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Supplementary Information

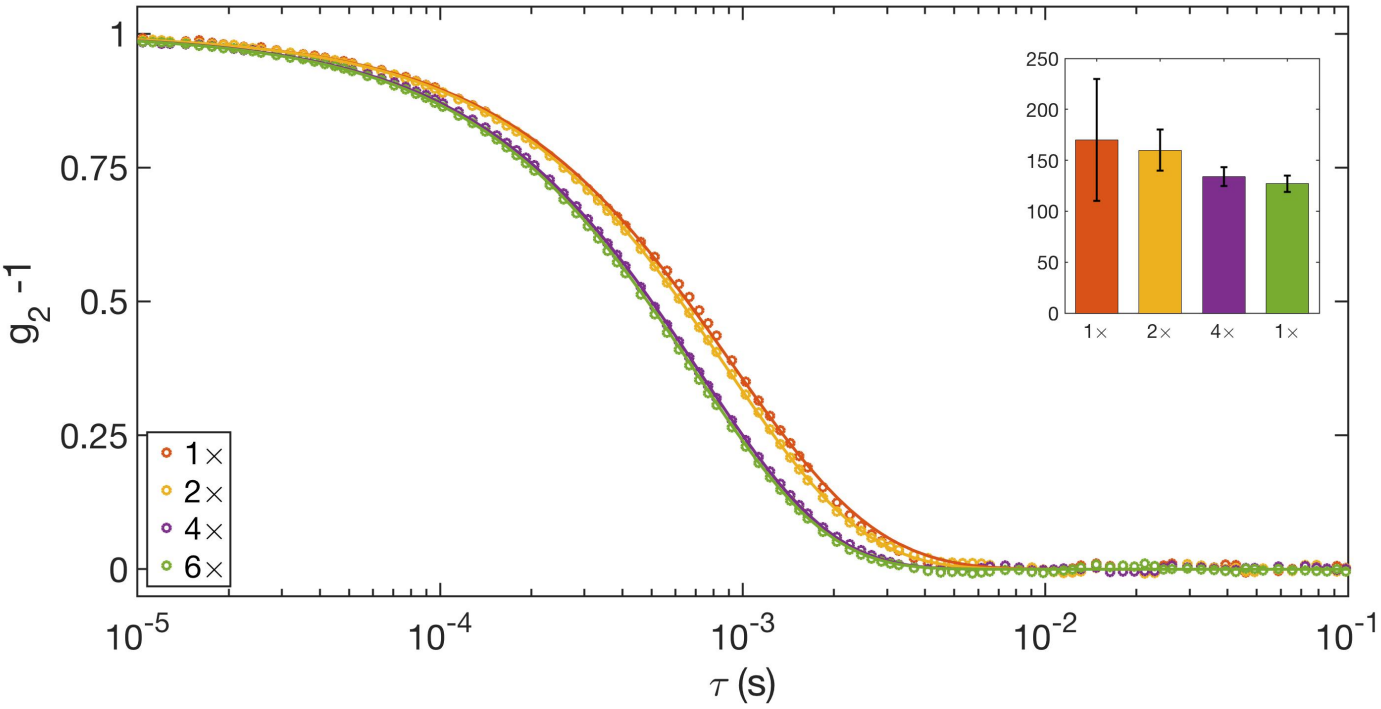

Figure S1: Renormalised intensity autocorrelation g_2 data as a function of lag time τ for the different microgel suspensions, measured using DLS. Solid lines indicate fits of the data using a cumulant expression (equation 1). Inset figure shows the calculated hydrodynamic radii R_h. Corresponding values of R_h are shown in table S1 below.

Table S1: Mean hydrodynamic radii calculated from DLS data for each particle CMR.

