

Supporting Information:

Structure formation of PNIPAM microgels in foams and foam films

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AFM scans of spin coated microgels in air

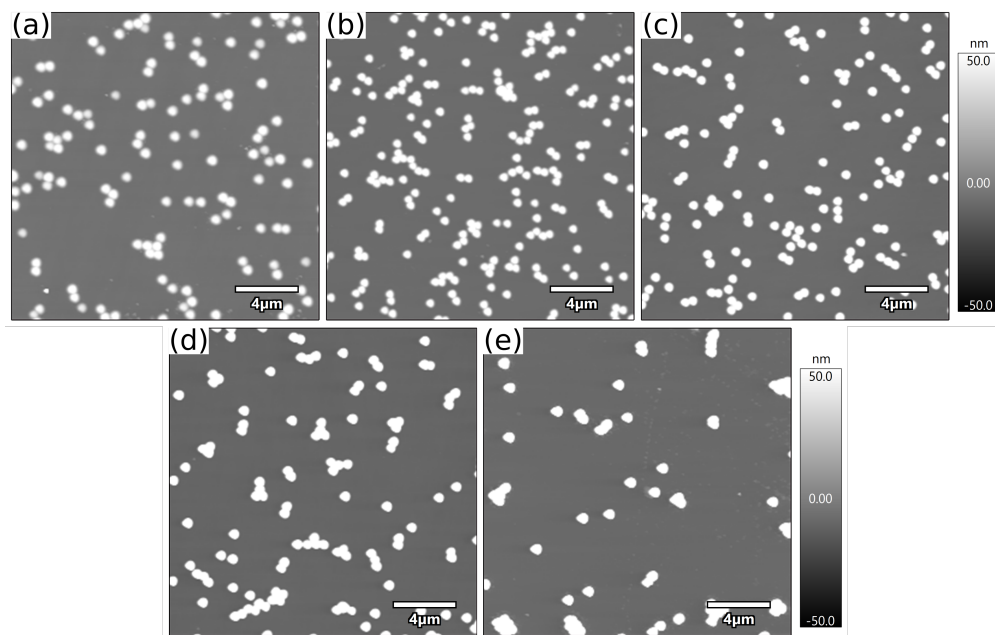


Figure S1: AFM scans of the MG substrates in air. (a) MG2, (b) MG3.5, (c) MG5, (d) MG7.5, (e) MG10.0.

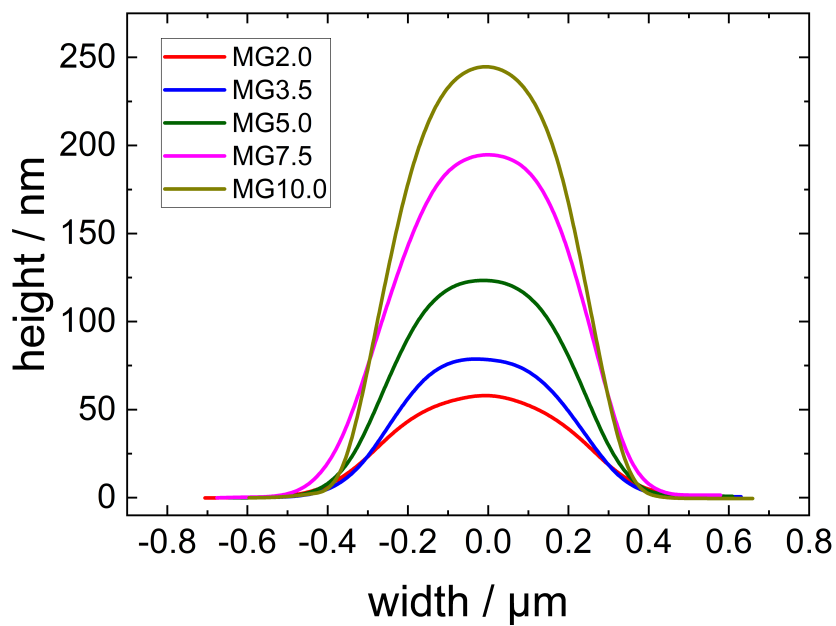


Figure S2: Representative height profiles of all MGs in air.

