Electronic Supplementary Information

Fast and Controlled Thermoresponse in Photoluminescence of Well-Designed Hydrogels of Two Separate Nanodomains with Solvatochromic Dyes

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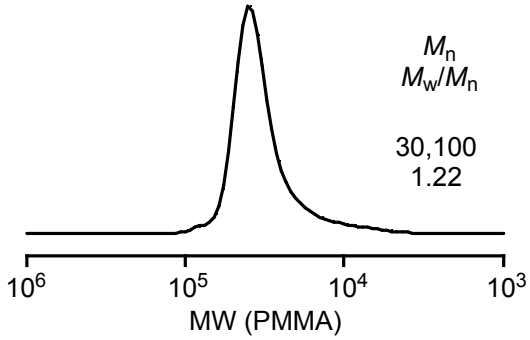

Fig. S1 SEC curve of PDMAAm macro-CTA. Reaction conditions: [DMAAm] = 3000 mM, [CTA] = 10 mM, [AIBN] = 1.0 mM in 1,4-dioxane at 60 ºC for 24 h (monomer conversion: 81 %).

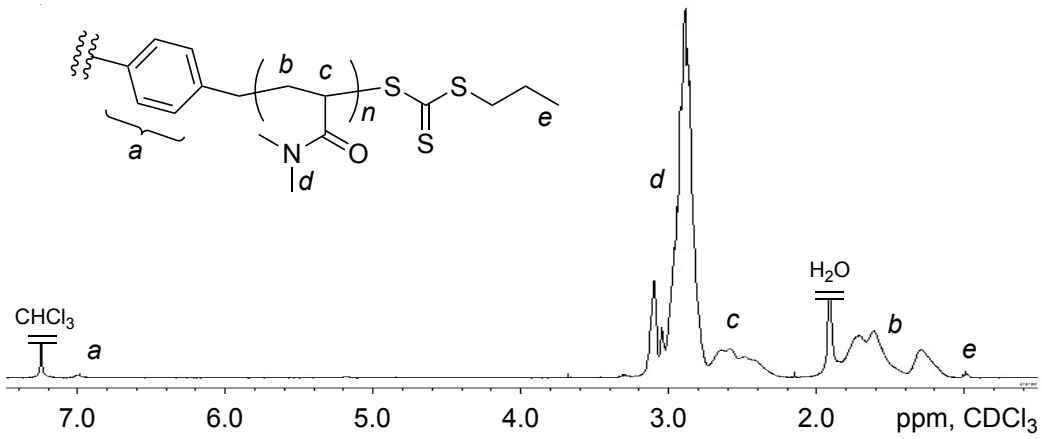

Fig. S2 ^{1}H NMR spectrum of PDMAAm macro-CTA. The DP_n and $M_{n,\,NMR}$ were calculated from the ratio of integral values between the signals *a* and *d*. Reaction conditions: see the caption of Fig. S1.

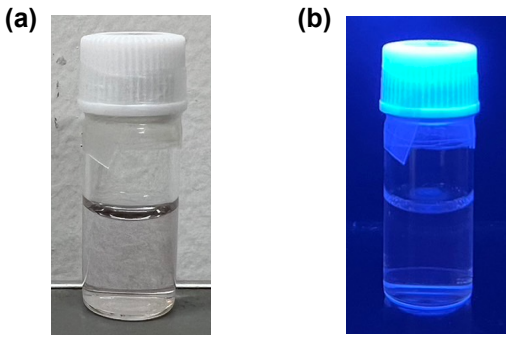

Fig. S3 Appearances of an aqueous dispersion of Nile Red (30 μg/mL) under (a) visible light and (b) irradiation of UV light (wavelength: 365 nm).

