# Supporting Information

**Elastic modulus distribution in poly(*N*-isopopylacrylamide) and oligo(ethylene glycol methacrylate) microgels studied by AFM**

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**Hydrodynamic Radius $R_h$ via dynamic light scattering measurements**

The analysis of size and swelling behavior was done in solution of 0.5 wt% microgel sample in ultra-pure water. The measurements were conducted on a Zetasizer Nano Series Nano ZS (Malvern GmbH, Germany) at a wavelength of 633 nm and a backscattering angle of 173°. Swelling behavior was determined by measuring size at temperatures between 14 °C and 54 °C. Size was recorded at 2 °C steps with an equilibration time of 20 min.
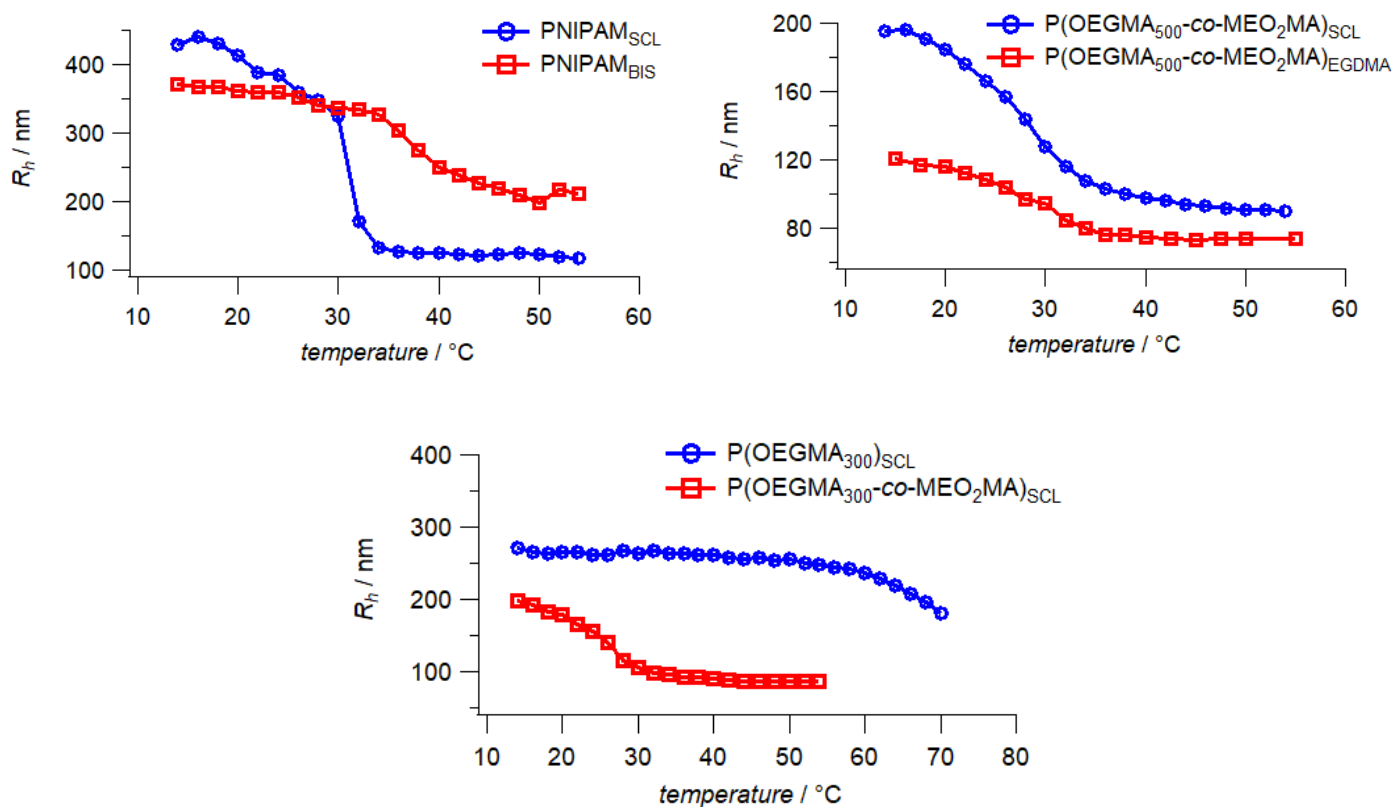


Figure S1 Summary of swelling curves of all samples.

