More Fluorous Surface Modifier Makes it Less Oleophobic: Fluorinated-Siloxane Copolymer/PDMS Coatings.

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Supplementary Information.

1. Dynamic Light Scattering

The mean particle size (z-average) is calculated according to the Stokes-Einstein equation.[1]

$$d = \frac{kT}{3\pi\eta D} \qquad \text{Eq. (1)}$$

where, d is the hydrodynamic diameter, k is the Boltzmann's constant, T is absolute temperature, D is translational diffusion coefficient, and η is the viscosity. The solvent viscosity at room temperature, 800 cSt, was used for convenience during measurements. A correction was made later to account for dependence of viscosity on temperature. PDMS solvent viscosities at different temperatures were calculated based on a viscosity-temperature coefficient (VTC) of 0.6. Assuming a linear relationship in the temperature range of 38 – 99 ºC,[2] VTC is defined as:

$$VTC = 1 - \frac{\text{viscosity @ 99 °C}}{\text{viscosity @ 38 °C}} \qquad \text{Eq. (2)}$$

This linear relationship is assumed valid within the temperature range investigated. Given the PDMS solvent viscosity of 800 cSt at 25 ºC, Eq. (2) can be converted to

$$\Delta\eta / \Delta T = 7\text{cSt/°C}$$

Eq. (3)

Therefore, the corrected particle size, d_{corr} can be calculated from the corrected viscosity at given temperature by

$$d_{corr} = d \bullet k_{\eta}$$

Eq. (4)

with $k_{\eta} = 800/[800 - 7T]$ and T is temperature in ºC.

The fit of data points is done by the cumulants analysis from which the z-average diameter and polydispersity index are calculated according to ISO13321. The data points used in the analysis are from the actual data in the correlation function obtained by

selecting a sub-set of points geometrically spaced and normalizing these by subtracting the baseline

The sizes are in z-average diameter, as derived from DLS measurements. For each condition, 16 measurements were done and the average of the z-average diameter was taken as the particle size and the standard error was reported as the error in Table 1.

References

(1) ISO13321; Particle size analysis -- Photon correlation spectroscopy: 1996.

(2) Coefficient and VTC definition equation is provided by Gelest, Inc in the "Silicon Compounds: Silanes &Silicones" catalog (2008) for a trimethylsiloxy terminated PDMS compound with same molecular weight and viscosity as the silanol terminated PDMS used for DLS study.