CMR	1×	2×	4×	6×
R_h(nm)	170 ± 60	160 ± 20	134 ± 9	127 ± 8

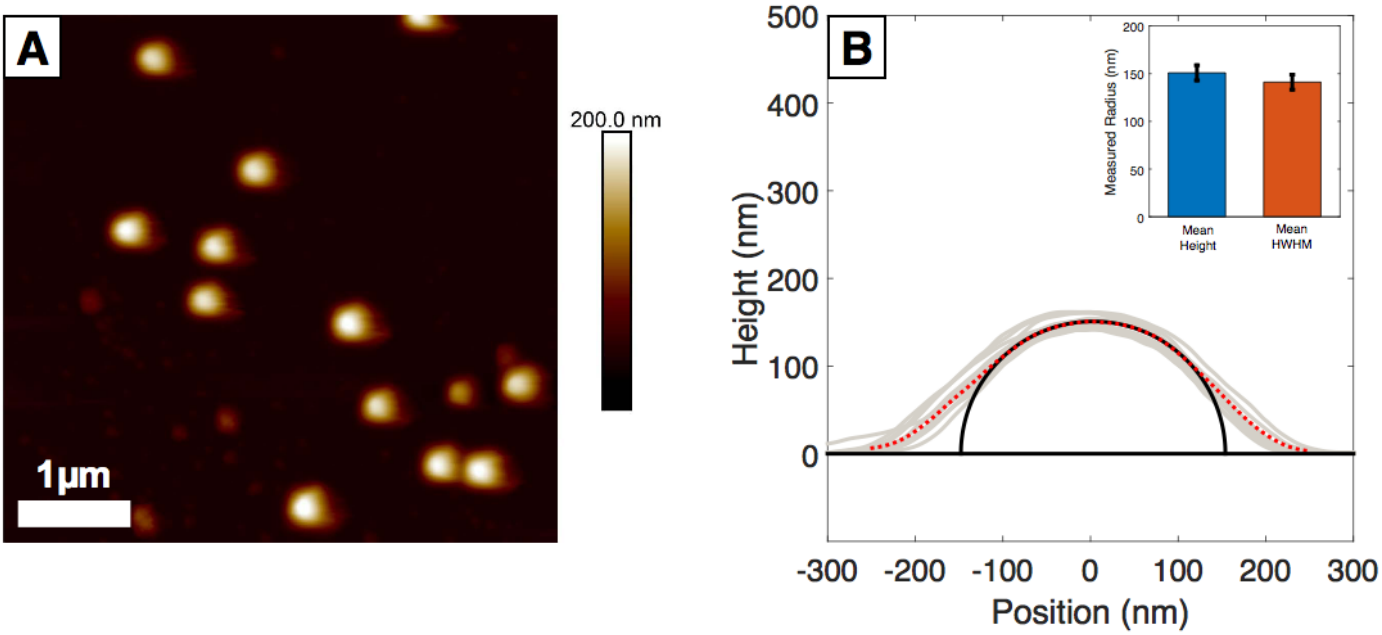

Figure S2: PNIPAm particles prepared at 6× CMR and imaged in contact mode at low force, resulting in a more accurate measurment of particle height at the expense of lateral resolution (A). Cross sections (grey) are averaged (red) and are found to be in close agreement with a biquadratic fit, strongly suggesting a hemispherical particle profile on the substrate (B). This is further supported by the close agreement between the particles' half width at half maximum and height (B, inset).

