

SUPPORTING INFORMATION

Synthesis of Self-Healing Waterborne Polyurethane Systems Chain Extended with Chitosan.

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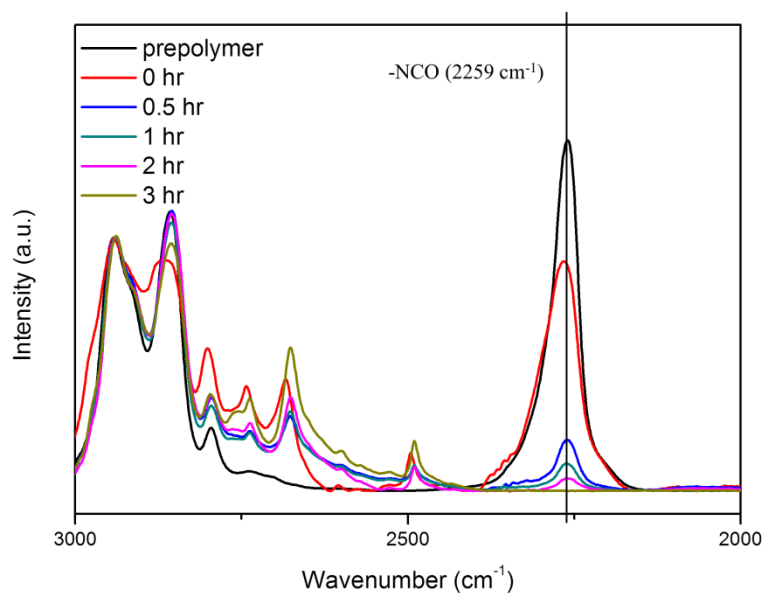


Figure 1. FT-IR spectra of waterborne polyurethanes (WPU) during the chain extension. Peaks due to isocyanate groups at 2259 cm⁻¹ disappeared after 3 h.

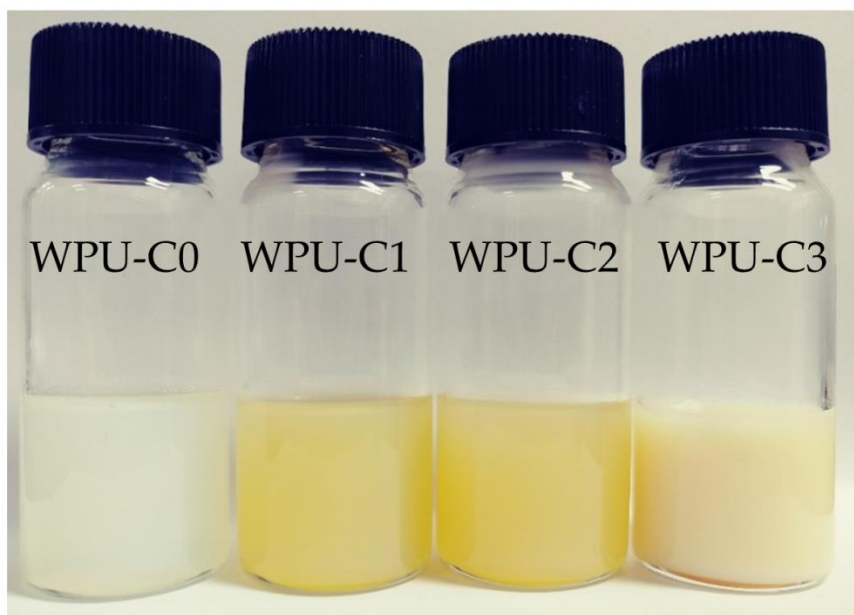


Figure S2. Images of WPU emulsions.

