Supporting Information:

Structure formation of PNIPAM microgels in

foams and foam films

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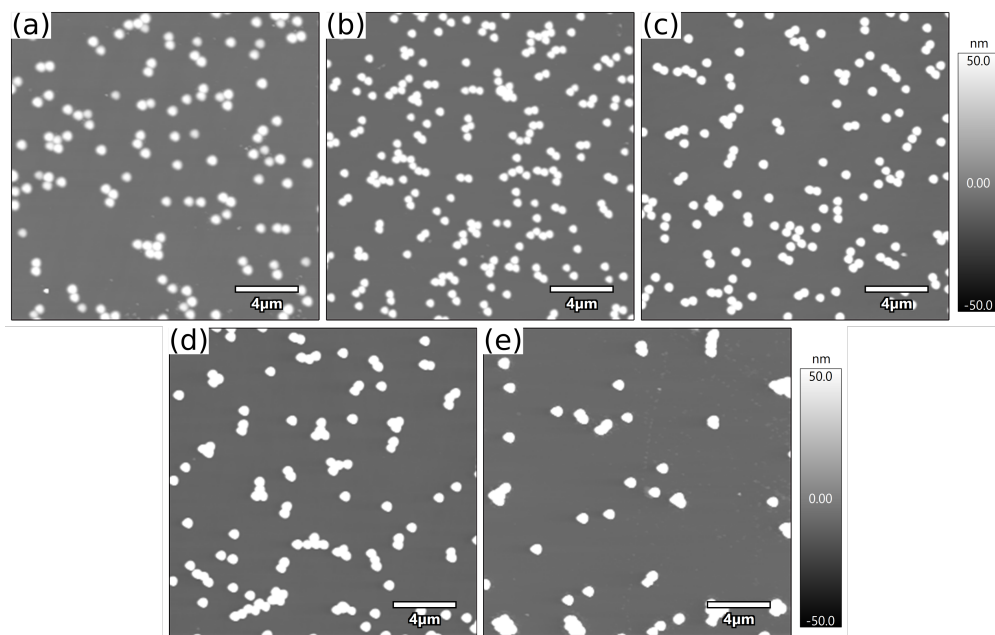
AFM scans of spin coated microgels in air