**Atomic force microscopy (AFM), elastic modulus profiles showing absolute values**

AFM measurements were performed on a JPK Bruker NanoWizard IV in quantitative imaging (QI$^{TM}$) mode with a set point force of 5 nN and 20 s acquisition time per force curve. Cantilevers (HQ:XSC11/No Al, μMasch, Bulgaria) with a nominal spring constant of 7 N/m were used, the force curves were acquired with a loading rate of 125 μN/s. The AFM tip radius was obtained by imaging a porous alumina surface (PA01, μMasch, Bulgaria) and evaluation with Gwyddion. Resulting radii were 25 ±3 nm. Measurements were conducted in ultra-pure water at 20 °C. To submerge the coated surfaces were placed in a petri dish filled with ultra-pure water and let to equilibrate for 15 min. The obtained force-deformation maps were processed with the software provided by the AFM manufacturer to calculate the elastic modulus by fitting the approach cycle with the Hertz-Sneddon equation. Radial profiles of the elastic moduli were extracted from the resulting elastic modulus maps using the radial profile plugin for ImageJ.
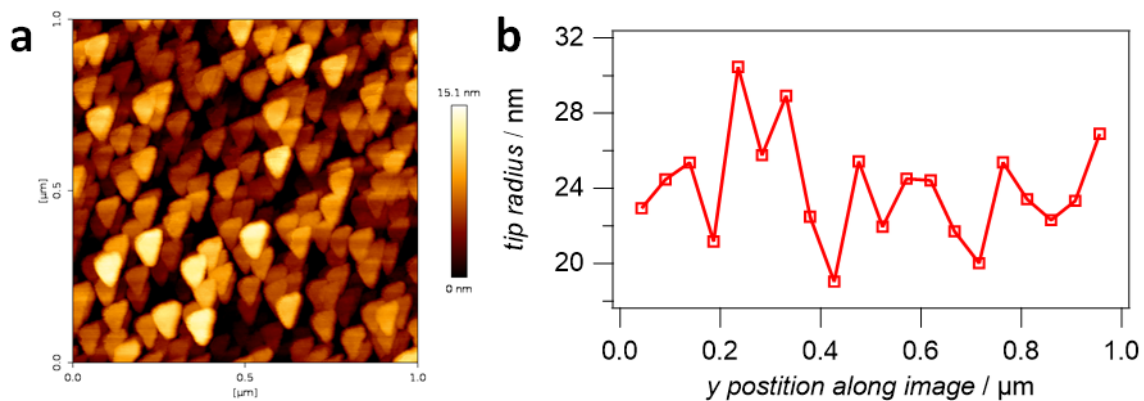


