Electronic supplementary information

Derivation equation 2:

$$f_{Vol}^{Theory} = \frac{V_{DBP}^{caps} \cdot n_{DBP}}{V_{DCPD}^{caps}}$$

This denotes the volume fraction: the liquid volume in all the small capsules ($V_{DBP}^{caps} \cdot n_{DBP}$) divided by the liquid volume in a big capsule (V_{DCPD})

The volume of a small capsule can be written as:

$$V_{DBP}^{caps} = \tfrac{1}{6} \cdot \pi \cdot d^3$$

The volume of a big capsule can be written as:

$$V_{DCPD}^{caps} = \tfrac{1}{6} \cdot \pi \cdot D_{eff}{}^3$$

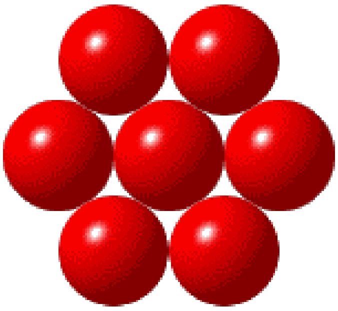
in which D_{eff} is the effective capsule diameter (corrected for the shell wall thickness, h)

$$D_{eff} = D - 2h$$

The amount of small capsules (n_{DBP}) in a monolayer can be calculated from the total area of the bigger sphere and the size of the capsules. The total area (on the inside of the shell wall) of the DCPD capsule is given by:

$$A_{DCPD}^{caps} = \pi \cdot D_{eff}^2$$

Now assuming a 2D hexagonal packingof the capsules:



$$A_{DCPD}^{2D\_hexagonal} = A_{DCPD}^{caps} \cdot \frac{\pi}{2\sqrt{3}}$$

The surface area necessary to place one single small capsule can be assumed to be:

$$A_{DBP}^{caps} = \tfrac{1}{4} \cdot \pi \cdot d^2$$

Thus, n_{DBP} can be found by taking the total (inner) sphere surface area of a DCPD capsule, taking into account perfect hexagonal packing, and the area required to place a single DBP capsule on the surface:

$$n_{DBP} = \frac{A_{DCPD}^{2D\_hexagonal}}{A_{DBP}^{caps}} = \frac{\pi \cdot D_{eff}^2}{\tfrac{1}{2}\sqrt{3} \cdot d^2}$$

Substituting all the known parameters in the first equation given, this results in:

$$f_{Vol}^{Theory} = \frac{V_{DBP}^{caps} \cdot n_{DBP}}{V_{DCPD}^{caps}} = \frac{\tfrac{1}{6} \cdot \pi \cdot d^3}{\tfrac{1}{6} \cdot \pi \cdot D_{eff}^3} \cdot \frac{\pi \cdot D_{eff}^2 \cdot \varphi}{\tfrac{1}{2}\sqrt{3} \cdot d^2} = \frac{\pi \cdot d \cdot \varphi}{\tfrac{1}{2}\sqrt{3} \cdot D_{eff}}$$

wherein φ = 1 for a monolayer.