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Supporting Information

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Transparent and Self-Healing Elastomers for Reconfigurable 3D Materials

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Supporting Information

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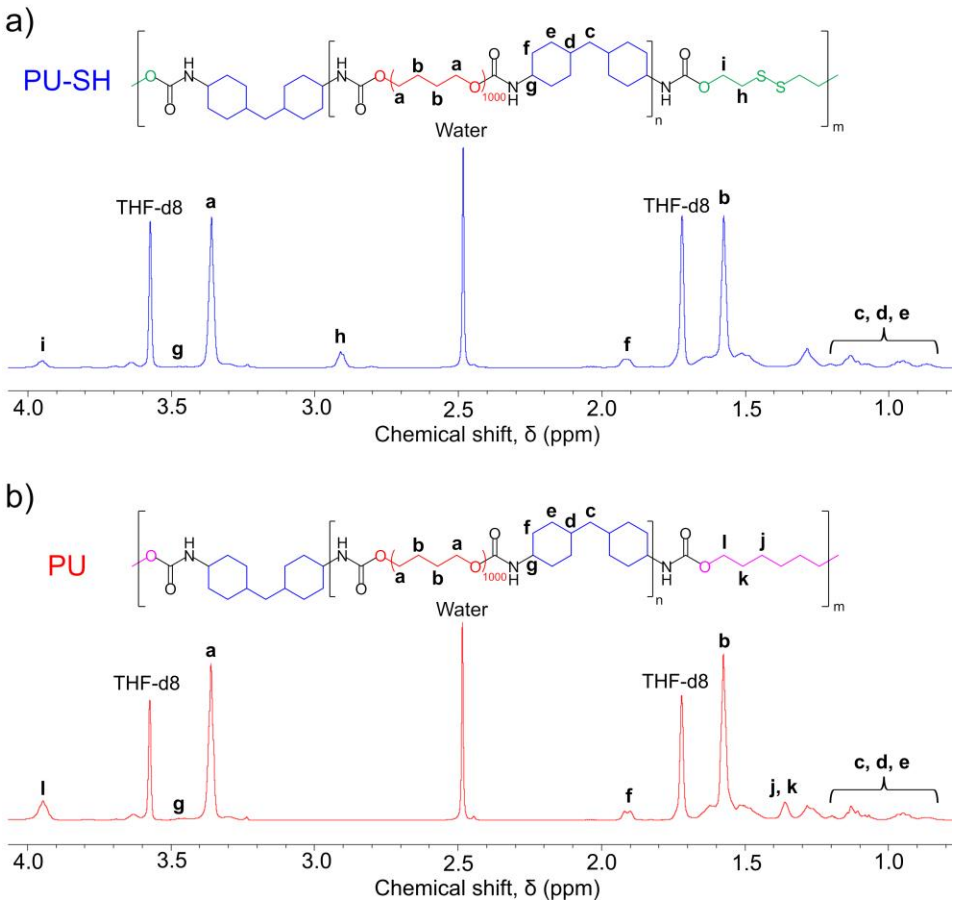

Figure S1. ^{1}H nuclear magnetic resonance (^{1}H-NMR) spectra of a) self-healing polymer (PU-SH) and b) non-self-healing polymer (PU) in THF-d8.

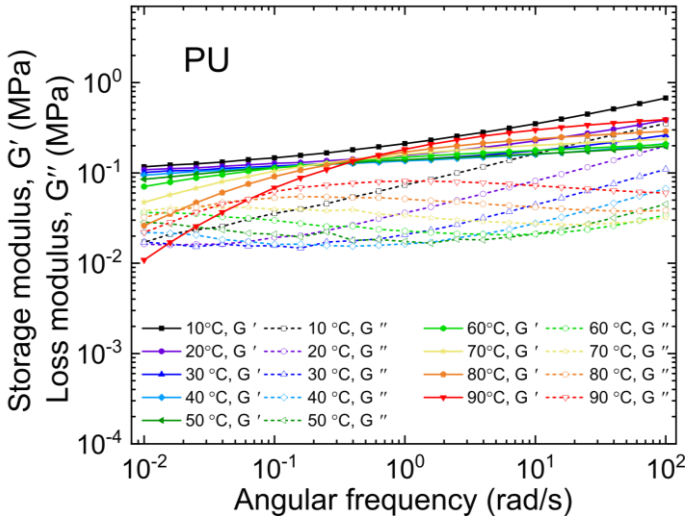

Figure S2. Storage modulus (G′) and loss modulus (G″) as a functions of frequency sweep at different sweeping temperature for non-self-healing polymer (PU).