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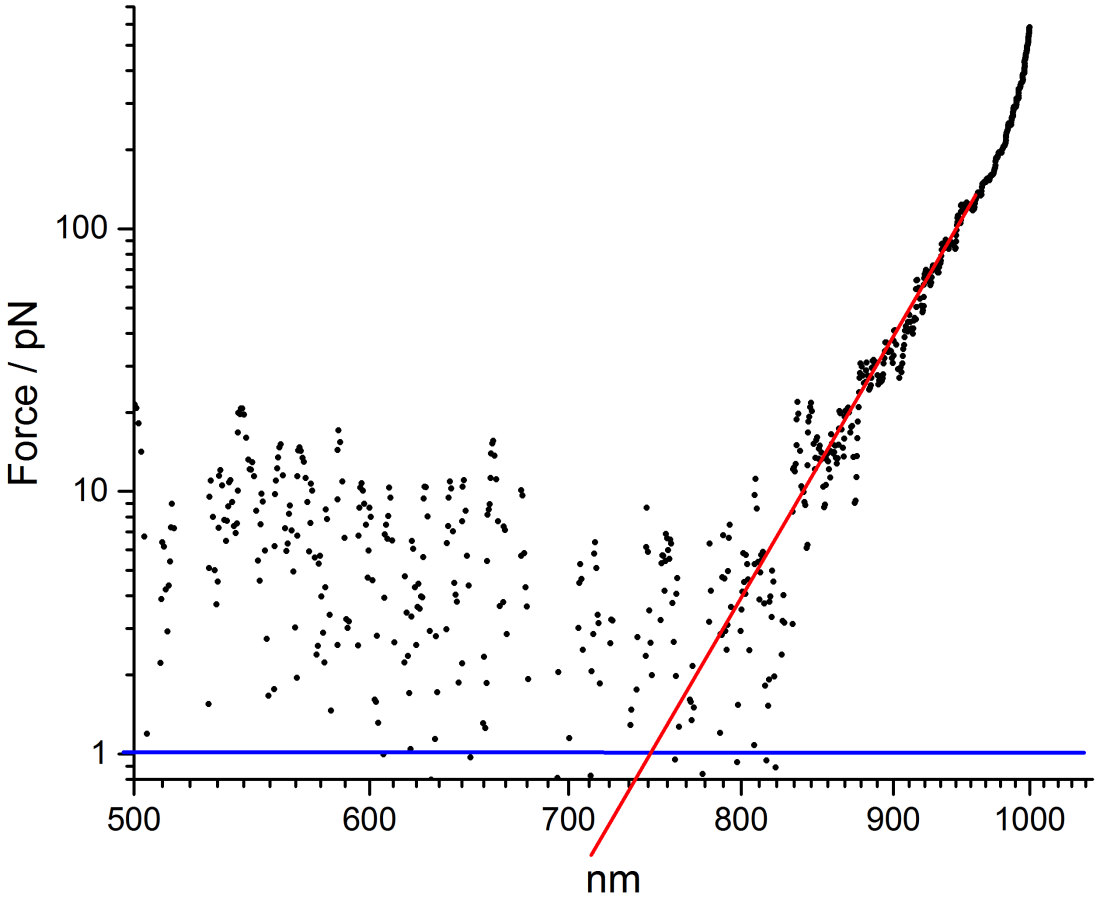

Figure S3: Example force vs. indentation curve (1× CMR), showing the approach used to determine the contact point. Since most contact models reduce to a power law, force vs. indentation curves linearize on a log-log plot. The contact point is determined by extrapolating (red line) this linearized curve to 1pN (blue line).

