ó <sup>-</sup>                           |
| 7 CI CI CI OH                          | 6      | CI                                       |
| 7 CI CI CI OH                          |        |  |
| 7 CI CI CI CI OI                 |        |  |
| 8 OH OH OH  9 CI OH OH  10 OH OH  OH OH  OH  OH  OH  OH  OH  OH  O   |        |  |
| 8 OH OH OH  9 CI OH OH  10 OH OH  OH OH  OH  OH  OH  OH  OH  OH  O   | 7      | Cl                                       |
| 8 HO OH OH  9 CI OH OH  HO OF OH  OH  OH  OH  OH  OH  OH  OH  OH  OH |        |  |
| 9 CI OH OH HO OF OH O         |        | o in |
| 9 CI OH OH 10 OH OH  | 8      | OH OH                                    |
| 9 CI OH OH 10 OH OH  |        | но                                       |
| 10 OH OH OH  |        | ∟ ¬n                                     |
| 10 OH OH   | 9      | CI                                       |
| 10 OH  |        |  |
|  |        | HO $\wedge$ $  \wedge $ $\wedge$         |
|  |        | OU                                       |
|  | 10     |  |
|  |        | $\sim \downarrow \sim \sim \sim$         |
|  |        |  |
| 11 CI  | 11     | CI                                       |
|  |        |  |
| HO O   |        | HO                                       |
| "  |        | 11                                       |

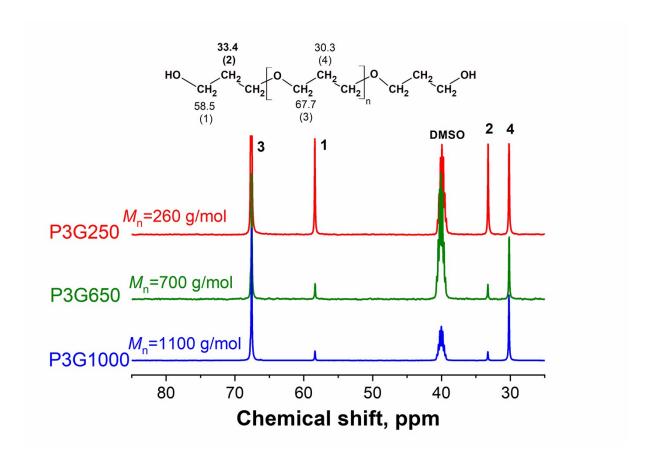
| 12 |   |
|----|---|
|    | CI  |
| 13 |   |
| 14 | o ( o   H   |
| 15 | O O O O O O O O O O O O O O O O O O O   |
| 16 | O O O O O O O O O O O O O O O O O O O   |
| 17 |   |
| 18 | $HO \longrightarrow \begin{bmatrix} \\ \\ \\ \end{bmatrix}_{n}^{O} \longrightarrow \begin{bmatrix} \\ \\ \\ \\ \end{bmatrix}$ |
| 19 | OH OH OH  |
| 20 | HO OH OH  |
|    | HO OH OH OH   |



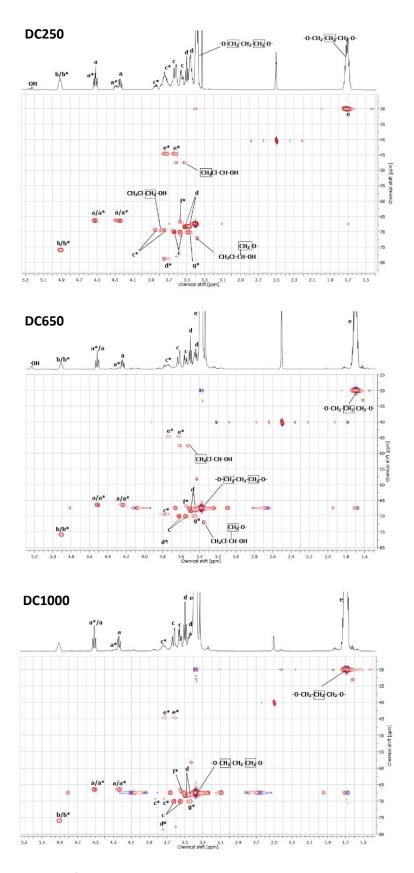




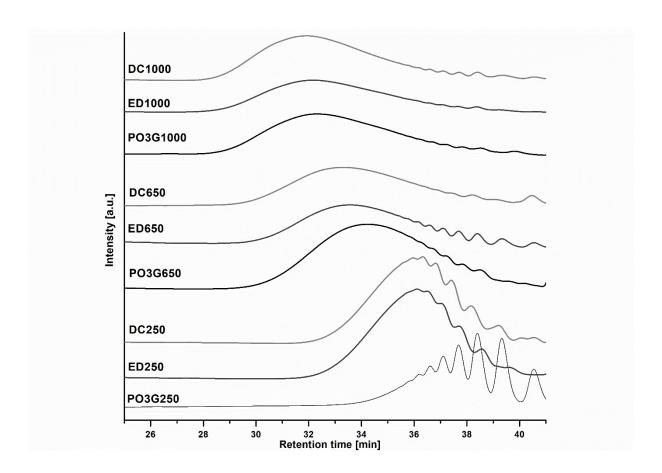
**Figure S1:**MALDI TOF mass spectra of the initial bio-based poly(trimethylene glycol) PO3G250 (A), PO3G650 (B) and PO3G1000 (C), and assigned structure (D). The peaks correspond to sodium adducts of molecular ions [M+Na]<sup>+</sup> (unless otherwise marked).



