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Supporting Information

Surface-induced crystallisation of Sodium Dodecyl Sulfate (SDS) micellar solutions in confinement

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DLS measurements

Present DLS measurements of the minimum solubility temperature of SDS solutions $T_{C,C}$ were compared to conventional DSC measurements reported in the literature, see Fig. S1.

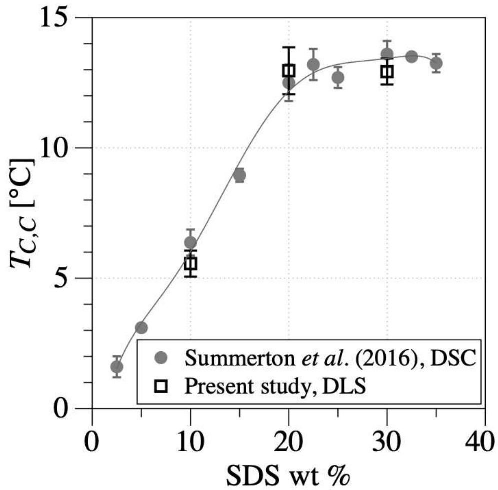

Figure S1: Comparison of present DLS measurement of cooling crystallisation with those reported in the literature using DSC.[1]

Surface-area to volume ratio

The surface-area to volume ration ($SA : V$) is estimated for the 1 mL sample in the DLS cuvette and the < 1 μL sample in the microdroplet experiment as illustrated in Fig. S2.

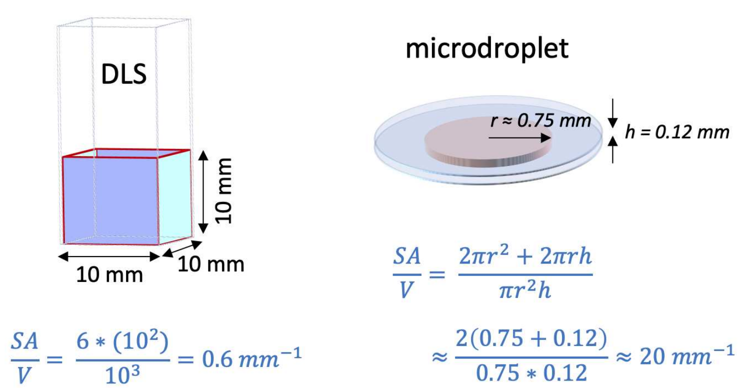

Figure S2: Estimation of $SA : V$ in different experimental settings.

Surface free energy

Surface free energy values were extracted from literature for the different materials used in this study.[2–6] Both polar and dispersive components of the surface energy are reported in Fig. S3a. Induction time t_i measurements showed a monotonic decrease upon increasing the total surface free energy (Fig. S3b). This is expected to be mainly attributed to the polar component of the surface energy since no clear correlation was found with the dispersive term (Fig. S3c).

