Supporting Information

The spike in N_g was further confirmed by repeating the experiment on separate days and comparing the quartile-quartile plots for a normal distribution to the displacement distributions. An example of each of these confirmations is included below. **Figure S1** shows the non-Gaussian, N_g, and alpha, α, parameters as a function of time, t for a repeated 40 mg/mL TPEG sample. Here, the spike in N_g occurred at t = 16 minutes, whereas the spike in N_g occurred at t = 19 minutes on a different day, as reported in the main text. As the resolution in time for the SPT is ± 2 minutes, good agreement exists between trials from different days. **Figure S2** shows the quartile-quartile plots comparing a normal Gaussian distribution to the displacement distributions of the 30 mg/mL TPEG sample at t = 10, 27, and 37 minutes at a τ of 1 s, the sample time points shown in **Figure 6** of the main text. In a and c, most data points, blue crosses, fall on the red dashed line, which indicates the displacements are well described by a Gaussian distribution. In b, however, only the central portion of data points fall on the red dashed line, and larger displacements deviate from what would be expected for a Gaussian distribution. These deviations from the normal Gaussian distribution at intermediate t corroborate the observed large N_g values. **Table S1** gives the fitted parameters of the Gaussian fit to the displacement distributions of the 30 mg/mL TPEG sample at t = 10, 27, and 37 minutes for $\tau = 0.08$, 0.4, and 1 s, including the base, y_0, center of the distribution, x_c, the area under the fitted curve, A, and the full width at half maximum (FWHM) of the distribution, w.
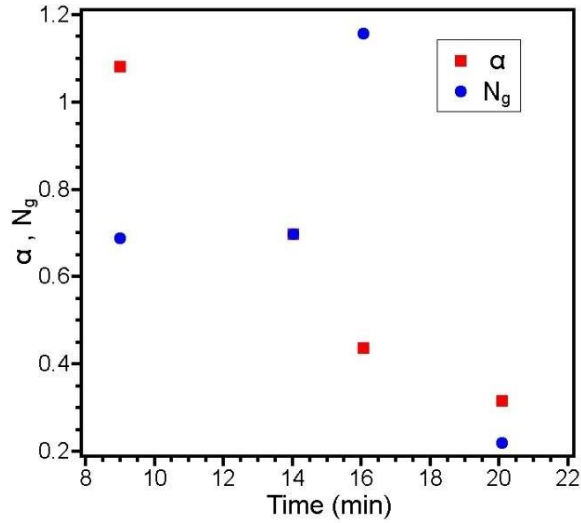
Figure S1: Non-Gaussian, N_g, and alpha, α, parameters as a function of time, t for a repeated 40 mg/mL TPEG sample.
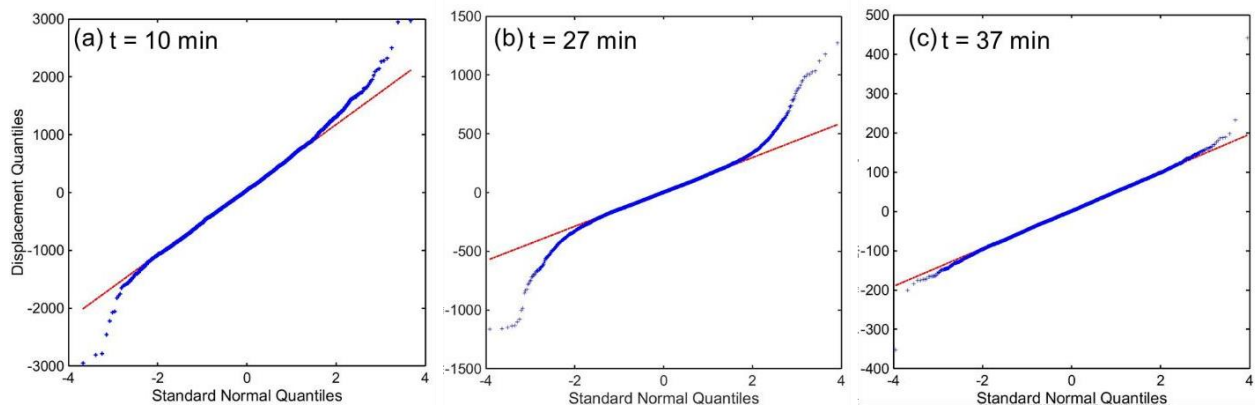

Figure S2: Quartile-quartile plots comparing a normal Gaussian distribution to the displacement distributions of the 30 mg/mL TPEG sample at t = (a) 10, (b) 27, and (c) 37 minutes at a τ of 1 s, the sample time points shown in **Figure 6** of the main text.

Table S1: Fitted parameters for a normal Gaussian distribution to the displacement distributions of the 30 mg/mL TPEG sample at t = (a) 10, (b) 27, and (c) 37 minutes at a τ of 1 s, the sample time points shown in **Figure 6** of the main text. y_0 is the base, x_c is the center of the distribution, A is the area under the curve, and w is the full width-half maximum of the distribution.

	10 minutes			27 minutes			37 minutes		
τ	0.08 s	0.4 s	1 s	0.08 s	0.4 s	1 s	0.08 s	0.4 s	1 s
y_0	1.16E-05	5.40E-06	8.59E-06	2.62E-05	1.57E-05	5.79E-06	7.70E-06	8.45E-06	1.46E-05
x_c	5.6	38.8	165.8	0.4	5.1	11.4	0.3	2.5	6.3
A	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0
w (nm)	542.3	1294.9	1924.2	185.8	332.8	452.5	90.0	113.3	120.4