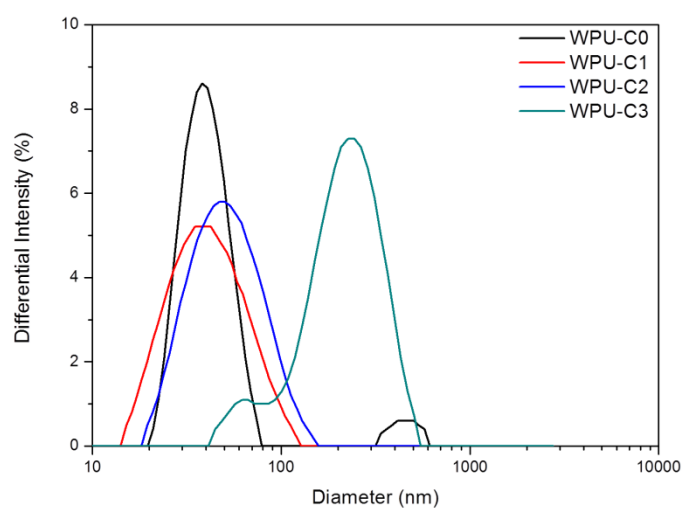


Figure S3. Particle size distribution of WPU emulsion.

Table S1. Number average particle size of WPU emulsions.

Sample code	Number average diameter (nm)
WPU-C0	40.8
WPU-C1	37.1
WPU-C2	48.3
WPU-C3	182.5

Table S2. Gel contents of WPU films.

Sample code	Gel content* (%)
WPU-C0	0.35 (± 0.03)
WPU-C1	48.85 (± 0.71)
WPU-C2	61.58 (± 0.24)
WPU-C3	66.53 (± 4.37)

* Determined from the ratio of sample weight after removal of soluble parts and the weight of pristine WPU film before the dissolution in THF/DMF mixture (50/50 by wt) at room temperature.