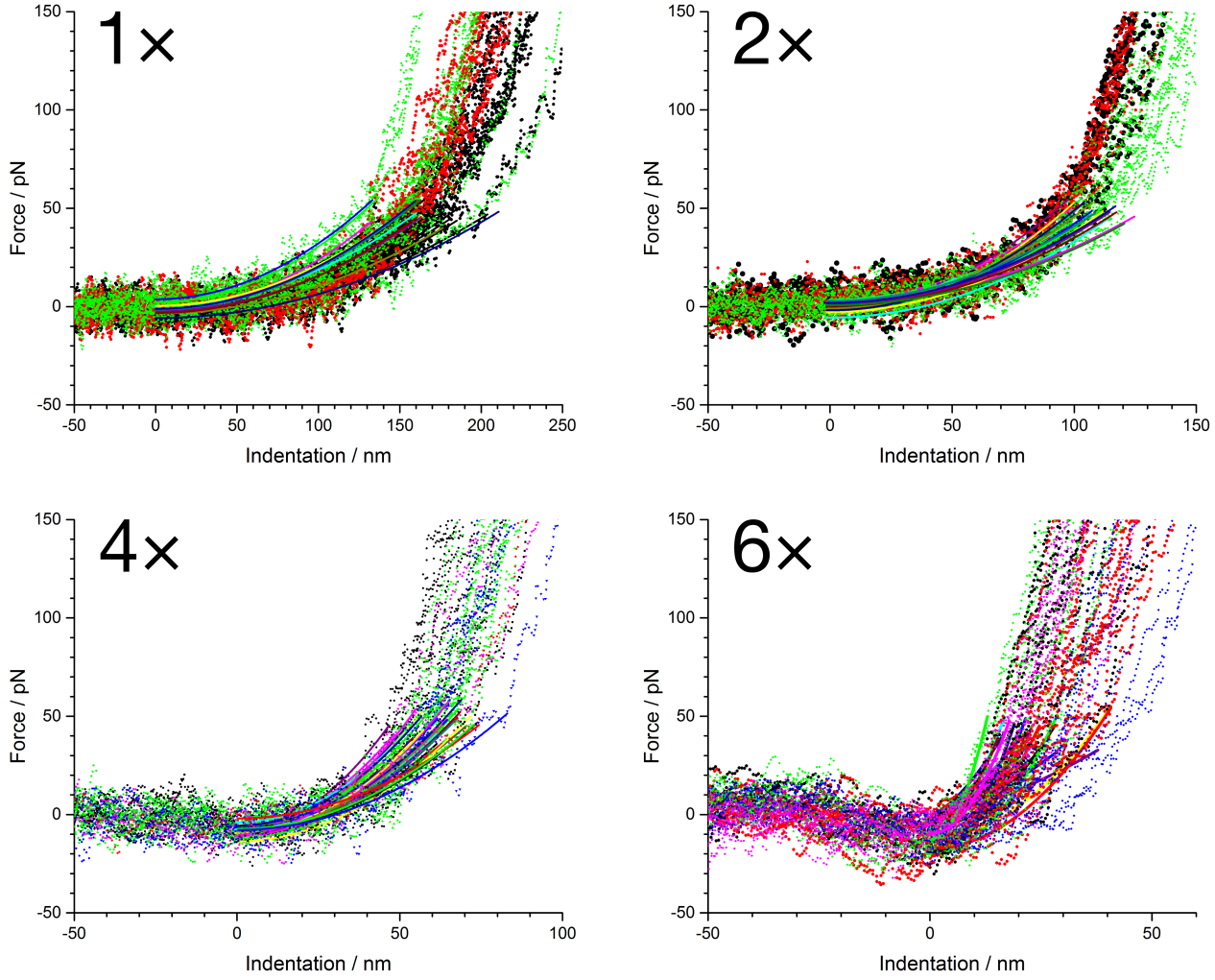

Figure S4: Plots of force vs. indentation overlaid with their corresponding Hertz model fits. Between 3-7 particles for each CMR are probed, and between 8-16 force curves are extracted from the centres of each of the particles. Curves with the same colour originate from the same microgel particle.

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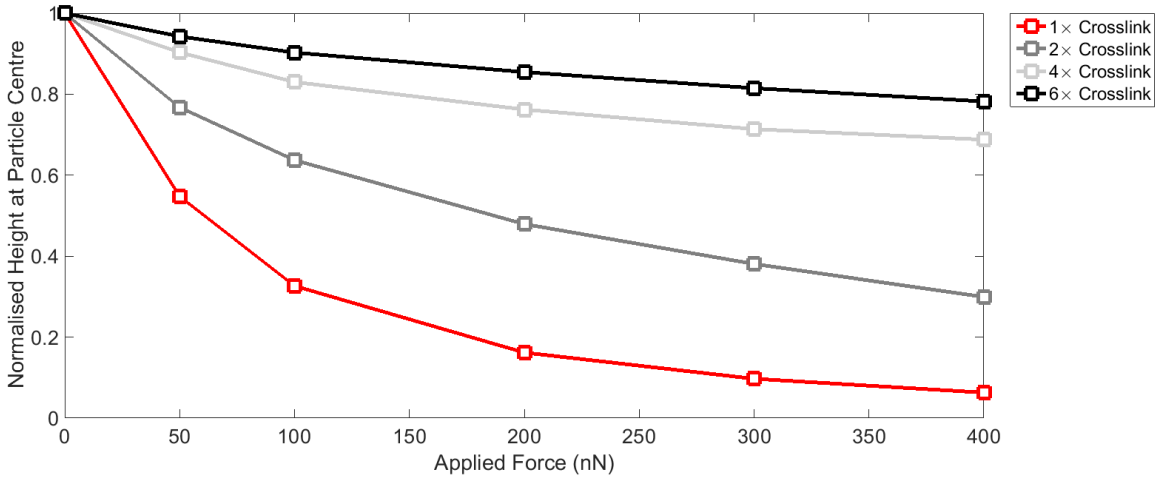

Figure S5: Particle height at centre, normalised to initial height as extrapolated from by force volume curves. For all particle CMRs, the highest deformation occurs at initial contact between tip and cantilever. Lower CMRs result in high deformations across all applied forces.