Foam decay at room temperature

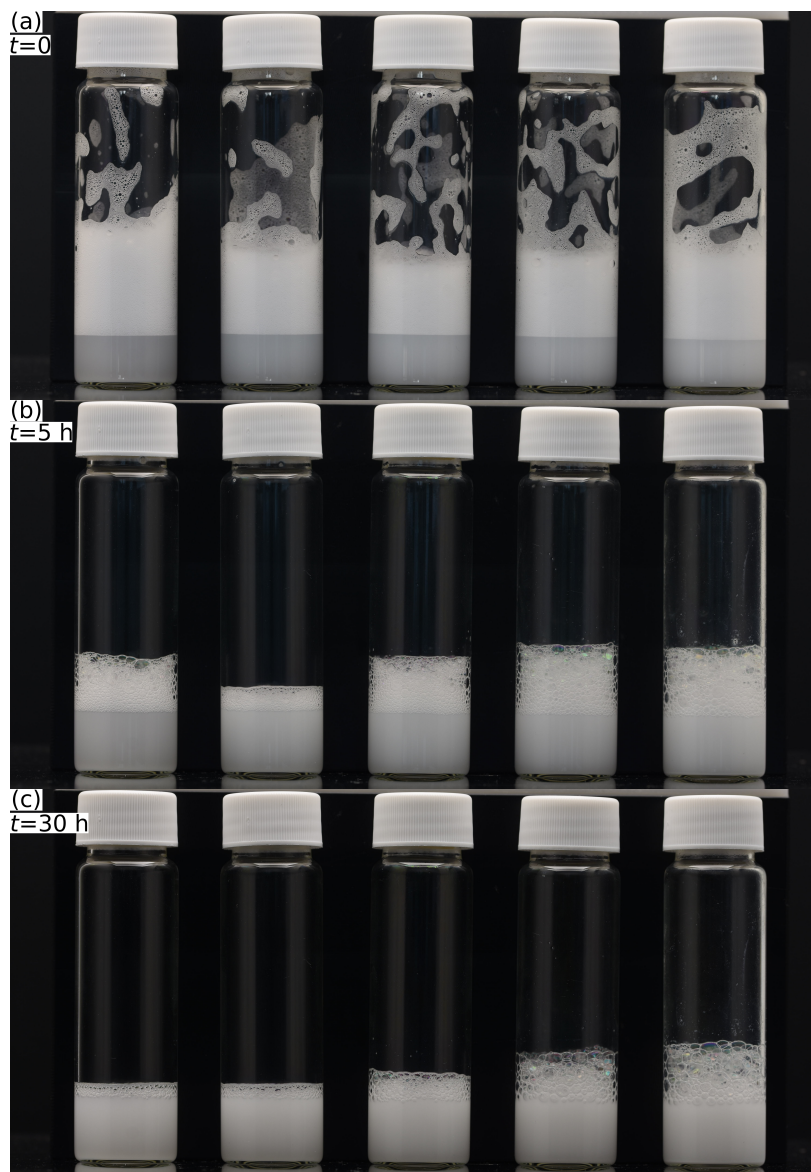


Figure S3: Exemplary foam decay at $T = 22\text{ }^{\circ}\text{C}$ for the different MGs studied at a concentration of $w = 1.0\text{ wt}\%$. (a) Immediately after foam formation, (b) after 5 h and (c) after 30 h. Samples are MG2.0, MG3.5, MG5.0, MG7.5 and MG10.0 from left to right.