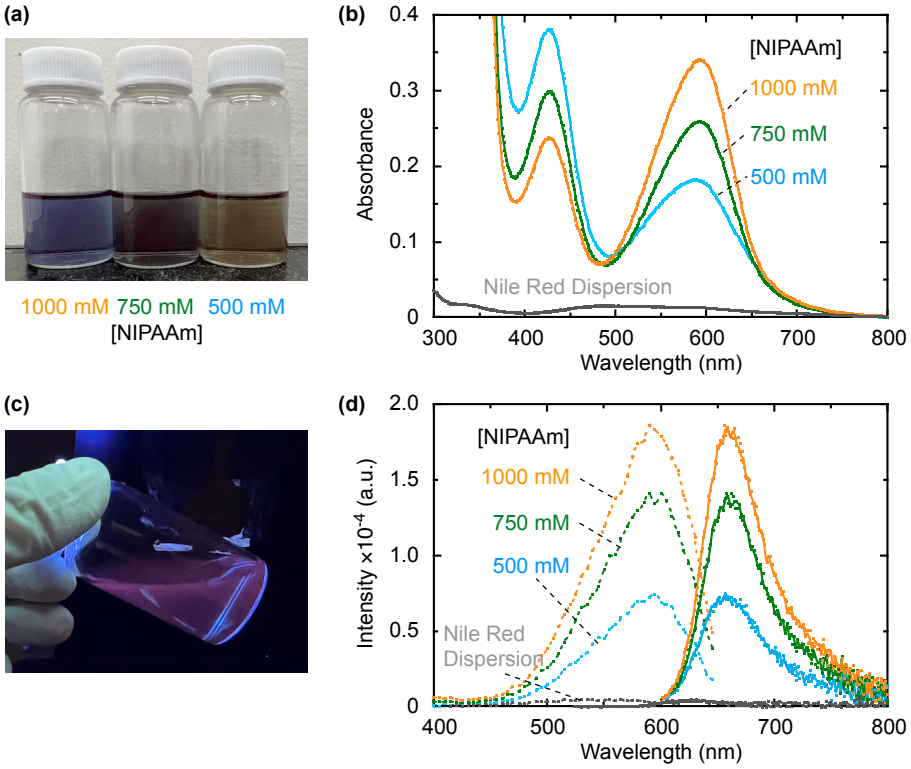

Fig. S4 Appearances under (a) visible light and (c) irradiation of UV light (wavelength: 365 nm), (b) UV-vis spectra and (d) photoluminescent spectra (dashed line: excitation, solid line: emission) of the reaction solutions for hydrogels with thermoresponsive CDs containing Nile Red under various concentration ratios ([NIPAAm] = 500, 750 and 1000 mM, [NIPAAm] + [DMAAm unit] = 2000 mM, [BIS] = 20 mM, Nile Red: 30 μg/mL in water). In the panel (c), the reaction solution under [NIPAAm] = [DMAAm] = 1000 mM is shown as the representative. The spectra of Nile Red dispersion are included in (b) and (d).