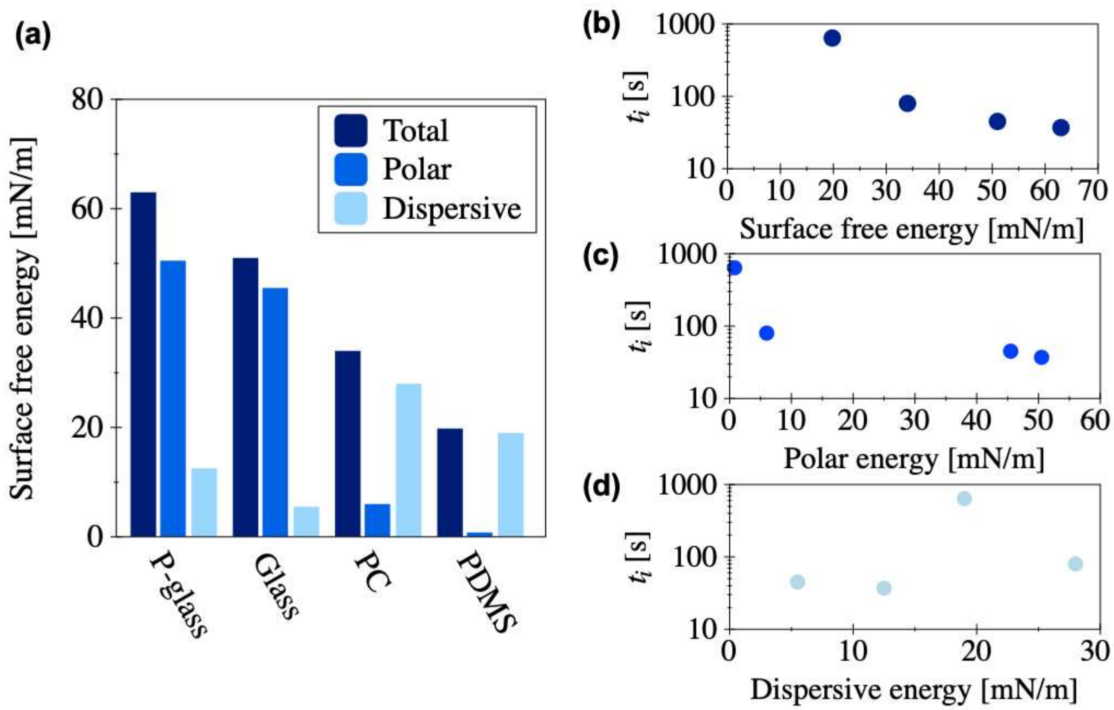

Figure S3: (a) Surface free energy and its components extracted from reports in the literature for various substrates used in this study. Induction time measurement vs. total (b), polar contribution (c) and dispersive contribution (d) of surface energy.

Surface roughness

Contact angle measurements for DI water droplets are reported in Fig. S4.

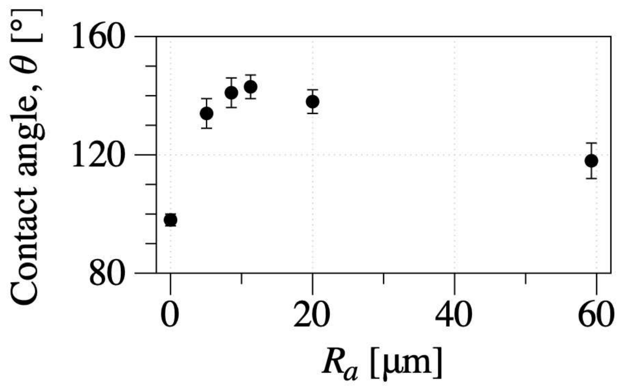

Figure S4: Effect surface roughness of PDMS on water contact angle.

Surface roughness measurements are summarised in Table. S1.

Table S1: Surface roughness measurements for PDMS substrates casted on sandpaper.

Grid no.	R_a [μm]	R_q [μm]	R_v [μm]	R_p [μm]	R_z [μm]	surface area [mm^2]
flat PDMS	-	-	-	-	-	16
3000	5	6	29	25	54	2121
2000	9	11	40	41	81	14237
1000	11	14	61	53	115	9929
400	11	13	45	69	114	36173
60	60	76	179	334	513	43597

References

(1) Summerton, E.; Zimbitas, G.; Britton, M.; Bakalis, S. Crystallisation of sodium dodecyl sulfate and the corresponding effect of 1-dodecanol addition. *Journal of Crystal Growth* **2016**, *455*, 111–116.

(2) Kirby, B. J.; Hasselbrink Jr., E. F. Zeta potential of microfluidic substrates: 2. Data for polymers. *ELECTROPHORESIS* **2004**, *25*, 203–213.

(3) Naseh, N.; Mohseni, M.; Ramezanzadeh, B. Role of surface active additives on reduction of surface free energy and enhancing the mechanical Attributes of easy-to-clean automotive clearcoats: Investigating resistance against simulated tree gum. *Int. J. Adhes. Adhes.* **2013**, *44*, 209–219.

(4) Zhang, R.; Somasundaran, P. Advances in adsorption of surfactants and their mixtures at solid/solution interfaces. *Adv. Colloid Interface Sci.* **2006**, *123-126*, 213–229.

(5) McKechnie, D.; Anker, S.; Zahid, S.; Mulheran, P. A.; Sefcik, J.; Johnston, K. Interfacial Concentration Effect Facilitates Heterogeneous Nucleation from Solution. *The Journal of Physical Chemistry Letters* **2020**, *11*, 2263–2271.

(6) Vitha, M. F.; Carr, P. W. Study of the Polarity and Hydrogen-Bond Ability of Dodecyltrimethylammonium Bromide Micelles by the KamletTaft Solvatochromic Comparison Method. *J. Phys. Chem. B* **1998**, *102*, 1888–1895.