Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary data

Toughening of Amorphous Poly(propylene carbonate) by Rubbery CO_2-based Polyurethane: Transition from Brittle to Ductile

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Gernal information

FT-IR spectra of the samples were recorded on a Bruker TENSOR-27 spectrophotometer with spectral resolution of 2 cm^{-1}, where the sample solutions were casted onto a KBr disk and dried in vacuum at room temperature. NMR spectra were collected at ambient temperatures using a Bruker ARX-300 spectrometer at room temperature in deuterated chloroform ($CDCl_3$). Rheological measurements were performed at 140 ^oC using a AR 2000 (TA, USA) rheometer with a parallel plate geometry and 25 mm plate diameters. The dynamic frequency sweeps were performed from 0.01 to 100 rad/s at a small strain of 1% within the linear viscoelastic zone. The rubber particle size from the TEM was calculated using Nanomeasure software. The number and weight average rubber particle sizes were calculated using the following equations.

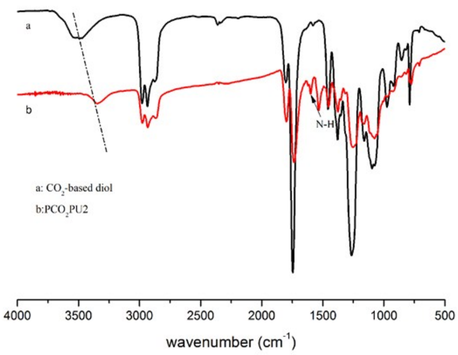


Fig. S1. FTIR of CO_2-based diol and PCO_2PU2

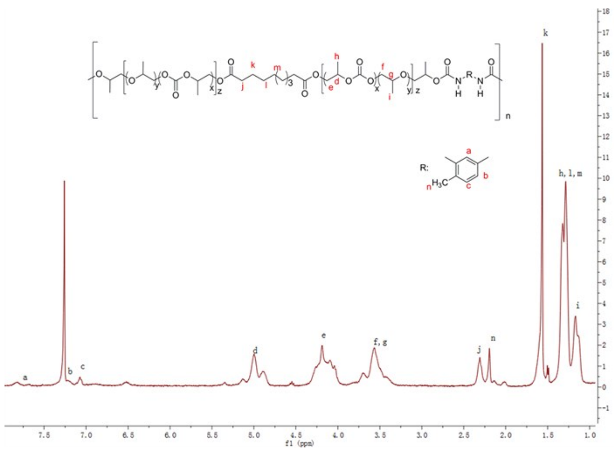


Fig. S2. ^1H NMR of PCO_2PU2

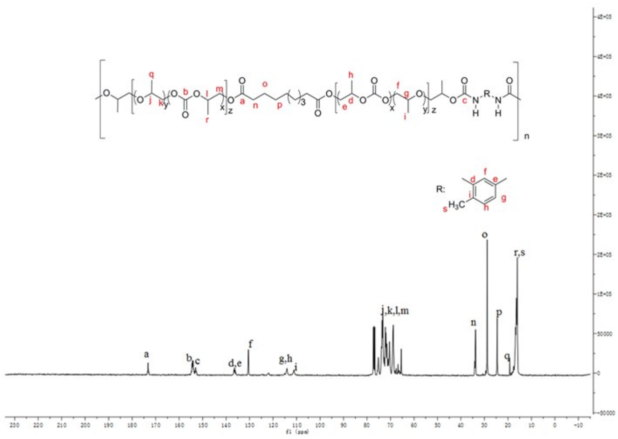
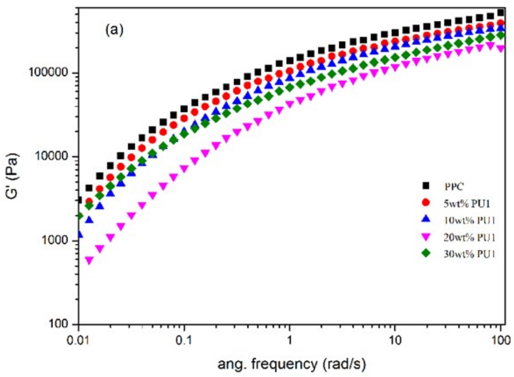
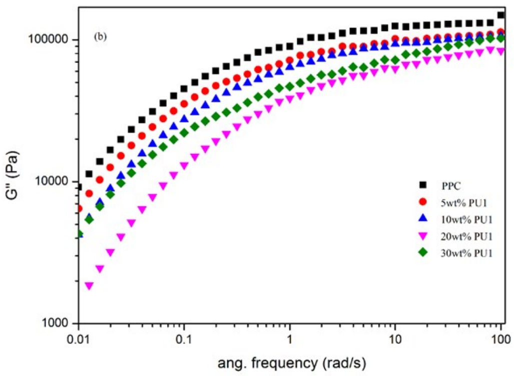