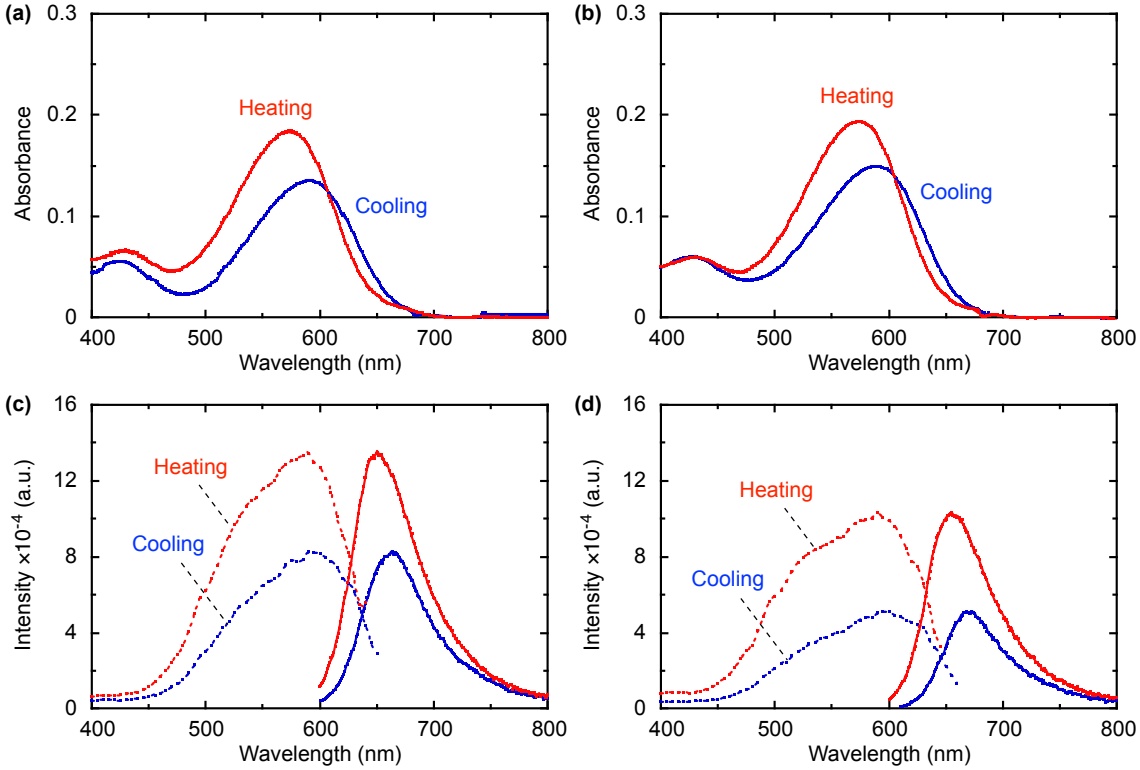

Figure S5. Effect of the composition of CD gels containing Nile Red on the absorption and photoluminescent properties in response to temperature change. UV-vis spectra of (a) **NG$_{500}$** and (b) **NG$_{750}$**, and photoluminescent spectra (dashed lines: excitation, solid lines: emission) of (c) **NG$_{500}$** and (d) **NG$_{750}$** at room temperature (blue lines) and after heating at 40 ºC for 20 minutes (red lines).

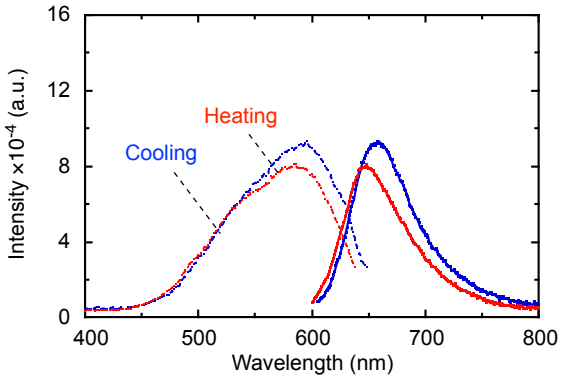

Figure S6. Photoluminescent spectra (dashed lines: excitation, solid lines: emission) of **NG$_{1000BIS80}$** at room temperature (blue lines) and after heating at 40 ºC for 20 minutes (red lines).

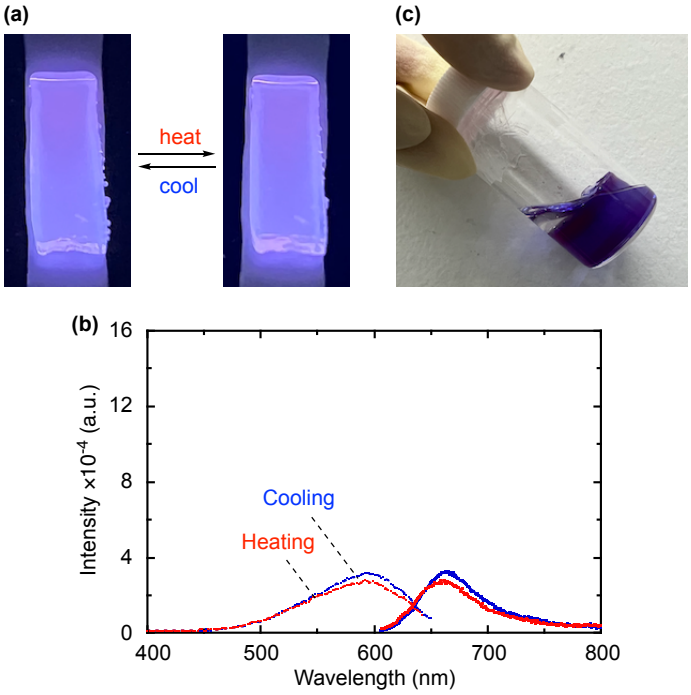

Figure S7. (a) Appearances of $\mathbf{FG_{1000}}$ under irradiation of UV light (wavelength: 365 nm) at room temperature and upon heating at 40 ºC for 20 minutes. (b) Photoluminescent spectra (dashed lines: excitation, solid lines: emission) of $\mathbf{FG_{1000}}$ at room temperature (blue lines) and after heating at 40 ºC for 20 minutes (red lines). (c) Appearance of $\mathbf{FG_{1000}}$ after heating at 40 °C for 16 h. Noticeable syneresis was observed and the weight loss was ca. 50%.

