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Supplementary Materials: Glass and Jamming Rheology in Soft Particles made of PNIPAM and polyacrylic acid

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1. Parameters from the Cross model

Data at low concentrations $C_w \leq 0.6\%$, in the shear thinning fluid regime, are well described by the Cross model:

$$\sigma(\dot{\gamma}) = \dot{\gamma}\left[\eta_\infty + \frac{\eta_0 - \eta_\infty}{1 + (\tau_C\dot{\gamma})^m}\right], \quad (1)$$

where η_0 and η_∞ are the zero and infinite shear rate limiting viscosities respectively, m a power exponent, τ_C the relaxation time of the system that marks the onset of shear thinning [1] and its inverse $\dot{\gamma}_c$ represents an intermediate critical shear rate. In Figure S1 all the fit parameters from Cross model are reported for microgel with C_{PAAc}=24.6% at two temperatures, T=298 K and T=311 K, below and above the volume phase transition (VPT), respectively.

2. Comparison between Cross e Carreau-Yasuda models at low concentrations

The same data are also well described by the Carreau-Yasuda model:

$$\sigma(\dot{\gamma}) = \dot{\gamma}\left[\eta_\infty + (\eta_0 - \eta_\infty)\left(1 + (\tau_{CY}\dot{\gamma})^a\right)^b\right]. \quad (2)$$

The two models overlap if b=-1, a=m and τ_{CY}=τ_C. A comparison between the parameters obtained from the two models is reported in Figure S2 as a function of C_w at T=311 K showing a perfect agreement.

3. Parameters from the Herschel Bulkley model

Data at higher concentrations $0.7 \leq C_w \leq 5.0\%$, in the glass and jammed state, when a yield stress appears, are well described by the Herschel Bulkley model model:

$$\sigma(\dot{\gamma}) = \sigma_y + k\dot{\gamma}^u, \quad (3)$$

where σ_y is the yield stress, for $\sigma < \sigma_y$ there is no flow and the system behaves as a solid, for $\sigma > \sigma_y$ instead it flows, k is named "consistency" index and u is the flow index that defines the non-Newtonian behaviour, u<1 is typical of shear thinning fluids and u>1

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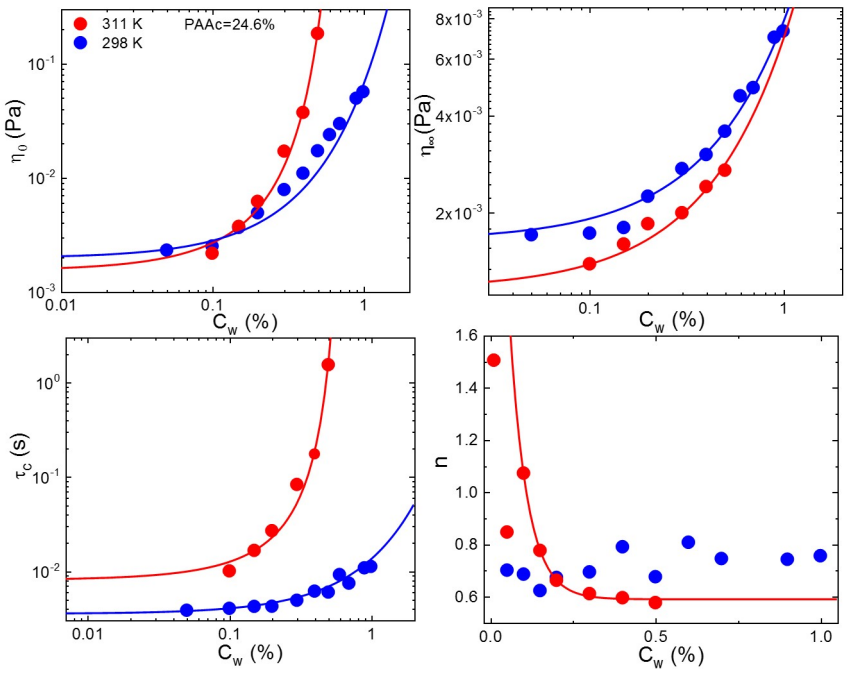

Figure S1. Fit parameters (a) η_0 (b) η_∞ (c) τ_C and (d) n, obtained from the Cross equation of IPN microgels with C_{PAAc}=24.6% at T=298 K (blue symbols) and T=311 K (red symbols).

defines systems characterized by shear thickening [2–4]. Moreover a characteristic shear rate $\dot{\gamma}_c$ can be obtained from the above parameters:

$$\dot{\gamma}_c = \left(\frac{\sigma_y}{k}\right)^{1/n}. \tag{4}$$

Fit parameters from the Herschel Bulkley model at T=311 K are reported in Figure S3 versus C_w.

