Polymer - Induced Recovery of Nanoparticles from Microemulsions
Supporting Information

Olesya Myakonkaya* Julian Eastoe*† Kevin J. Mutch*‡
Isabelle Grillo§

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1 Scattering for Schultz polydisperse spheres with an attractive square-well potential

The scattering from a dispersion of polydisperse spherical droplets of radius R, volume V_p, volume fraction ϕ_p and coherent scattering length density ρ_p, dispersed in a medium of density ρ_m, can be expressed as[1]:

$$I(Q) = \phi_p(\rho_p - \rho_m)^2 V_p \left[\sum_i (P(Q)X \right] S(Q) \tag{1}$$

$P(Q)$ is the form factor of a homogeneous, monodisperse sphere of radius R, defined as[1]:

$$P(Q) = \left[\frac{3\,(sin(QR) - (QR)cos(QR))}{(QR)^3} \right]^2 \tag{2}$$

X is a Schultz distribution function, which can be expressed as[2]:

*School of Chemistry, University of Bristol, Bristol, BS8 1TS, UK
†E-mail: Julian.Eastoe@bristol.ac.uk
‡Current address: Condensed Matter Physics Laboratory, Heinrich-Heine-University, Universitätsstrasse 1, D-40225 Düsseldorf, Germany.
§Max-Von-Laue-Paul-Langevin, BP 156-X, F-38042 Grenoble Cedex, France

$$X = \left(\frac{Z+1}{R^{av}}\right)^{Z+1} R^Z \exp\left[-\left(\frac{Z+1}{R^{av}}\right) R\right] \frac{1}{\Gamma(Z+1)}, Z > -1 \tag{3}$$

where R^{av} is the average radius, $\Gamma(X)$ is the gamma function, Z - width parameter, related to the mean root square deviation of the radius:

$$\delta = \frac{R^{av}}{(Z+1)^{1/2}} \tag{4}$$

The structure factor $S(Q)$ was described by Sharma and Sharma as[3]:

$$S(Q) = \frac{1}{1 - c(Q)} \tag{5}$$

where the total direct correlation function $c(Q)$ can be written as a sum of the hard sphere (c_{hs}) and square-well (c_{sw}) direct correlation functions: $c(r) = c_{hs} + c_{sw}$.

References

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[3] Sharma, R.; Sharma, K. *Physica* **1977,** *89A*, 213 – 218.