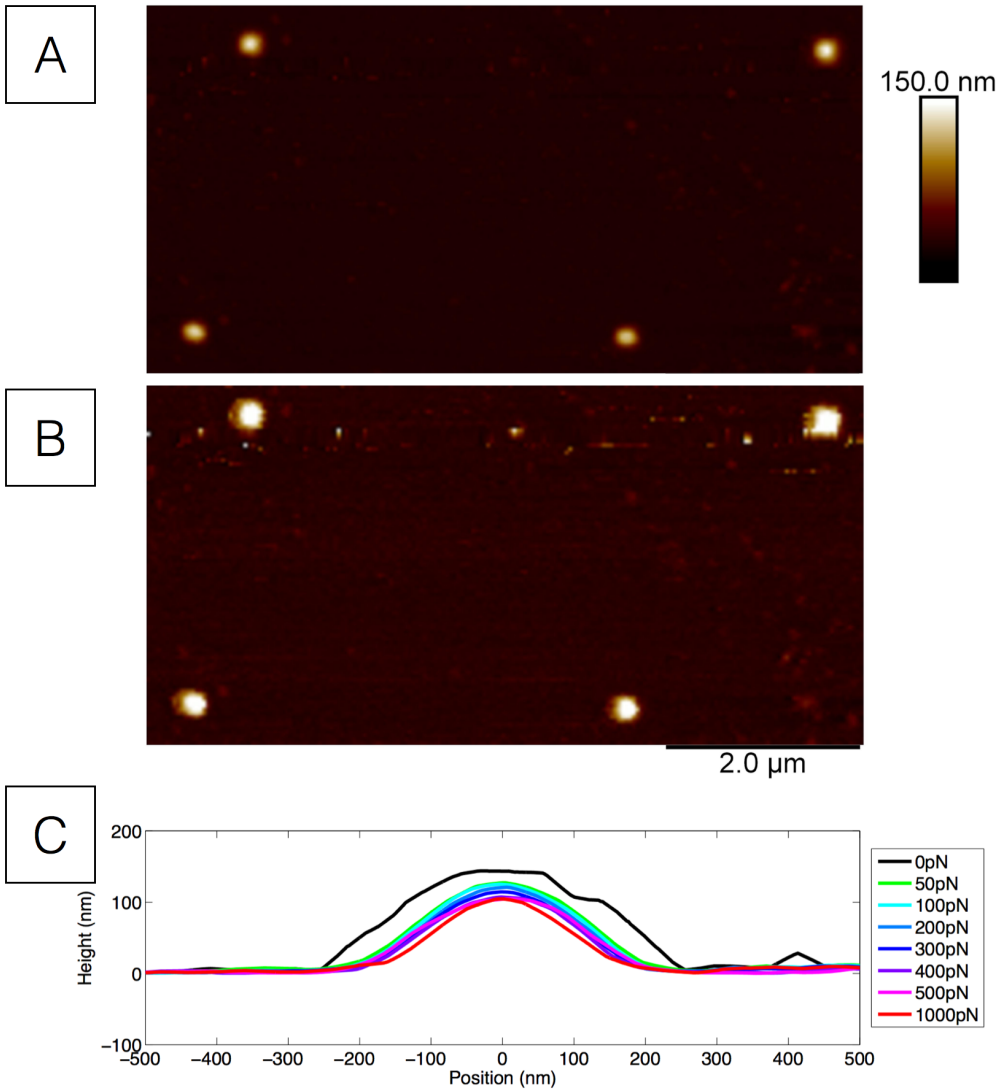

Figure S6: Recovery of particle profile at zero force using the deformation channel of PF-QNM. Particles are indented at forces ranging between 50pN-100pN, causing compression(A). The original height of the particle is recovered by adding the measured deformation to the measured height at each point (B). Averaged cross sections over 20 particles show the particles' recovered height at zero force in comparison to measured particle profiles at different imaging forces,(C) in good agreement with low force images (figure S2).

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