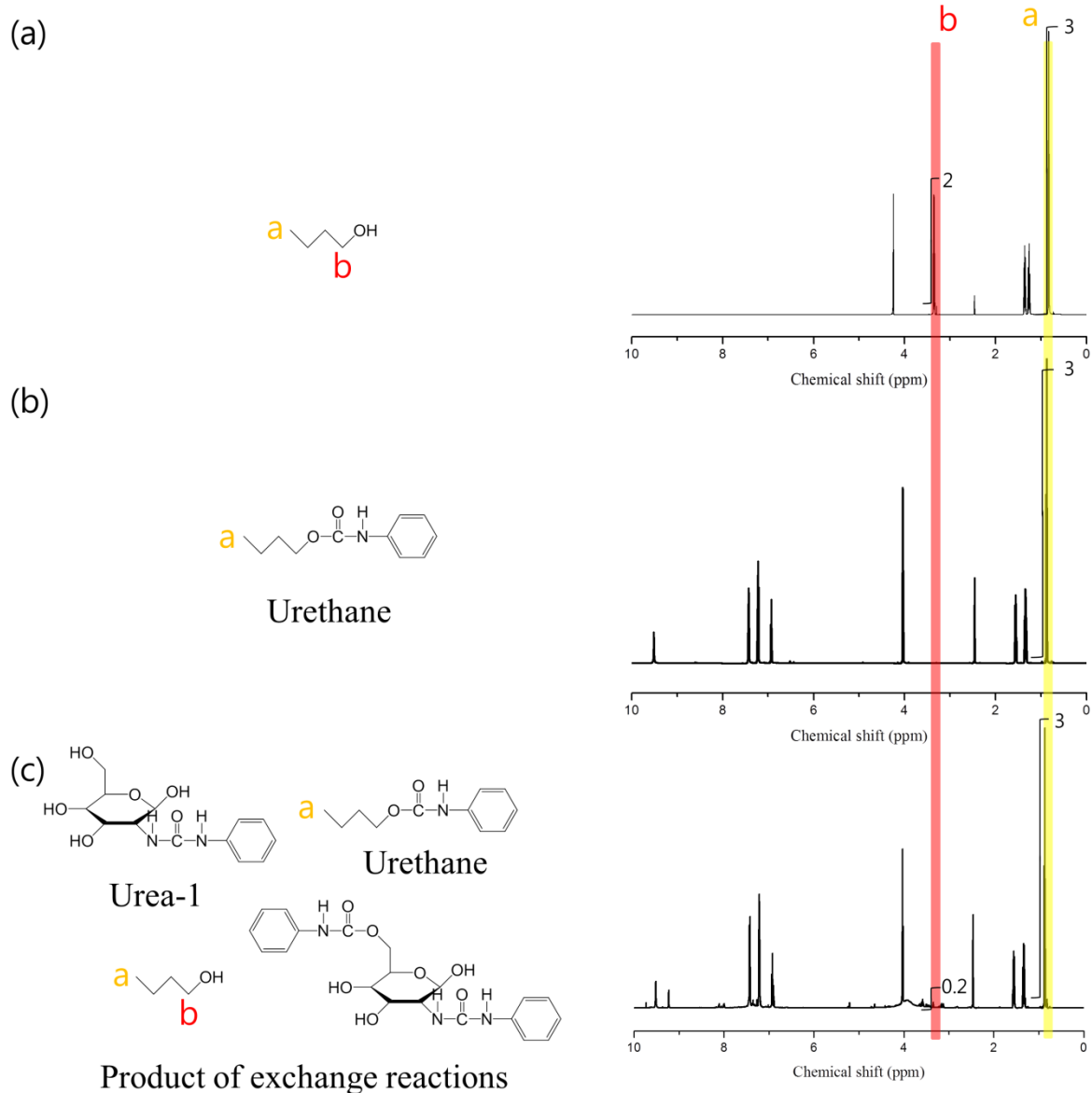


Figure S4. ^1H NMR spectra of the model compounds for the exchange reaction between Urea-1 and Urethane: (a) butanol; (b) Urethane; (c) products of the exchange reactions between Urea-1 and Urethane.

