Electronic Supporting Information

Hydroxypropyl Cellulose as a Green Polymer for Thermo-Responsive Aqueous Foams

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Turbidity measurements

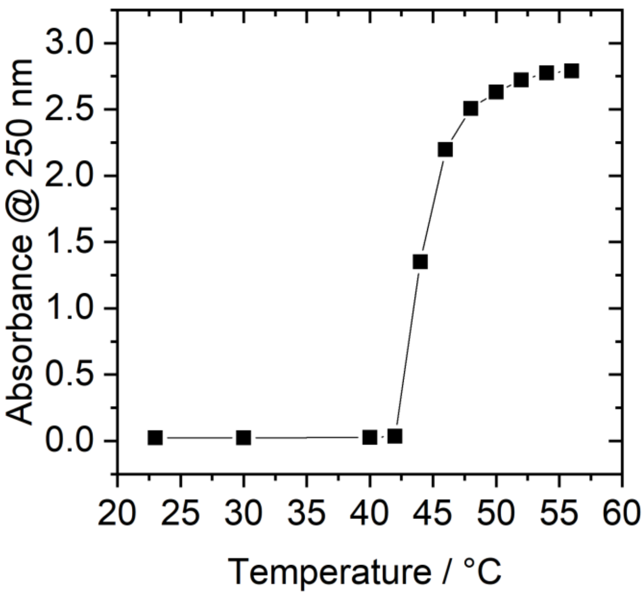

Figure S1: *Turbidity at a wavelength of 250 nm from aqueous solutions of 0.5 g/l HPC with a molecular weight of 1 MDa as a function of temperature.*

Ultraviolet/visible (UV/Vis) absorption spectra were recorded for wavelengths between 200 and 800 nm using a Carry 100 Scan (Agilent, USA). In order to control the sample temperature, the photometer was connected with a thermostat. In the current work, turbidity is defined as absorption at 250 nm. Figure S1 shows turbidity measurements of HPC at 250 nm. Below the LCST, absorbance is zero. A cloud point can be found around 43±1 °C, which is in good agreement with the LCST of HPC reported in previous literature.[1–3]

Drainage curves

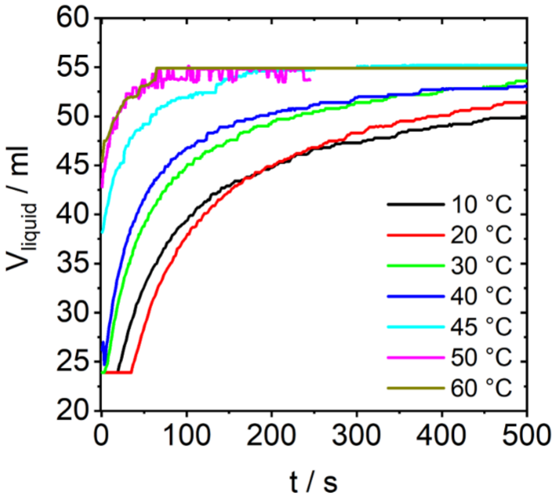

Figure S2: *Drained liquid volume of 0.5 g/l HPC foams over time and as a function of temperature.*

Foamability

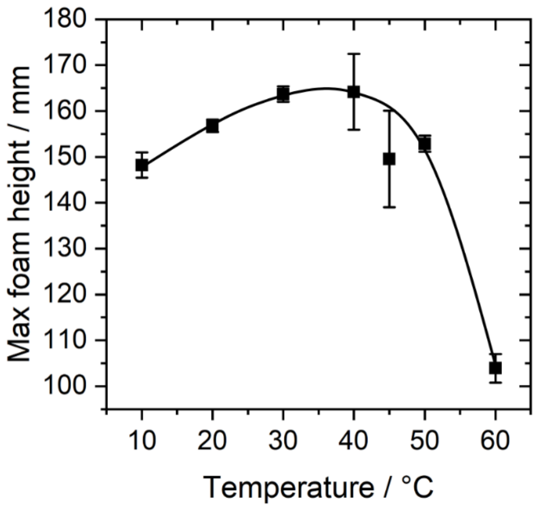

Figure S3: *Foam height of 0.5 g/l HPC directly after foaming process as a function temperature. Gas flow and foaming duration was set constant to 0.3 l/min and 30 s, respectively.*

Particle size distributions from DLS

Figure S4 shows the distributions of the hydrodynamic radius at different temperatures, which were determined by DLS experiments. For temperatures below 43 °C, broad size distribution of HPC polymers can be observed. Increasing the solutions' temperature above 43 °C, leads to much narrower particle size distributions. Further information and discussions are provided in the main text.