Porod plots at higher MG concentrations

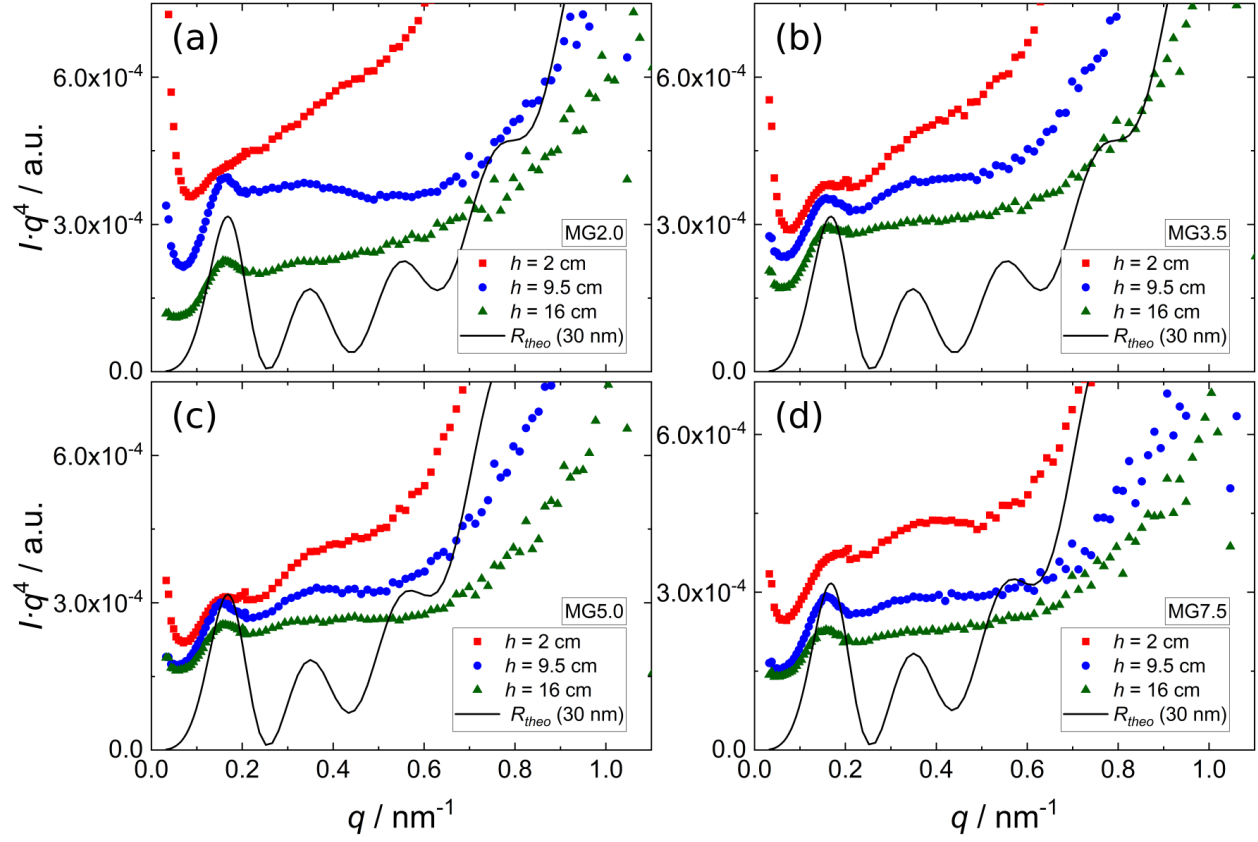


Figure S4: Porod plots of SANS data of foams prepared from 0.5 wt% dispersions of (a) MG2.0, (b) MG3.5, (c) MG5.0, (d) MG7.5, measured at different foam heights (red squares ($h = 2$ cm), blue circles ($h = 9.5$ cm) and green triangles ($h = 16$ cm)). The curves are shifted in intensity for clarity. For comparison a theoretical reflectivity curve of a 30 nm film in air with a SLD contrast of $\rho_{\text{film}} = 4.5 \times 10^{-6} \text{ \AA}^{-2}$ is shown (black line).