**Figure S2:** <sup>13</sup>C NMR spectra of the original PO3G polyols (PO3G250, PO3G650 and PO3G1000). The number-average molecular weights  $(M_n)$  of the PO3G polyols were calculated using integral values of end-groups (signal 2 at 33.4 ppm) and repeating units (signal 4 at 30.3 ppm).



**Figure S3:** H-13C HSQC spectra of the synthesized bis(cyclic carbonate)s showing proton signals of cyclic carbonate ring in the  $\alpha$ -C (a) and  $\beta$ -C (b) positions at 4.25 ppm (a), 4.50 ppm (a), 4.90 ppm (b), respectively.



**Figure S4:** SEC records of the initial bio-based poly(trimethylene glycol)s (PO3G250, PO3G650 and PO3G1000), the synthesized diglycidyl ethers (ED250, ED650 and ED1000) and the synthesized bis(cyclic carbonate)s (DC250, DC650 and DC1000).

**Table S2** SEC results: number average molar  $mass(M_n)$  and dispersity ( $\mathcal{D}$ ) of original polyols (PO3G250, PO3G650 and PO3G1000), epoxidized polyols (ED250, ED650 and ED1000) and bis(cyclic carbonate)s (DC250, DC650 and DC1000). PS calibration was applied.

| Sample   | M <sub>n (SEC)</sub>   | Đ (SEC) |
|----------|------------------------|---------|
|          | [g mol <sup>-1</sup> ] |         |
| PO3G250  | 260                    | 1.6     |
| ED250    | 520                    | 1.4     |
| DC250    | 540                    | 1.4     |
| PO3G650  | 700                    | 2.5     |
| ED650    | 790                    | 1.8     |
| DC650    | 800                    | 2.0     |
| PO3G1000 | 1100                   | 2.2     |
| ED1000   | 1100                   | 2.5     |
| DC1000   | 1200                   | 2.2     |

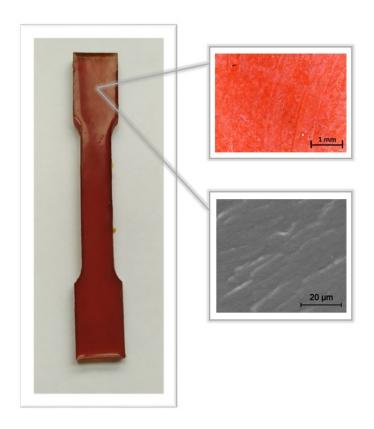


Figure S5: Photograph of NIPU650, optical microscope and scanning electron microscope images

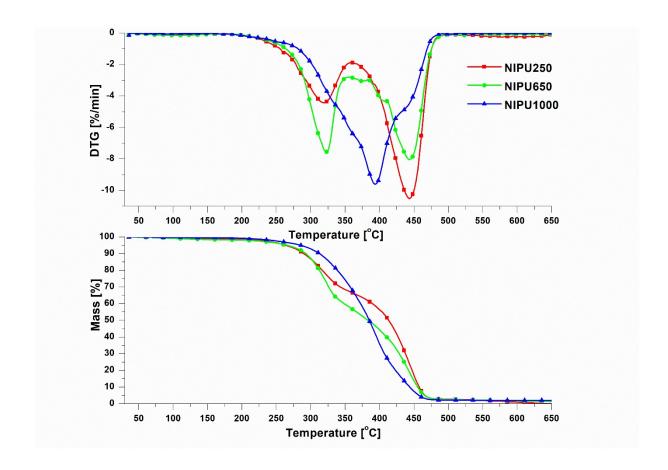
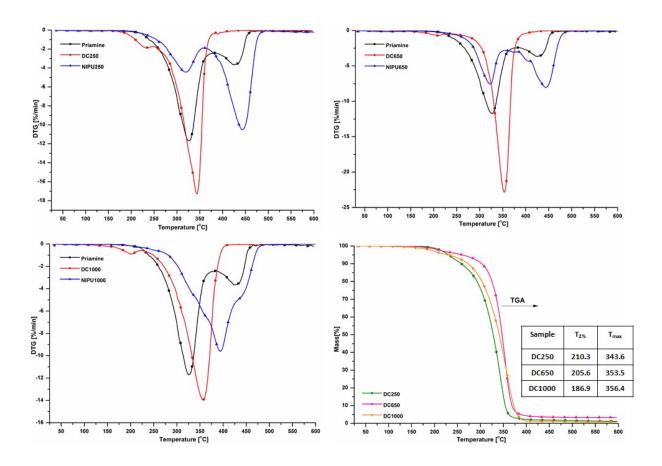


Figure S6: TGA and DTG curves of prepared non-isocyanate polyurethanes



**Figure S7:** Thermal stability of pure bis(cyclic carbonate)s (DC250, DC650, and DC1000) and amine hardener (Priamine 1071) in conjunction with NIPUs synthesized on their basis