Supplementary Information

Abnormal Fast Dehydration and Rehydration of Light- and Thermo- Dual-Responsive Copolymer Films Triggered by UV Radiation

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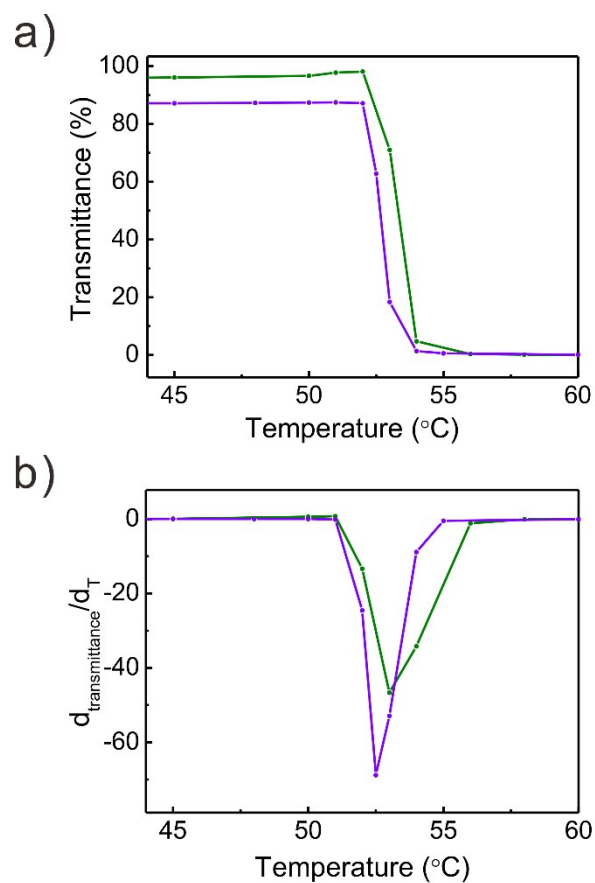muellerb@ph.tum.de, Phone +49 89 289 12451, fax +49 89 289 12473

qi.zhong@zstu.edu.cn, Phone +86 571 86843436, fax +86 571 86843436
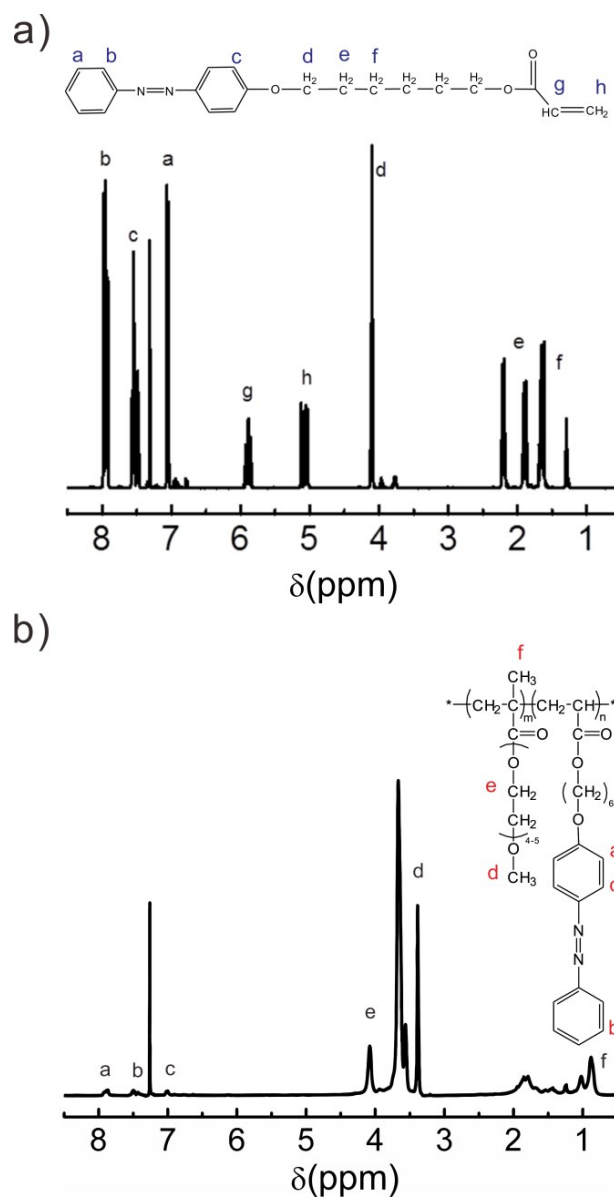
Figure S1. ^{1}H NMR spectra of (a) PAHA and (b) P(OEGMA$_{300}$-*co*-PAHA) in CDCl$_3$.