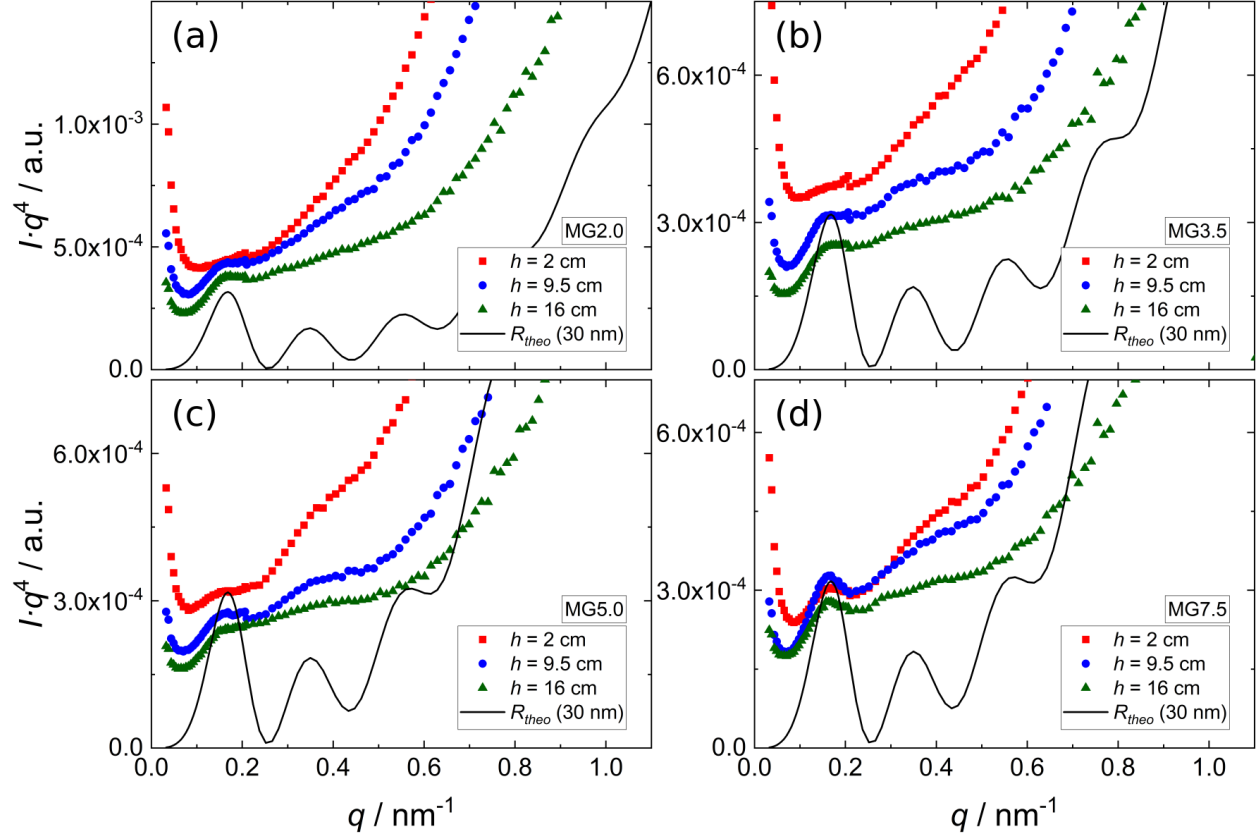


Figure S5: Porod plots of SANS data of foams prepared from 1.0 wt% dispersions of (a) MG2.0, (b) MG3.5, (c) MG5.0, (d) MG7.5, measured at different foam heights (red squares ($h = 2$ cm), blue circles ($h = 9.5$ cm) and green triangles ($h = 16$ cm)). The curves are shifted in intensity for clarity. For comparison a theoretical reflectivity curve of a 30 nm film in air with a SLD contrast of $\rho_{\text{film}} = 4.5 \times 10^{-6} \text{ \AA}^{-2}$ is shown (black line).

