**Supplementary Information**

# An innovative approach of bio-based polyurethane elastomer to overcome the "magic triangle" in tires

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**Table S2**: TGA and DTG data of PPCD/PO3G-PU elastomers.

**Table S3**: Mechanical property data of PPCD/PO3G-PU elastomers.

**Table S4**: DMA data of PPCD/PO3G-PU elastomers.

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**Table S1** GPC data of PPCD/PO3G-PU elastomers.

| Name | $M_n$ ($10^4$ g·mol$^{-1}$) | $M_w$ ($10^4$ g·mol$^{-1}$) | $Đ$ |
|---|---|---|---|
| PPCD-3G0 | 8.90 | 10.59 | 1.19 |
| PPCD-3G20 | 7.39 | 8.94 | 1.21 |
| PPCD-3G40 | 8.04 | 9.89 | 1.23 |
| PPCD-3G60 | 7.54 | 8.90 | 1.18 |
| PPCD-3G80 | 6.90 | 8.42 | 1.22 |
| PPCD-3G100 | 6.50 | 8.13 | 1.25 |

**Table S2** TGA and DTG data of PPCD/PO3G-PU elastomers.

| Name | $T_{5\%}$ (°C) | $T_{1,\,max}$ (°C) | $T_{2,\,max}$ (°C) | Char residue at 800°C (%) |
|---|---|---|---|---|
| PPCD-3G0 | 401.2 | 336.1 | - | 2.7 |
| PPCD-3G20 | 425.2 | 322.1 | 407.6 | 2.5 |
| PPCD-3G40 | 431.7 | 319.9 | 413.4 | 2.3 |
| PPCD-3G60 | 432.2 | 302.7 | 414.1 | 1.7 |
| PPCD-3G80 | 438.7 | 312.5 | 418.0 | 1.6 |
| PPCD-3G100 | 440.3 | 302.1 | 421.8 | 1.3 |

**Table S3** Mechanical property data of PPCD/PO3G-PU elastomers.

| Name | Tensile strength (MPa) | Elongation at break (%) | 100% elongation stress (MPa) | Hardness (Shore A) |
|---|---|---|---|---|
| PPCD-3G0 | 23.4±1.2 | 740±11 | 1.6±0.2 | 73±3 |
| PPCD-3G20 | 18.5±1.1 | 763±8 | 1.2±0.1 | 62±1 |
| PPCD-3G40 | 12.6±0.7 | 714±12 | 1.1±0.1 | 59±1 |
| PPCD-3G60 | 7.2±0.8 | 512±7 | 1.2±0.1 | 58±2 |
| PPCD-3G80 | 5.1±0.3 | 452±11 | 1.2±0.2 | 58±1 |
| PPCD-3G100 | 4.5±0.3 | 335±7 | 1.6±0.2 | 57±1 |

**Table S4** DMA data of PPCD/PO3G-PU elastomers.

| Name | $T_g$ (°C) | tan $\delta_{max}$ | tan $\delta_{0°C}$ | tan $\delta_{60°C}$ |
|---|---|---|---|---|
| PPCD-3G0 | 30.3±0.2 | 1.41±0.07 | 0.11±0.01 | 0.37±0.02 |
| PPCD-3G20 | 23.1±0.3 | 1.28±0.04 | 0.28±0.01 | 0.25±0.01 |
| PPCD-3G40 | 12.4±0.2 | 1.16±0.06 | 0.73±0.05 | 0.19±0.01 |
| PPCD-3G60 | 3.4±0.3 | 1.00±0.01 | 0.97±0.04 | 0.11±0.01 |
| PPCD-3G80 | -7.5±0.1 | 0.87±0.07 | 0.74±0.06 | 0.10±0.01 |
| PPCD-3G100 | -15.8±0.4 | 0.78±0.01 | 0.49±0.04 | 0.07±0.00 |