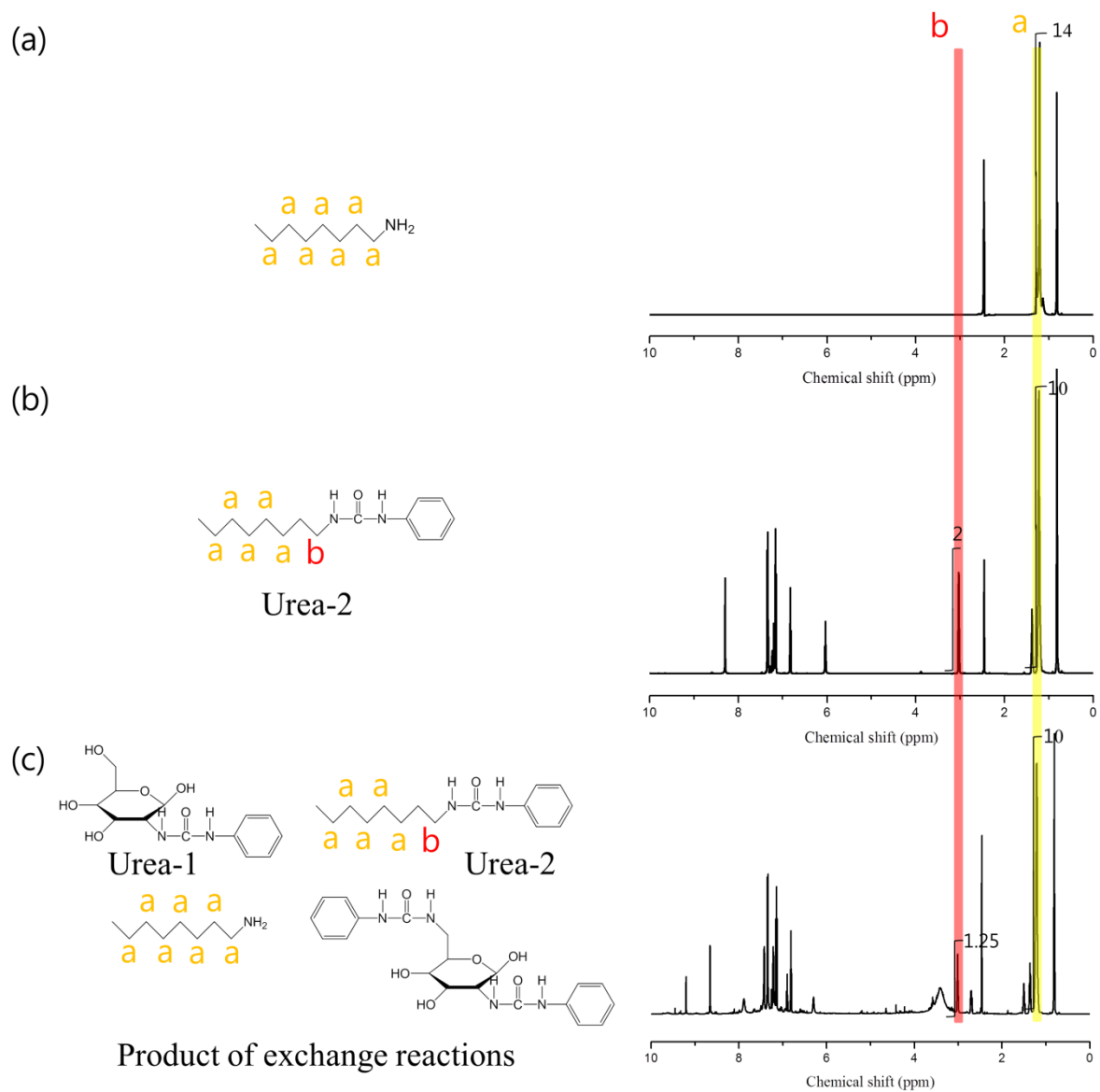


Figure S5. ^1H NMR spectra of the model compounds for the exchange reaction between Urea-1 and Urea-2: (a) octyl amine; (b) Urea-2; (c) products of the exchange reactions between Urea-1 and Urea-2.

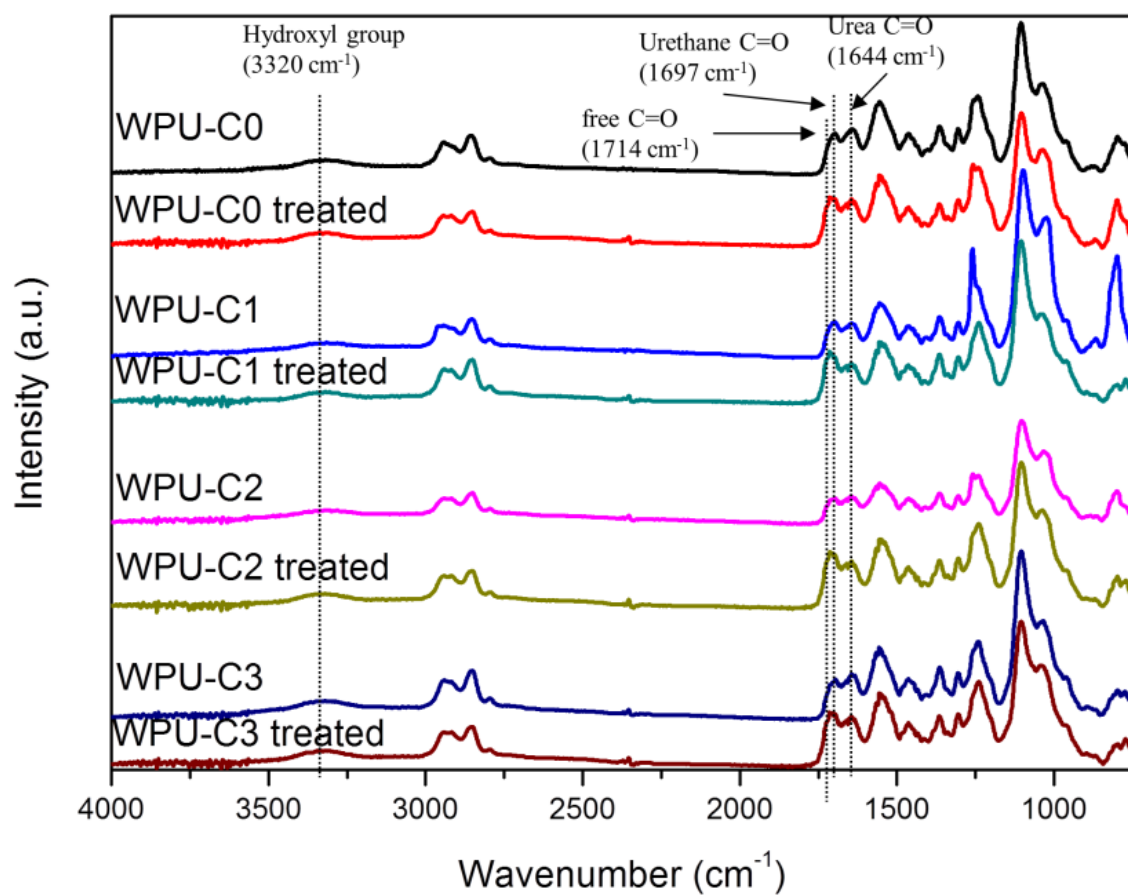


Figure S6. The FT-IR spectra of polyurethanes (PU) films before and after heat treatment for 24 h at $110 \text{ }^{\circ}\text{C}$.