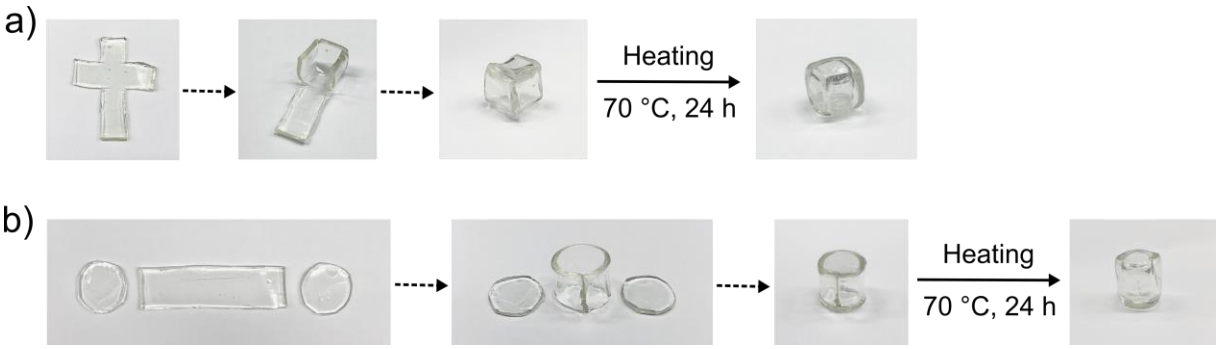

Figure S3. Photographs showing the formation of 3D objects by a) folding and b) assembling 2D polymer sheets to obtain a hollow cube and a hollow cylinder, respectively.

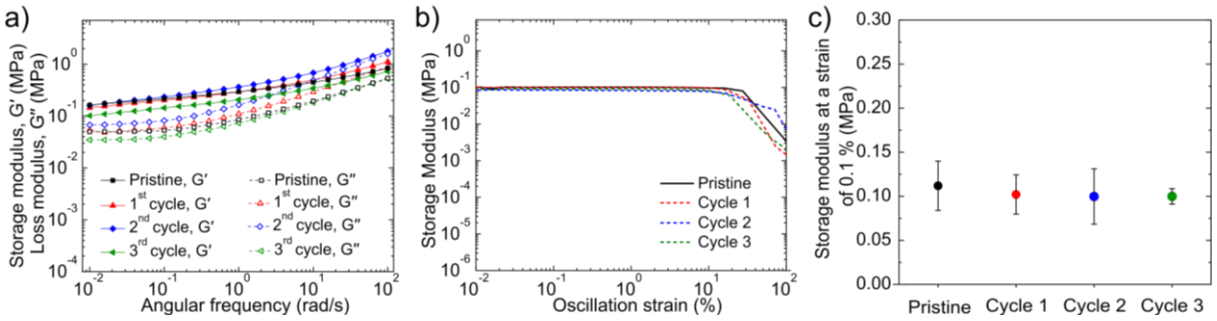

Figure S4. a) Storage modulus (G′) and loss modulus (G′′) as a functions of frequency sweep at 25 °C for PU-SH before and after being subjected to a cycle of shape programming (heating at 70 °C for 24 h, and then cooling down to 25 °C). b) Representative curves of storage modulus as a function of oscillation strain (%) under a frequency of 0.1 Hz for circular polymer sheets before and after three cycles of deformation-recovery by heating. c) Storage moduli (G′) at a strain of 0.1% of self-healing polymer sheets before after several cycles of deformation-recovery by heating. The moduli were extracted from linear viscoelastic region of dynamic mechanical analysis in shear mode under a frequency of 0.1 Hz and a dynamic strain sweep of 0.01 to 100% at 25 °C.

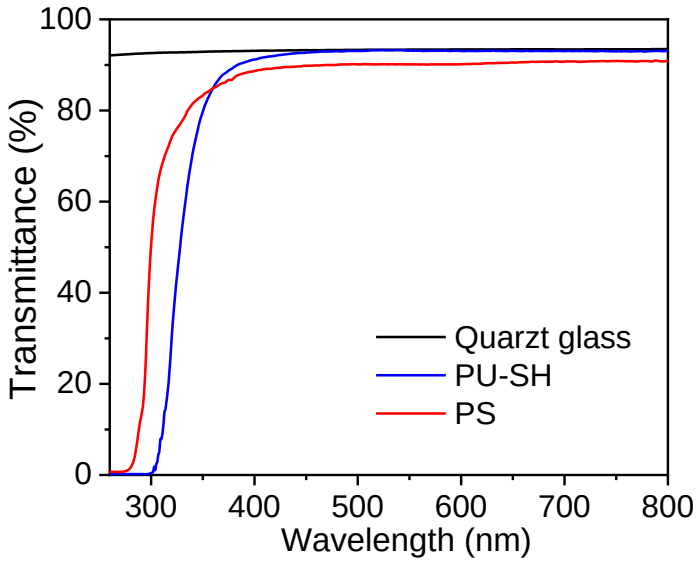

Figure S5. Ultraviolet-visible (UV-vis) transmittance spectra of a quartz glass substrate (thickness = 1.0 mm), a self-healing polymer sheet (thickness = 0.78 ± 0.02 mm), and a polystyrene substrate (thickness = 1.0 mm).