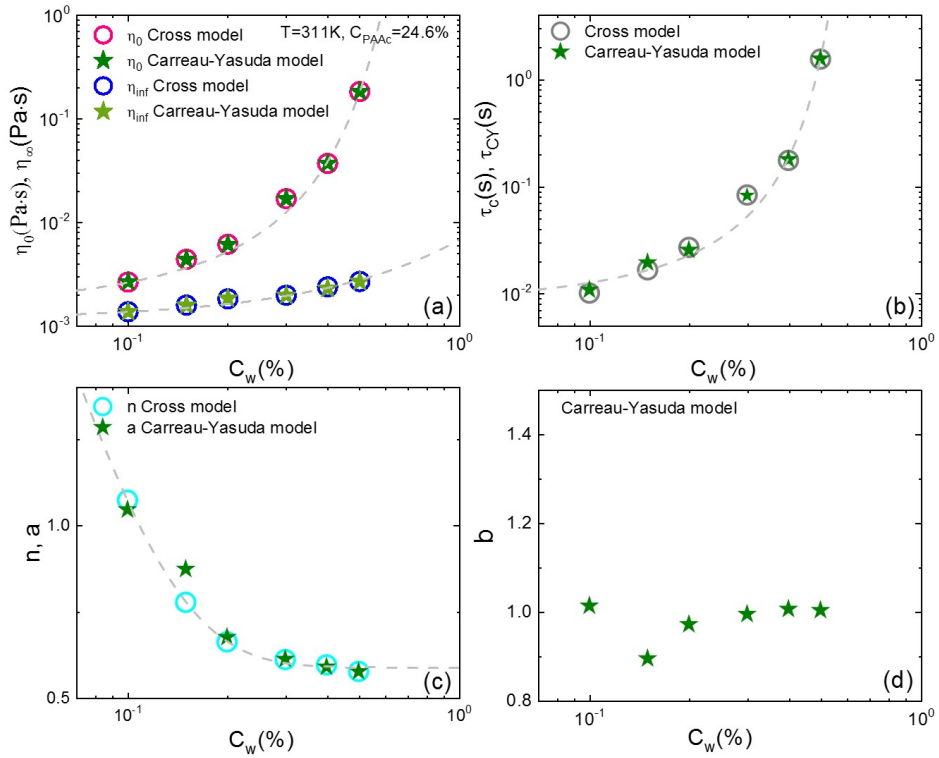

Figure S2. Comparison between the fit parameters (a) η_0, η_∞, (b) τ_C, τ_{CY} (c) n, a and (d) b, obtained from the Cross and Carreau-Yasuda models at T=311 K.

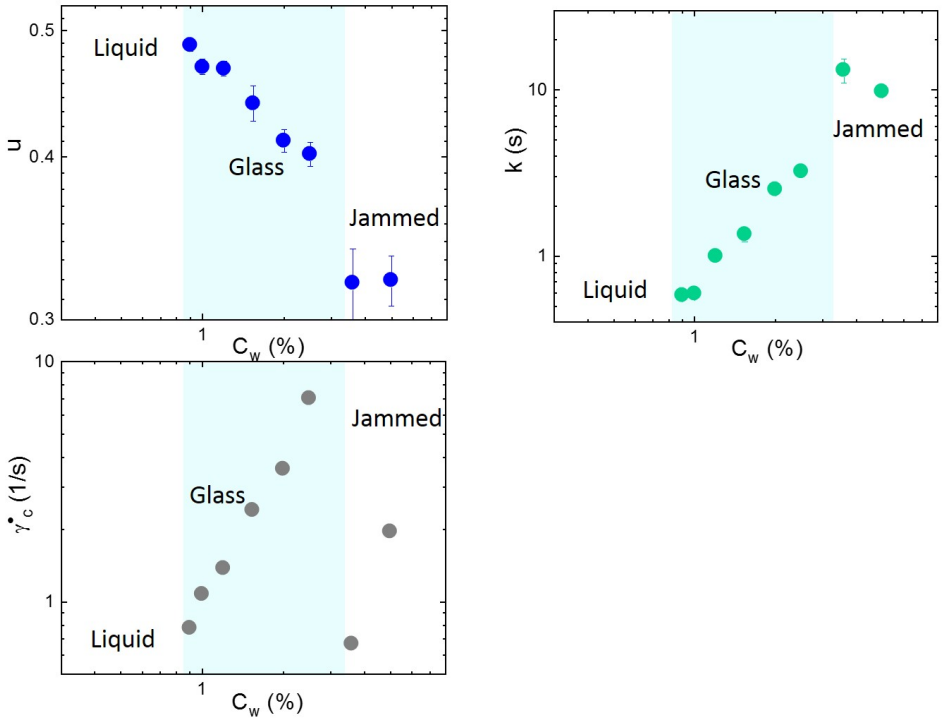

Figure S3. Fit parameters (a) u (b) k and (c) $\dot{\gamma}_c$, obtained from the Herschel Bulkley equation of IPN microgels with PAAc=24.6% as a function of concentration at T=311 K.

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