Table S1. GPC data for P(OEGMA$_{300}$-*co*-PAHA) with the extracted molecular weights and polydispersity index (PDI).

| Sample	Mn	Mw	PDI	Conversion(%)
P(OEGMA$_{300}$-*co*-PAHA)	33811	47902	1.42	63%

Figure S2. (a) Transmittance of P(OEGMA$_{300}$-*co*-PAHA) in aqueous solution (5 mg mL^{-1}) with (purple curve) and without (green curve) UV radiation as a function of temperature probed by UV-Vis spectroscopy. (b) First derivative of transmittance with respect to temperature as a function of the temperature.
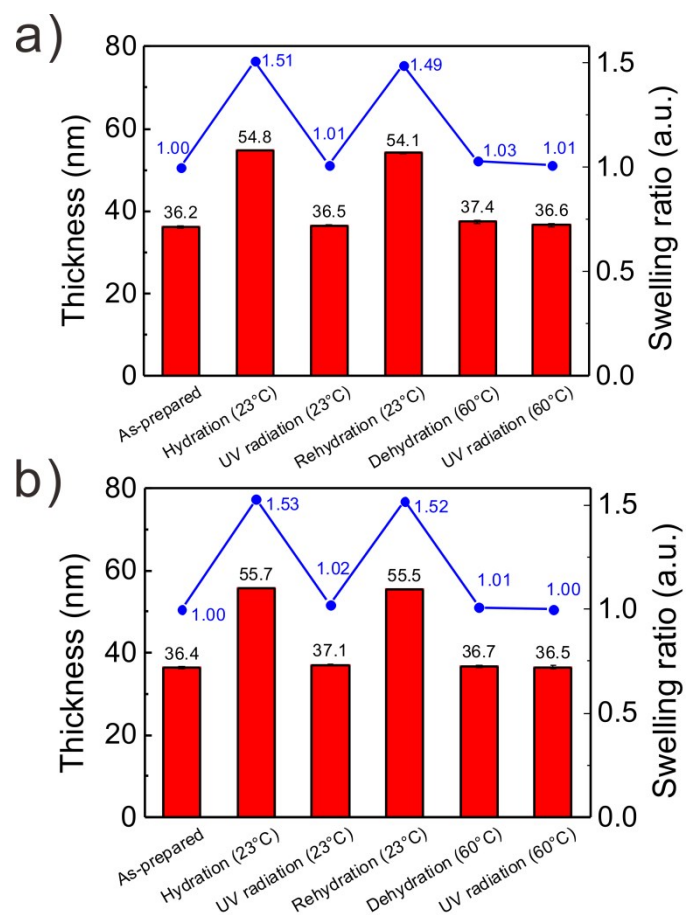
Figure S3. Thickness (red column) and swelling ratio (blue line) of P(OEGMA$_{300}$-*co*-PAHA) film measured by white light interferometry under the change of temperature and light condition dissolved in (a) 1, 4-dioxane and (b) methylbenzene.
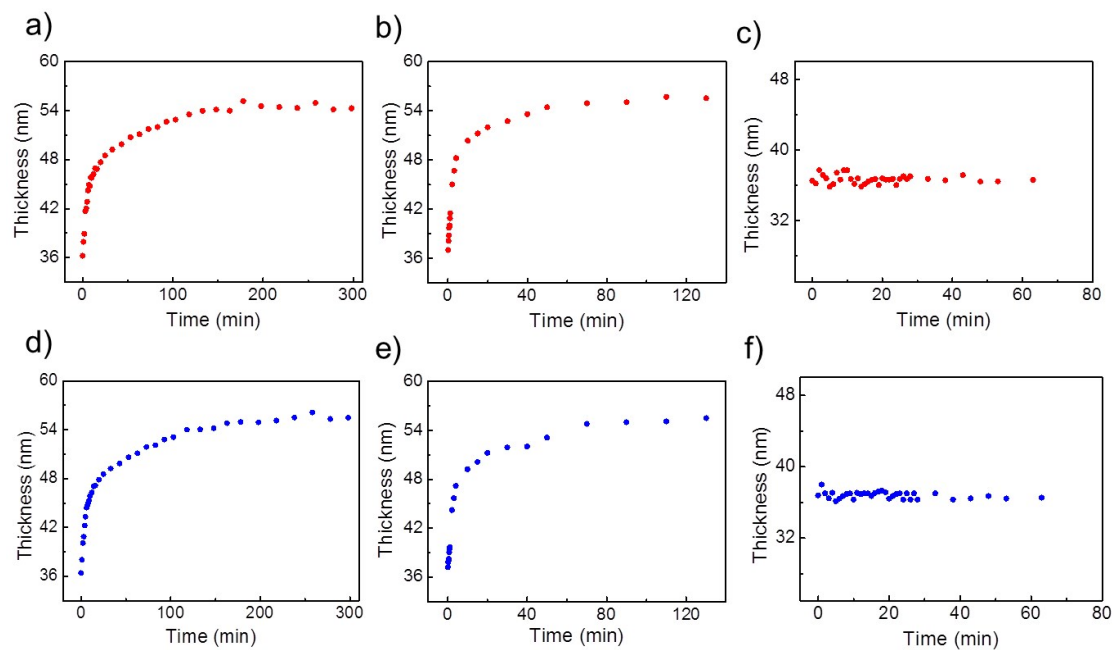
Figure S4. Dynamics of P(OEGMA$_{300}$-*co*-PAHA) films prepared from methylbenzene (top) and 1,4-dioxane (bottom) measured by white light interferometry in different scenarios: (a and d) hydration at 23 °C, (b and e) after removal of UV radiation at 23 °C and (c and f) after removal of UV radiation at 60 °C.