Fig. S3. ^{13}C NMR of PCO_2PU2





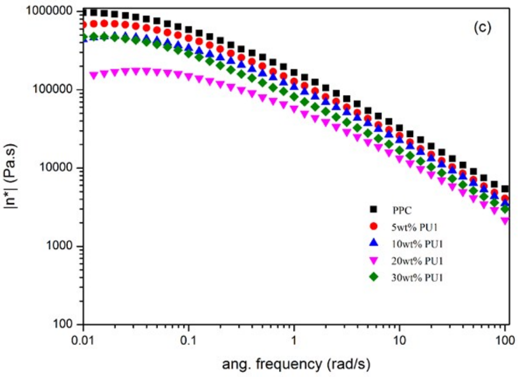
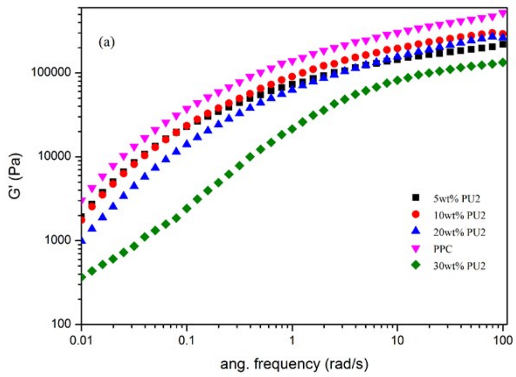
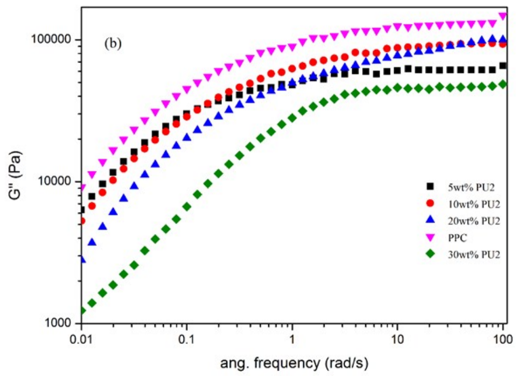


Fig. S4. Dynamic frequency sweeps of PPC and PPC/PCO$_2$PU1 with various compositions at 1% strains. (a) *G'*, (b) *G''*, (c) $|\eta^*|$





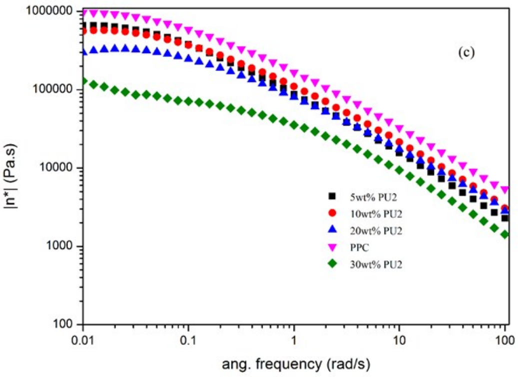


Fig. S5. Dynamic frequency sweeps of PPC and PPC/PCO_2PU2 with various compositions at 1% strains. (a) *G'*, (b) *G''*, (c) $|\eta*|$

Table S1. Diameters of PPC/PCO_2PU blends with various loadings

	Wr	D_n (μm)	D_w (μm)	D_w/D_n
PPC/PCO_2PU1	10%	0.058	0.066	1.13
PPC/PCO_2PU1	15%	0.088	0.091	1.03
PPC/PCO_2PU1	20%	0.163	0.202	1.23
PPC/PCO_2PU2	10%	0.049	0.052	1.06
PPC/PCO_2PU2	15%	0.051	0.056	1.09
PPC/PCO_2PU2	20%	0.100	0.111	1.11