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

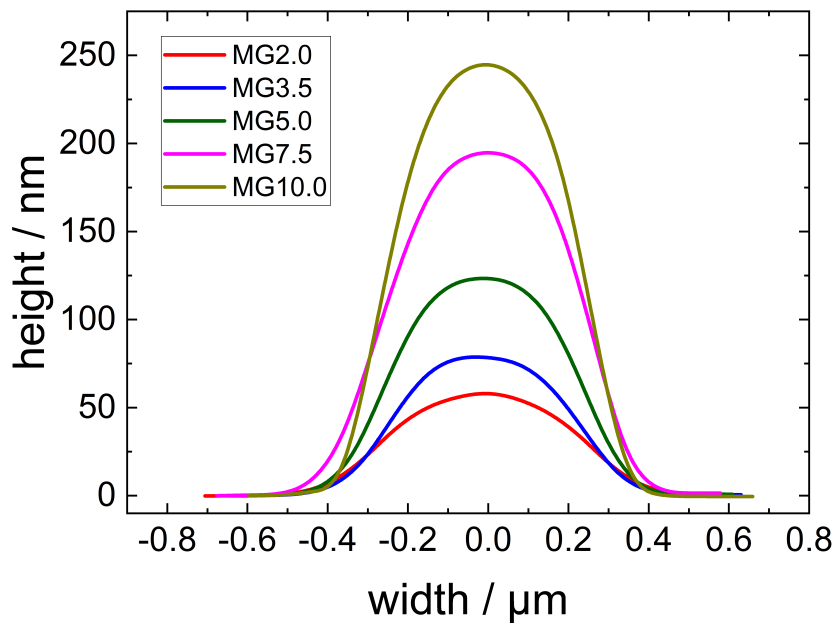
Figure S2: Representative height profiles of all MGs in air.
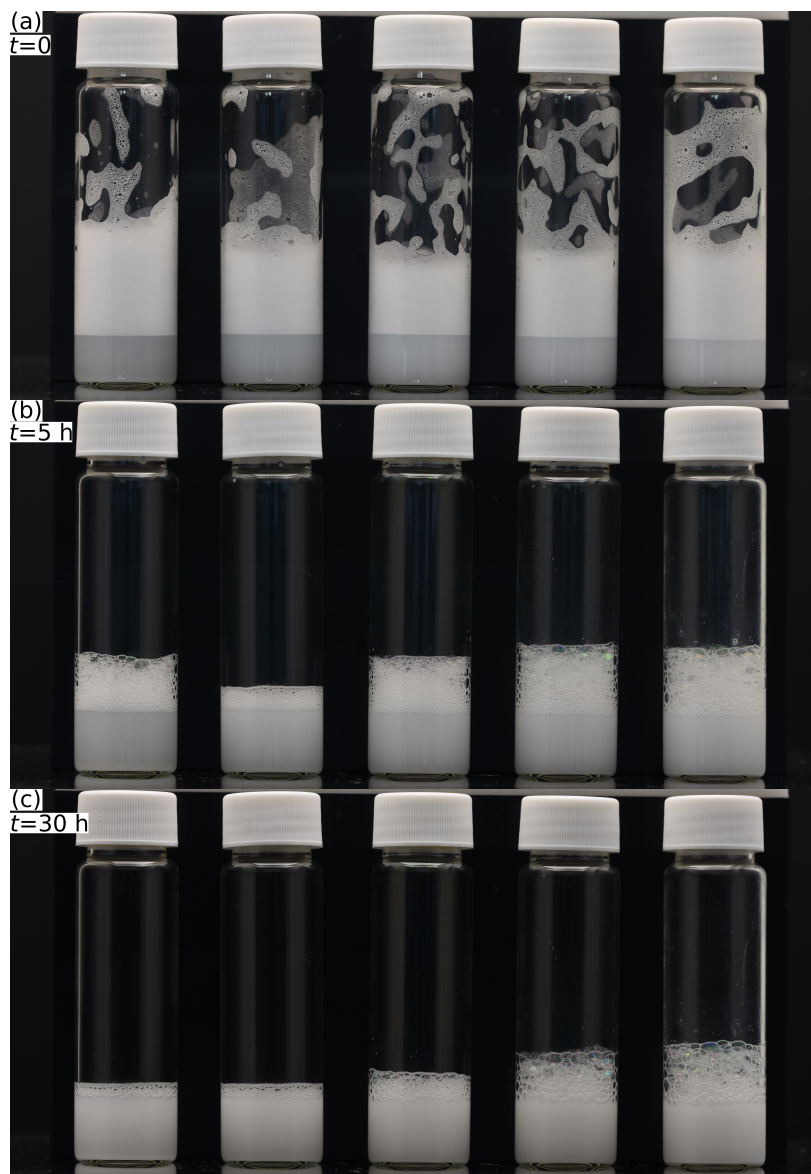
Foam decay at room temperature