Evolution of the foam film structure upon pressure release

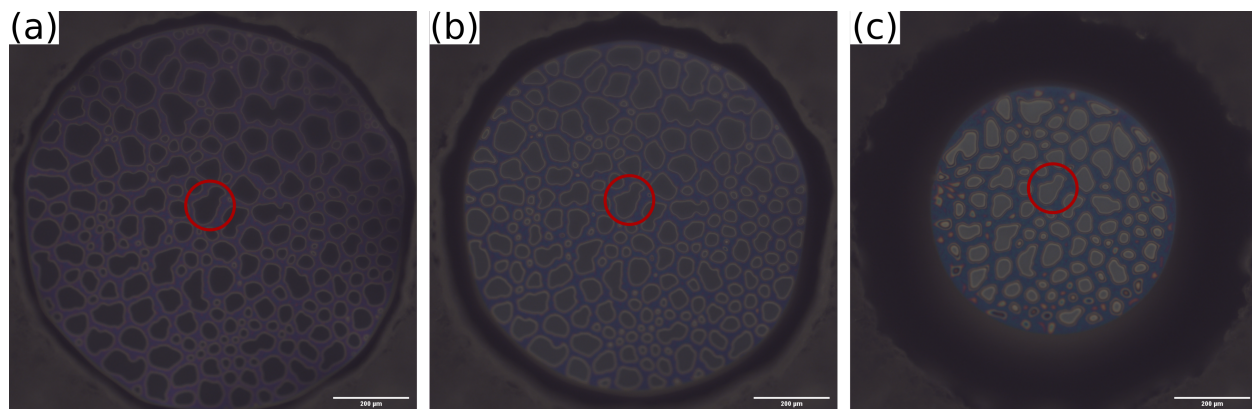


Figure S6: Evolution of the foam film structure upon pressure release of a foam film stabilised by 0.3 wt% MG5.0. **(a)** foam film structure at $\Pi = 760$ Pa immediately before the pressure was released. Structure 5 min **(b)** and 10 min **(c)** after the pressure release. The shape of the thinner film areas remains constant (highlighted with red circle).

Force curves for the determination of E moduli

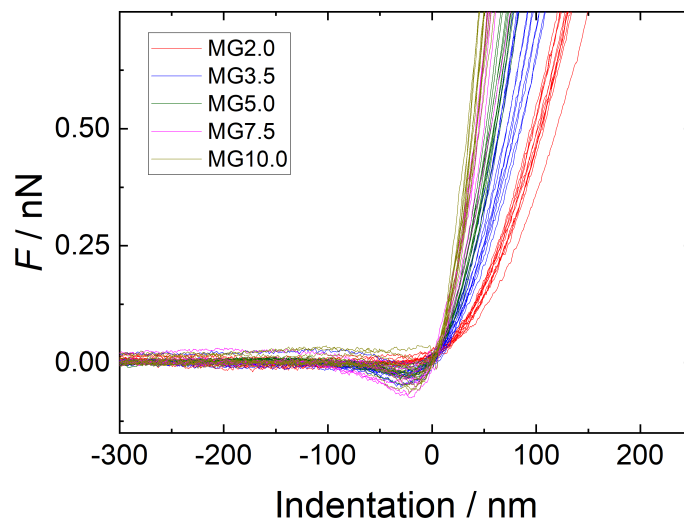


Figure S7: All force curves used for the determination of the elastic moduli given in Figure 11.

Correlation between foam film thickness and MG size

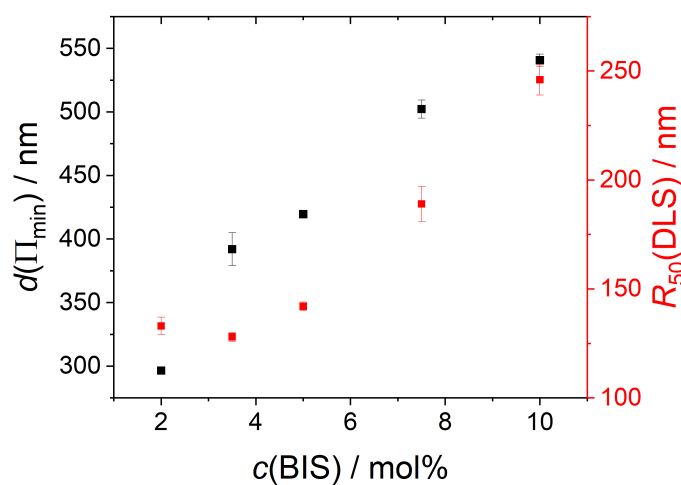


Figure S8: Foam film thickness at the lowest disjoining pressure $d(\Pi_{\min})$ (black squares, left ordinate) and hydrodynamic radius R_{50} (red circles, right ordinate) as a function the cross-linker concentration $c(\text{BIS})$.