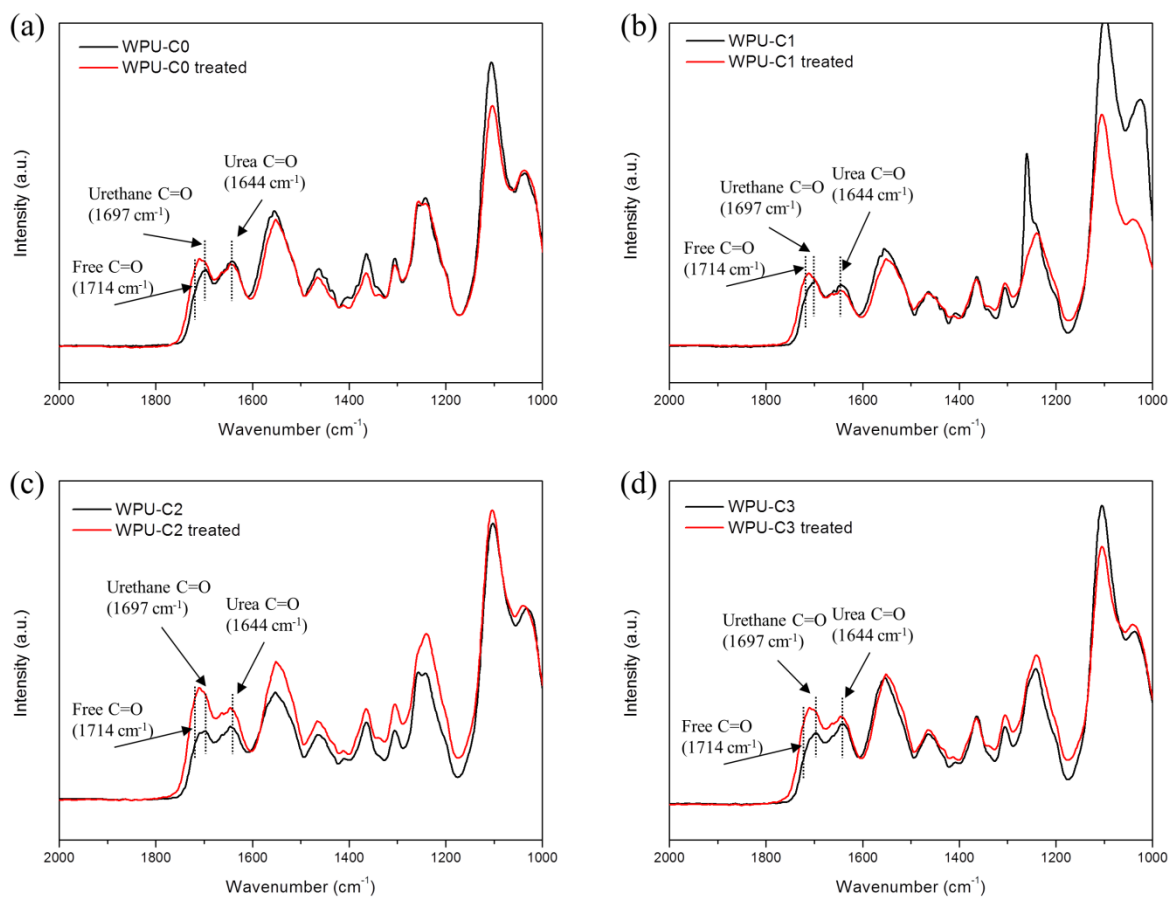


Figure S7. FT-IR spectra of WPU films before and after heat treatment for 24 h at 110 °C in the wavenumber of 2000~1000 cm^{-1} .

