S1. Materials

The source of the materials used in the synthesis of latexes is given below.

- Methyl methacrylate (99%, inhibitor removed, Aldrich)
- Methacrylic acid (99%, Aldrich)
- PMMA-graft-PHSA (Batch R8893/252)
- Azobisisobutyronitrile (98%, Acros Organics)
- 1-Octanethiol (98.5%, Aldrich)
- Diethanolamine (> 99%, Aldrich)
- n-Hexane (minimum 95%, VWR)
- n-Dodecane (≥ 99%, Sigma–Aldrich)
- n-Dodecane-d_{26} (98%, Cambridge Isotope Laboratories)
S2. SAXS of dilute dispersion of 76 nm latexes

SAXS measurements were made on a dilute dispersion ($\phi = 0.02$) of 76 nm latexes in $n$-dodecane. The measured data and fit to a spherical form factor are shown in Figure S1. The best fit radius is 28.4 nm, and the data is fit with a log-normal size distribution with $\sigma = 0.09$.

Figure S1: SAXS of a dilute dispersion ($\phi = 0.02$) of 76 nm latexes in $n$-dodecane. The data has been fit to a spherical form factor; the best fit radius is 28.4 nm.
S3. Residual scattering in contrast-matched \( n \)-dodecane

SANS measurements were performed on dispersions of 76 nm latexes in latex contrast-matched \( n \)-dodecane at two different volume fractions (\( \phi = 0.02 \) and 0.19), as shown in Figure S2. There is no contribution from the latexes in the dilute dispersion, but there is residual scattering from the latexes in the concentrated dispersion.

![Figure S2: Residual SANS for 76 nm latexes in latex contrast-matched \( n \)-dodecane at two volume fractions (\( \phi = 0.02 \) and 0.19).](image-url)
S4. SEM of 685 nm latexes

An example SEM image of the 685 nm latexes used to determine the distribution of the core size is shown in Figure S3.

Figure S3: SEM image of 685 nm latexes.
S5. Analytical centrifugation

Raw data measured for dispersions of 685 nm latexes in n-dodecane and n-dodecane-d$_{26}$ on the LUMiSizer are shown in Figure S4. The $y$-axis shows the percentage of light transmitted through the cells, and the $x$-axis shows the position along the cell. The curves are measured as a function of time while the particles sediment, with red curves showing the first measurements and green curves showing the last measurements.

Figure S4: Particle sedimentation measured using the LUMiSizer in n-dodecane and n-dodecane-d$_{26}$. The sedimentation velocity is greater in the unlabeled n-dodecane due to its lower density and viscosity compared to n-dodecane-d$_{26}$. 