Supplementary information

Insights into the Mechanical Response of Spiropyran Elastomers

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Figure S1. $^1$H NMR spectrum of SP1 (400 MHz, CDCl$_3$).

Figure S2. Mass spectrum of SP1.
Figure S3. $^1$H NMR spectrum of SP2 (400 MHz, CDCl$_3$).

Figure S4. Mass spectrum of SP2.
Figure S5. $^1$H NMR spectrum of SP3 (400 MHz, CDCl$_3$).

Figure S6. Mass spectrum of SP3.
Figure S7. Compressive stress-strain curves of (a) PDMS and SP-c1, (b) SP1-c(1-3), (c) SP2-c(1-3), (d) SP3-c(1-3) at concentration of 5.0, 9.4 and 14.1 μmol/g.

Figure S8. Ratio of RGB colour channel intensities as a function of compressive strain, (a) SP1, (b) SP2, and (c) SP3, at the concentration of c1.
Figure S9. Optical images of SP-PDMS with different SP concentration before and after compression at a strain of 70%.

Figure S10. Absorption spectra of SP2-c1 under 56% compressive strain at different time.

Figure S11. Plot of absorption intensity vs relaxation time for (a) SP1-c1, (b) SP2-c1, (c) SP3-c1, and their linear fitting curves.
**Figure S12.** Plot of absorption intensity/maximum absorption intensity vs compression time at a strain of 62% in darkness for SP-c1.

**Figure S13.** Calculated energies for merocyanine (MC) isomers of SP1 (blue) and SP2 (red) model compounds, with connecting transition state energies. Energies are 0 K enthalpies at the M06-2X/6-31G(d) level of theory.