**Supplementary Figures**

**Fig. S1** Photographs of a 15/15-hydrogel specimen after preparation (left) and after equilibrium swelling in distilled water (right).

**Fig. S2.** pH dependence of the equilibrium swelling ratio $q_w$ of 15/15-hydrogels formed at various C18 contents.
**Fig. S3.** Stress-strain curves from loading/unloading cyclic tensile tests. (a, b): Three successive tensile cycles with increasing $\varepsilon_{\text{max}}$ from 100 to 300% elongation conducted on 15/15- (a) and 20/20-hydrogel samples (b). The loading curves are indicated by up arrows. (c, d): Hysteresis energy $U_{\text{hys}}$ of the hydrogels during successive tensile cycles shown as a function of the number of cycles up $\varepsilon_{\text{max}} = 200\%$ (c), and the maximum strain $\varepsilon_{\text{max}}$ (d).