Figure S3: Exemplary foam decay at $T = 22\,^{\circ}\mathrm{C}$ for the different MGs studied at a concentration of $w = 1.0\,\mathrm{wt\%}$. (**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.
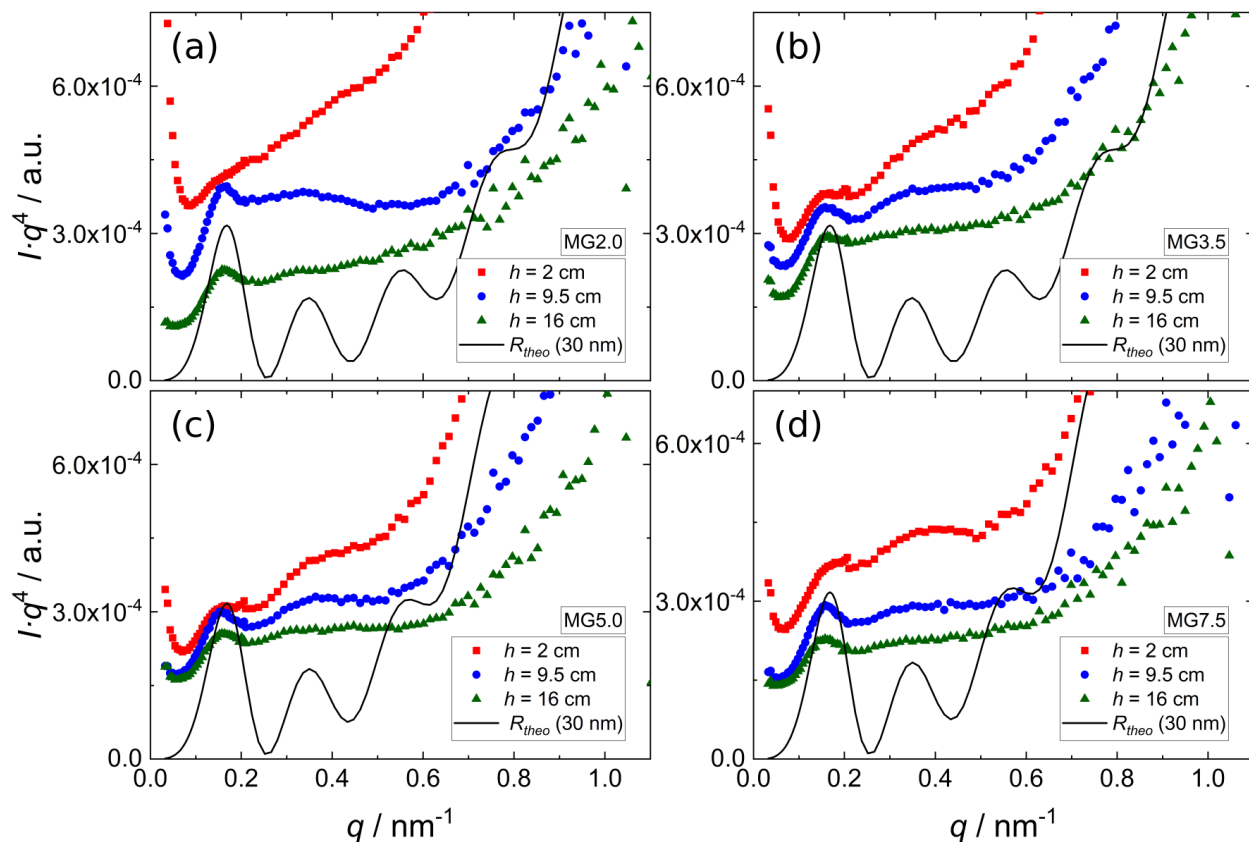
Porod plots at higher MG concentrations