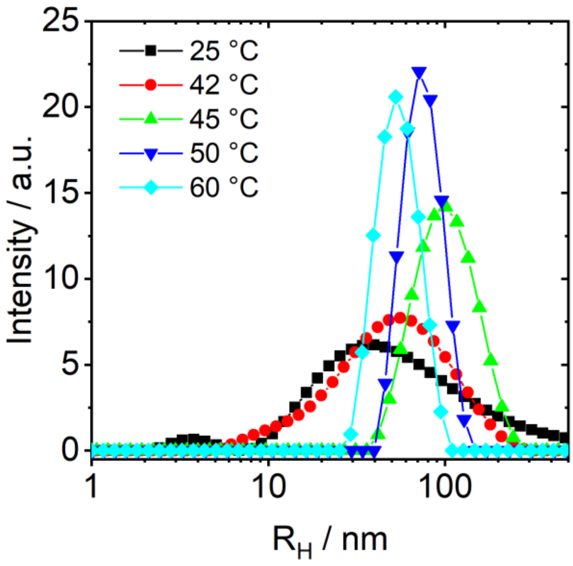

Figure S4: *DLS size distribution of 0.05g/l HPC in water at different temperatures as indicated in the figure. The sample solutions were filtered with a 0.2µm syringe filter to avoid multimodal size distributions below LCST.*

Influence of molecular weight

In order to investigate the influence of molecular weight to the size of the polymer, equal DLS experiments were performed as reported in the main text. HPC with an average mass of 100 kDa and 370 kDa (impurities < 5 wt. %) were purchased from Sigma Aldrich and used as received.

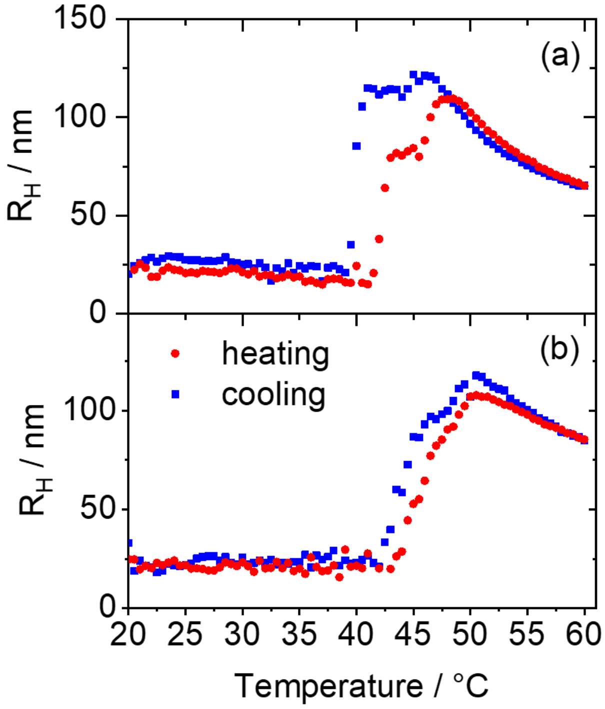

Figure S5: *Temperature dependence of the mean hydrodynamic radius R_H of HPC of a) 370 kDa and b) 100 kDa in bulk solution. HPC concentration was 0.05 g/l. Red circles and blue squares indicate R_H for heating and cooling temperature ramps, respectively.*

Stability of aggregates in dispersion

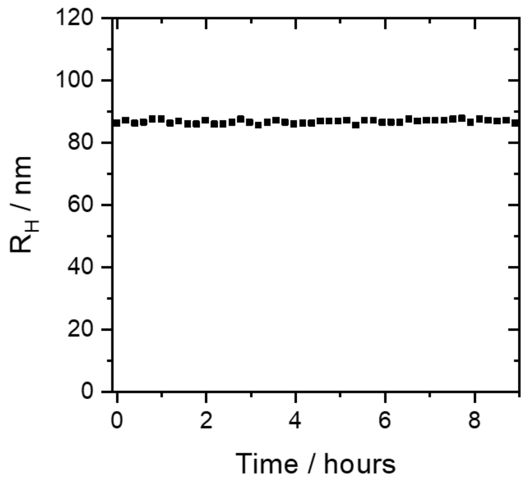

Figure S6: *Hydrodynamic radius of 0.05 g/l filtered HPC (1 MDa) at 50 °C. The temperature was kept constant. We found a constant hydrodynamic size which indicates stable polymeric dispersion.*

Notes and references

1 F. M. Winnik, *Macromolecules*, 1987, **20**, 2745–2750.

2 X. Xia, S. Tang, X. Lu and Z. Hu, *Macromolecules*, 2003, **36**, 3695–3698.

3 J. Gao, G. Haidar, X. Lu and Z. Hu, *Macromolecules*, 2001, **34**, 2242–2247.