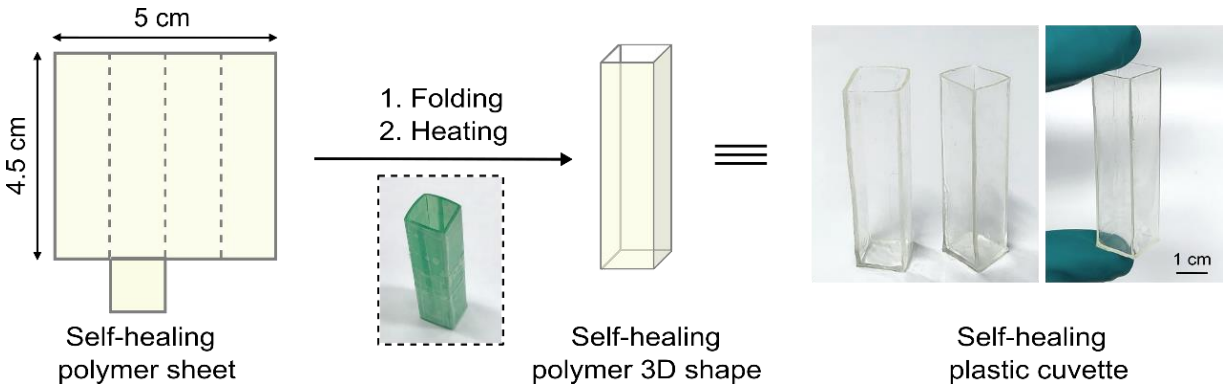

Figure S6. Fabrication of a self-healing plastic cuvette by folding a planar polymer sheet into a hollow rectangular prim.

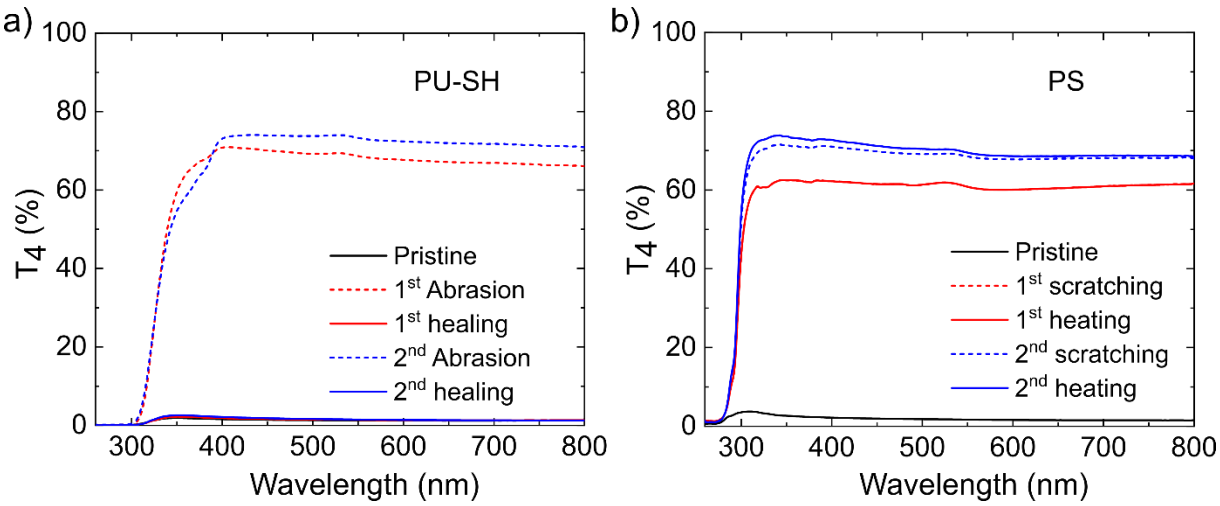

Figure S7. Ultraviolet–visible (UV-vis) spectra for light scattering of instrument and samples (T_4) of a) a self-healing polymer (PU-SH) substrate (thickness = 0.78 ± 0.02 mm) and b) a polystyrene (PS) substrate (thickness = 1.0 mm).