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

Figure S5: Porod plots of SANS data of foams prepared from $1.0\,\text{wt}\%$ dispersions of (**a**) MG2.0, (**b**) MG3.5, (**c**) MG5.0, (**d**) MG7.5, measured at different foam heights (red squares ($h = 2\,\text{cm}$), blue circles ($h = 9.5\,\text{cm}$) and green triangles ($h = 16\,\text{cm}$)). 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
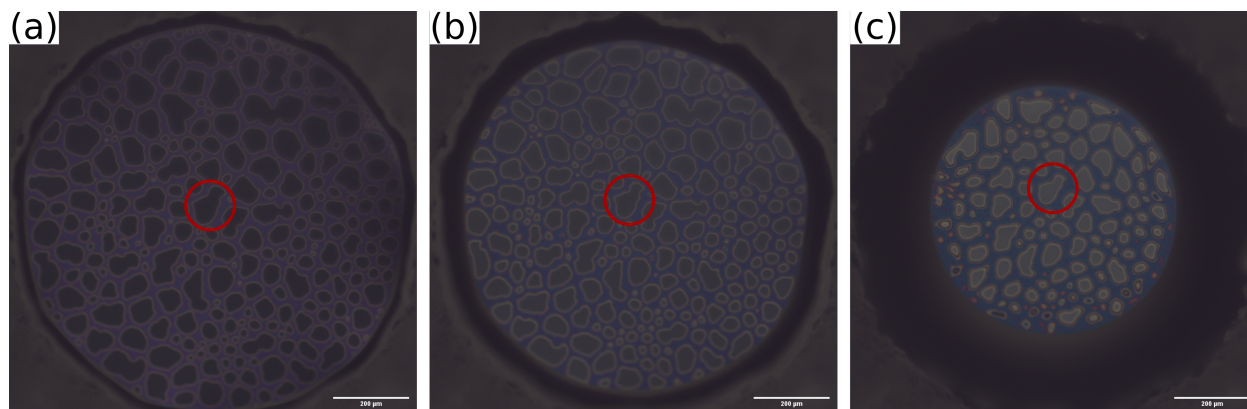

Figure S6: Evolution of the foam film structure upon pressure release of a foam film stabilised by 0.3 wt% MG5.0. (**a**) foam film structure at $\Pi = 760\,\mathrm{Pa}$ immediately before the pressure was released. Structure 5 min (**b**) and 10 min (**c**) after the pressure release. The shape of the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

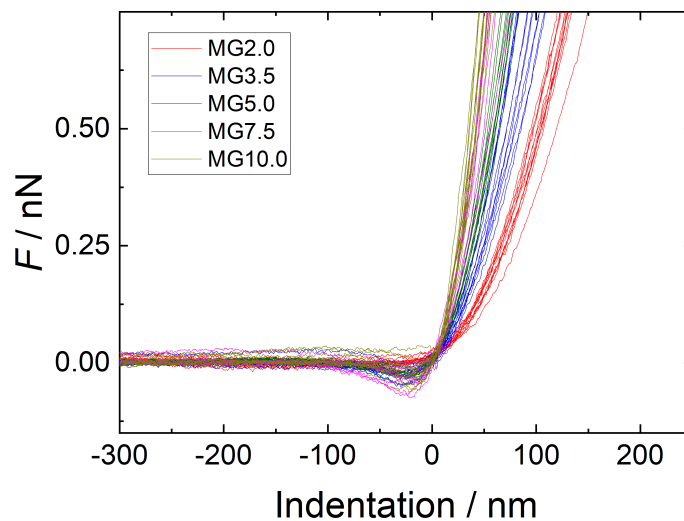# Force curves for the determination of E moduli

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

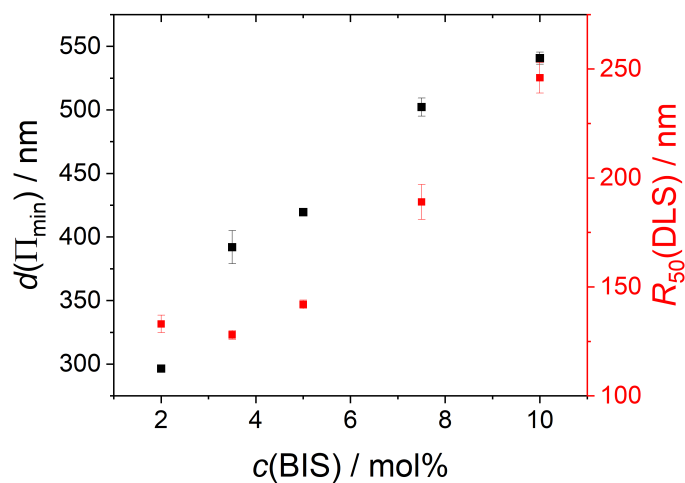# Correlation between foam film thickness and MG size

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(BIS).