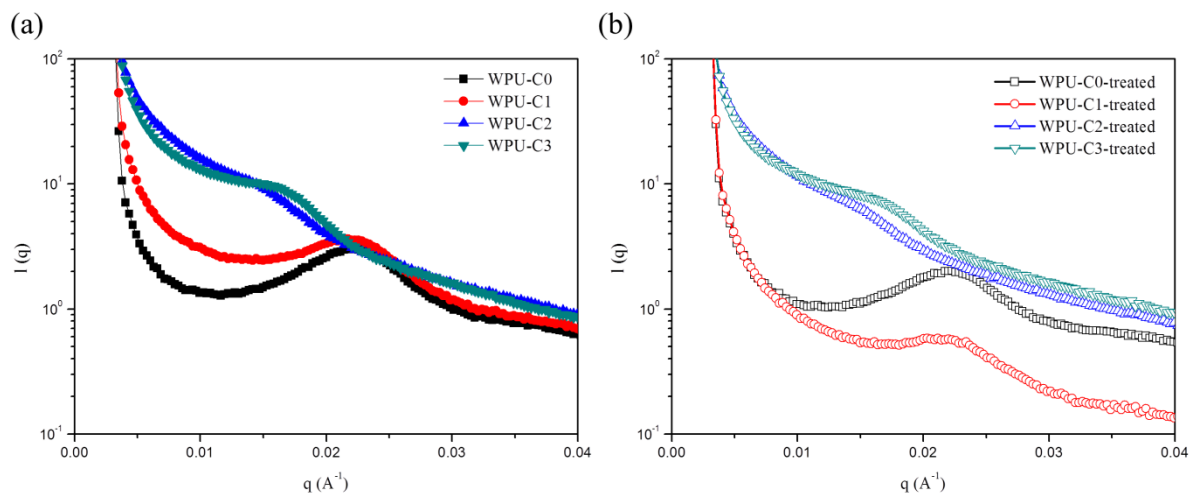


Figure S8. SAXS data of WPU films before and after heat treatment for 24 h at 110 °C.