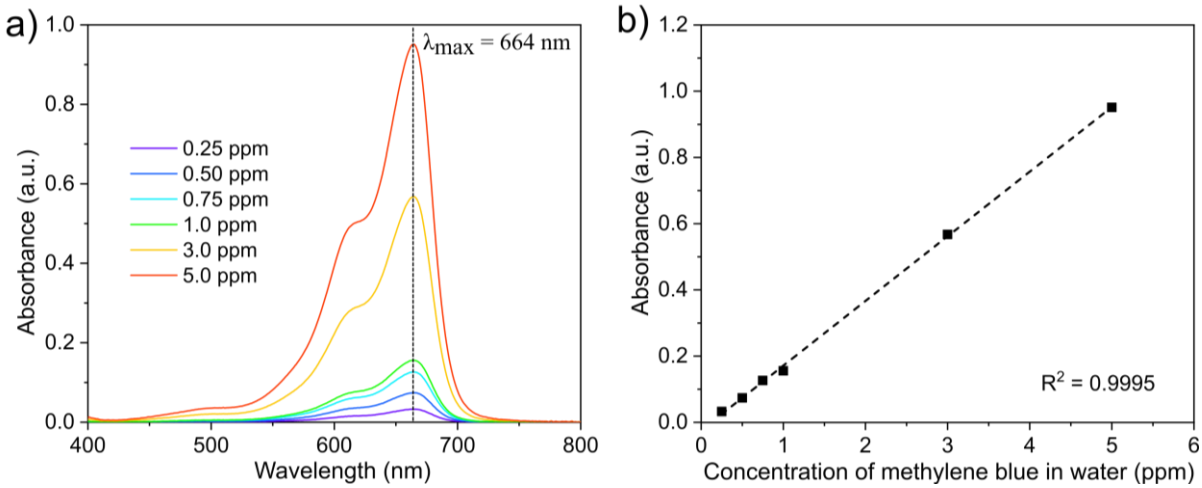

Figure S8. a) Ultraviolet–visible (UV-vis) absorption spectra of methylene blue aqueous solution with various concentrations, which were measured in a quartz cuvette. b) Relationships between UV-vis absorbance at λ_{max} = 664 nm and concentrations of methylene blue aqueous solutions.

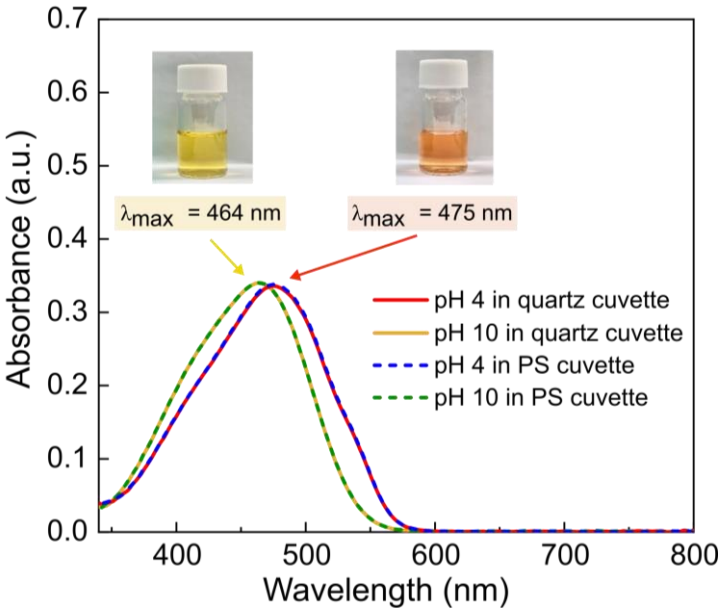

Figure S9. UV-vis absorption spectra of methyl orange aqueous solutions at pH 4 and 10, which were measured using quartz and polystyrene (PS) cuvettes.

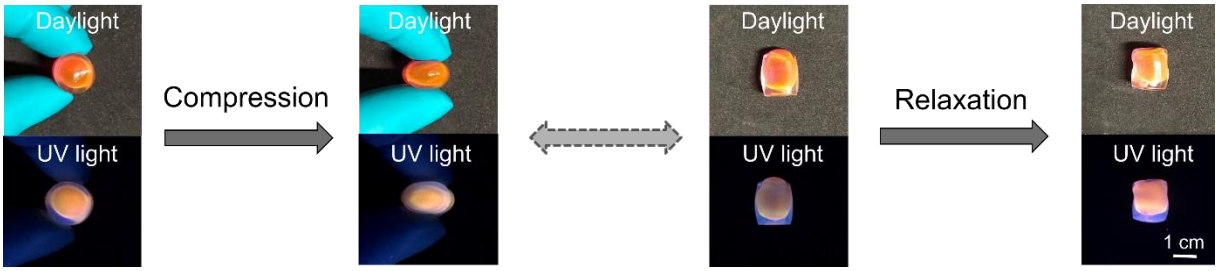

Figure S10. 3D shape changes of a self-healing polymer cylinder containing an aqueous solution of Rhodamine B by mechanical compression and relaxation at 25 °C.