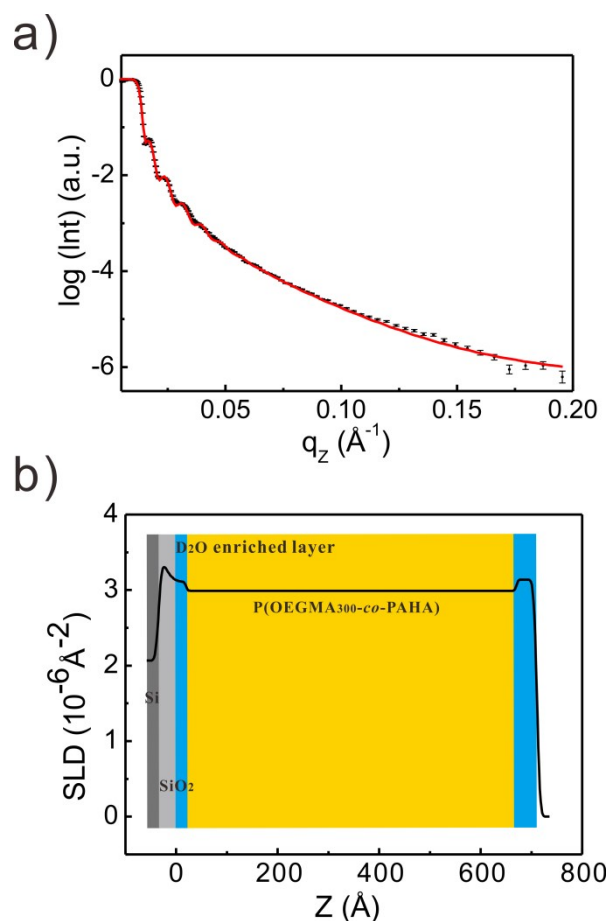
Figure S5. (a) NR curve of the swollen P(OEGMA$_{300}$-*co*-PAHA) film (black dots) shown together with the model fit (red line) in D$_2$O vapor atmosphere at 23 °C (below TT). (b) Corresponding SLD profile along the surface normal (Z-axis) of the P(OEGMA$_{300}$-*co*-PAHA) film. The position Z = 0 Å indicates the top surface of silicon oxide (SiO$_2$) layer. The Si (grey), SiO$_2$ (light grey), D$_2$O enrichment (blue) and main polymer (yellow) layers are highlighted.
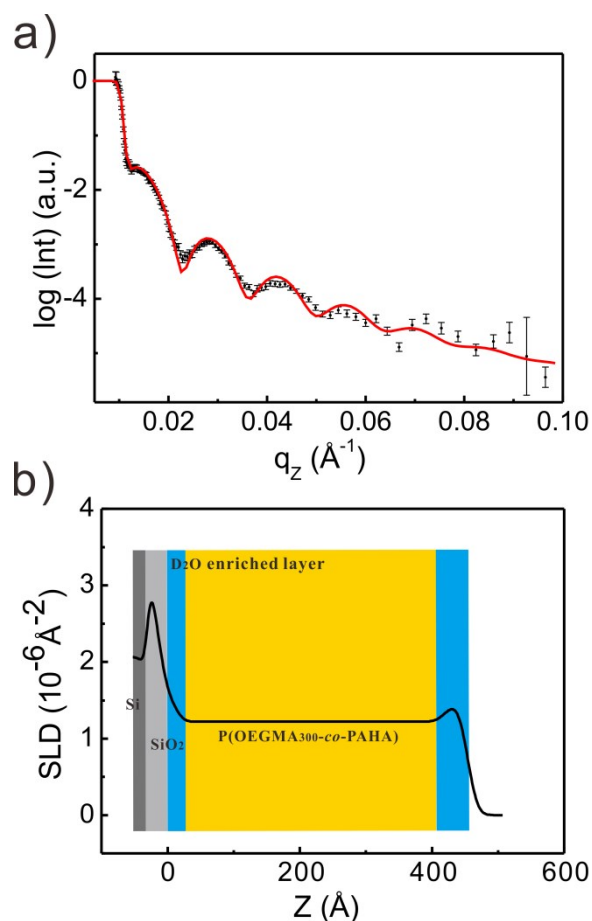
Figure S6. (a) NR curve of the collapsed P(OEGMA$_{300}$-*co*-PAHA) film (black dots) shown together with the model fit (red line) in D$_2$O vapor atmosphere at 60 °C (above TT). (b) Corresponding SLD profile along the surface normal (Z-axis) of the P(OEGMA$_{300}$-*co*-PAHA) film. The position Z = 0 Å indicates the top surface of silicon oxide (SiO$_2$) layer. The Si (grey), SiO$_2$ (light grey), D$_2$O enrichment (blue) and main polymer (yellow) layers are highlighted.