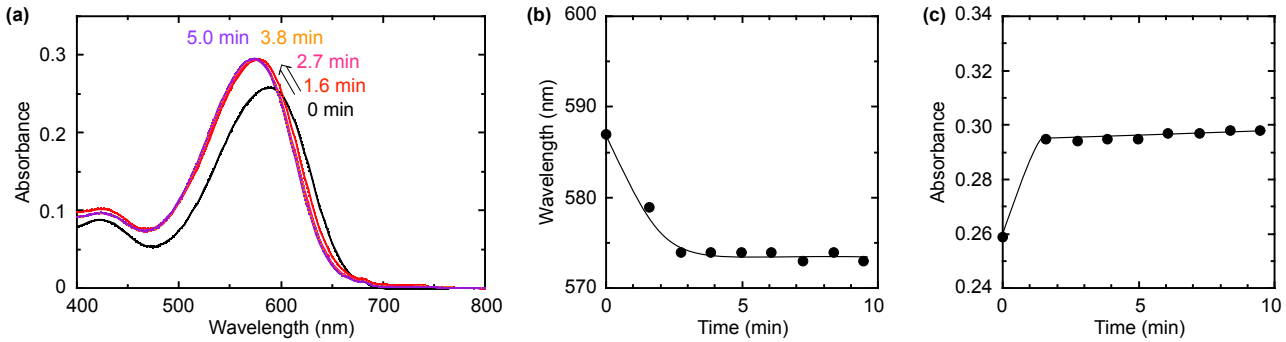

Fig. S8 Time dependence of (a) UV-vis spectra, (b) the maximum absorption wavelength, and (c) the maximum absorbance of $\mathbf{NG_{1000}}$ during heating from 20 ºC to 40 ºC.

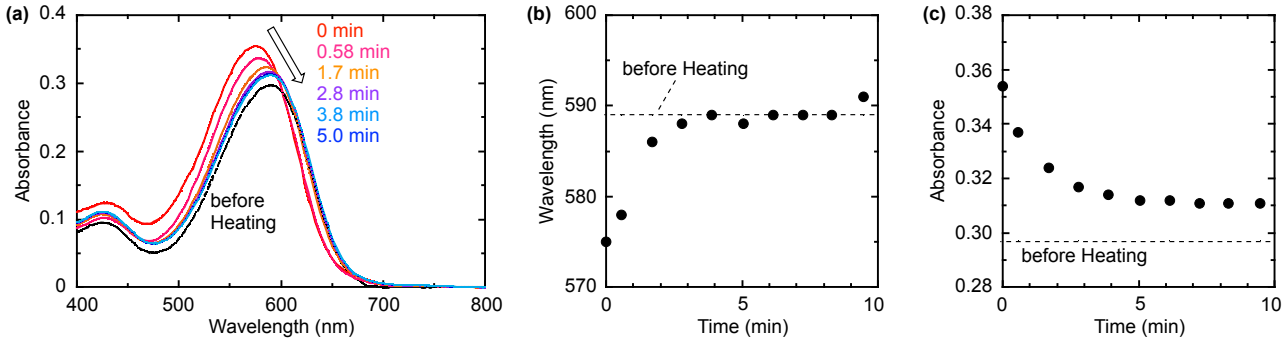

Fig. S9 Time dependence of (a) UV-vis spectra, (b) the maximum absorption wavelength, and (c) the maximum absorbance of **NG$_{500}$** during cooling from 40 ºC to 20 ºC. The sample was heated at 40 ºC for 60 minutes before the measurement. The spectrum before heating is also shown in the panel (a).