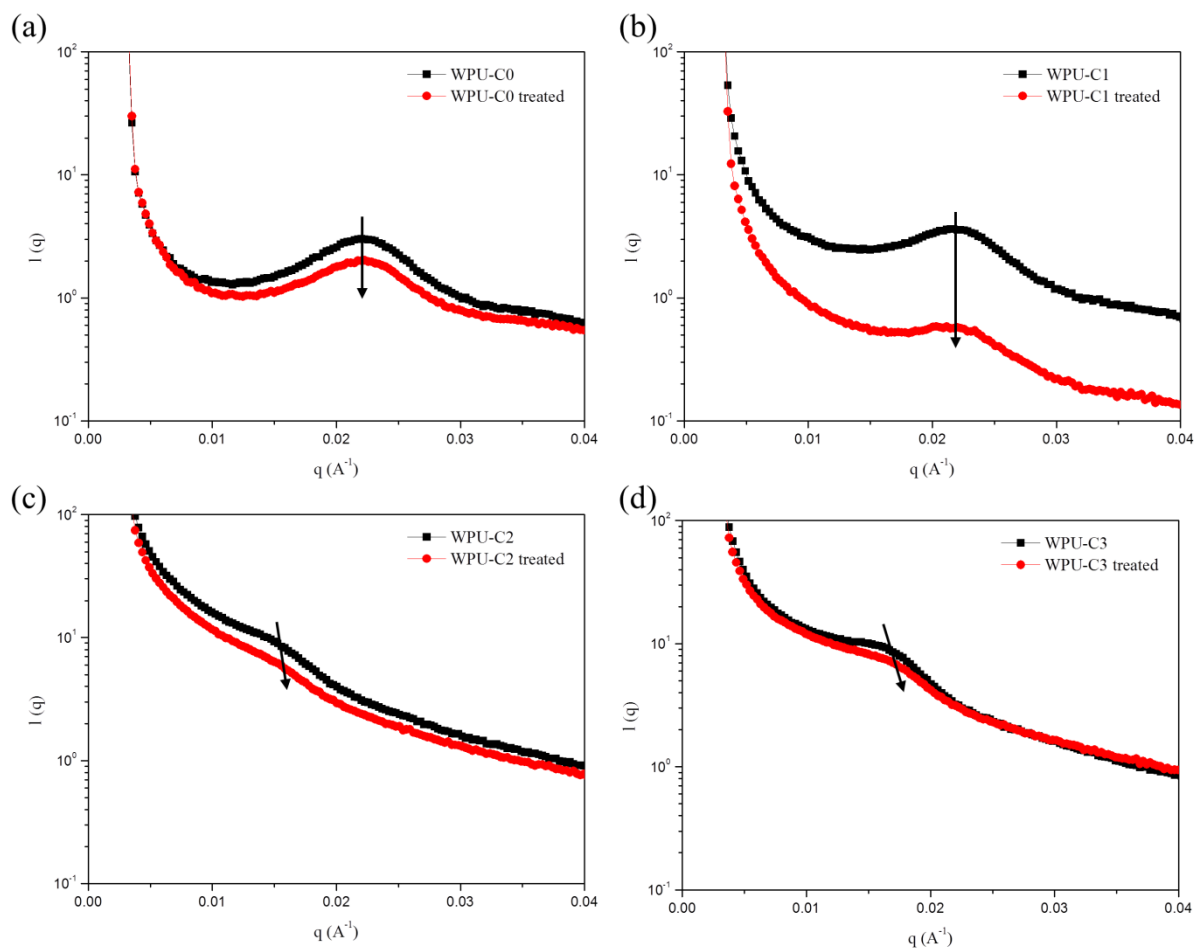


Figure S9. SAXS data of WPU films before and after heat treatment for 24 h at 110 °C.

Table S3. d-spacing of WPU films based on SAXS data before and after heat treatment for 24 h at 110 °C.

Sample code	d-spacing (nm)	
	Before heat treatment	After heat treatment
WPU-C0	28	28
WPU-C1	29	29
WPU-C2	35	33
WPU-C3	38	35

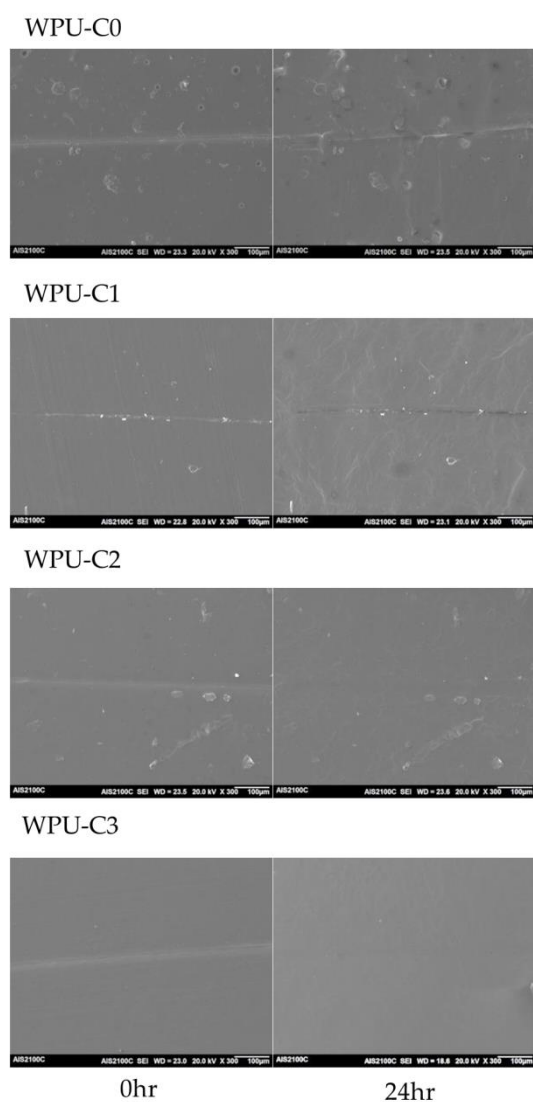


Figure S10. SEM images of the WPU films after the second self-healing test by the additional scratch and heat treatments at 110 °C for 24 h.