Figure S2 Tip reconstruction from porous alumina surface scan. a) Height image of the probe surface, b) calculated tip radius from separate sections of the image.
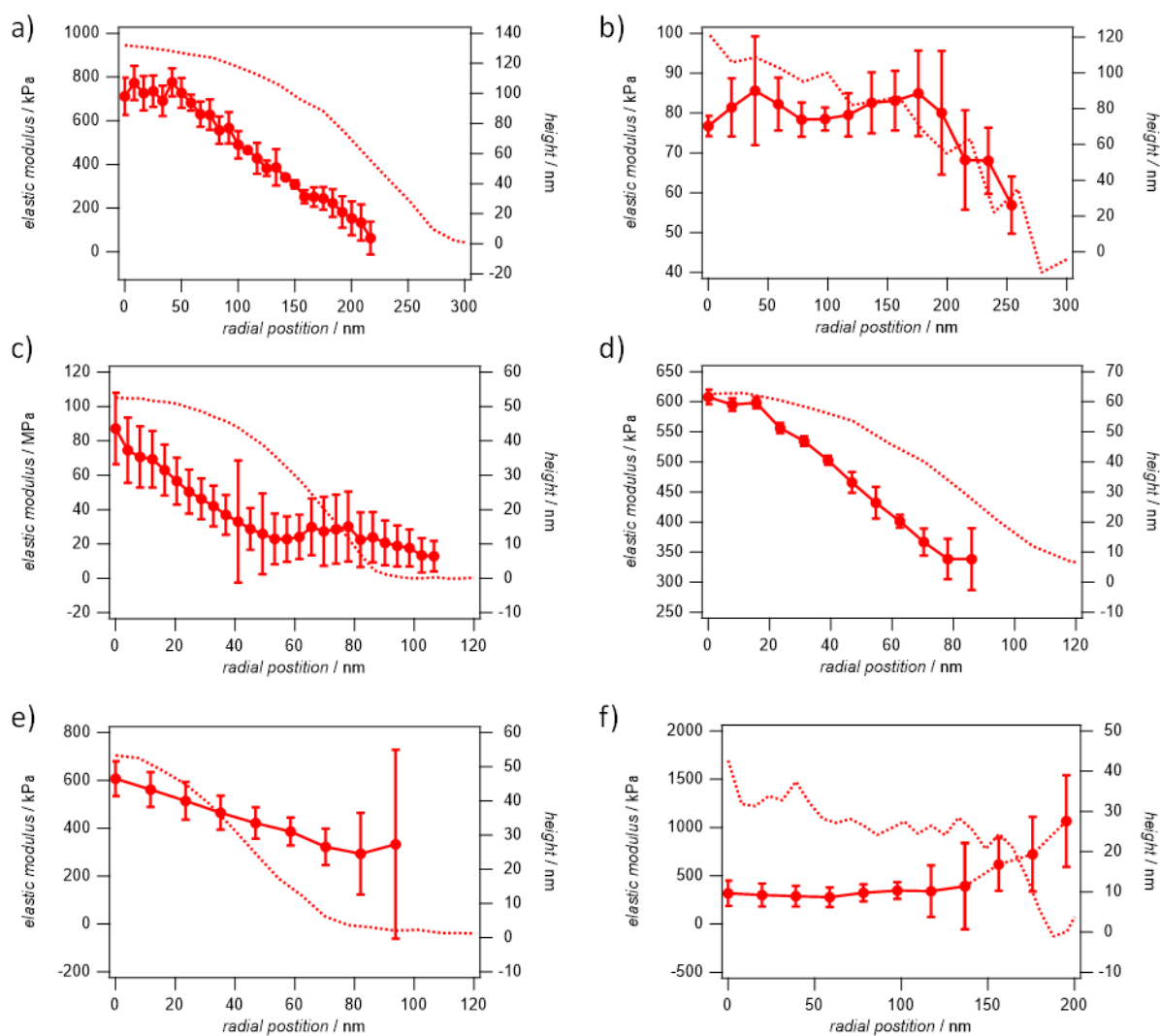
Figure S3 Summary of elastic moduli of all microgels as a function of the radial position. Plot of the elastic modulus vs. the radial position (left) calculated from at least six microgels using high-resolution elastic modulus mapping (right). The samples are ordered as follows: a) $PNIPAM_{BIS}$; b) $PNIPAM_{SCL}$; c) $P(MEO_2MA\text{-}co\text{-}OEGMA_{500})_{EGDMA}$; d) $P(MEO_2MA\text{-}co\text{-}OEGMA_{500})_{SCL}$; e) $P(MEO_2MA\text{-}co\text{-}OEGMA_{300})_{SCL}$; f) $P(OEGMA_{300})_{SCL}$.
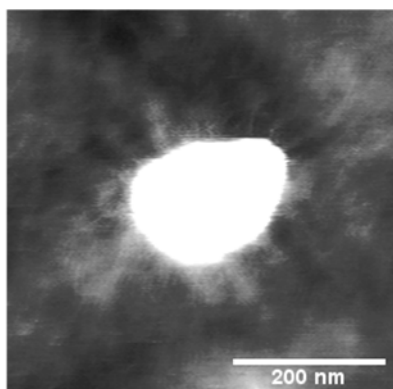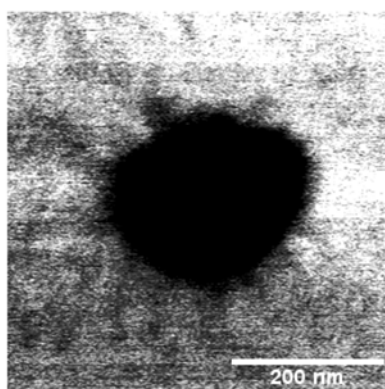
Figure S4: a) Height image and b) phase image of P(MEO$_2$MA-*co*-OEGMA$_{500}$)$_{EGDMA}$ microgels deposited on solid surface. The image was acquired in intermittent contact mode, the sample was submerged in ultra-pure water.