Morphology Modulation in Evaporative Drying Mediated Crystallization of Sodium Chloride Solution Droplet with Surfactant

Nandita Basu and Rabibrata Mukherjee*

Instability and Soft Patterning Laboratory, Department of Chemical Engineering,
Indian Institute of Technology Kharagpur, Pin 721 302, West Bengal, India

Supporting Information

SDS and NaCl being ionic dissociate into ions in aqueous solutions. The total **molality** (***m***) of the mixture $\hat{m}$ given as[1]

$$\hat{m} = 2m_1 + 2m_2 \text{.....(1)}$$

Where $\mathbf{m_1}$ and $\mathbf{m_2}$ are the **molalities** of NaCl and SDS respectively

Mole fractions of NaCl and SDS ($\hat{x}_1$ and $\hat{x}_2$) are calculated as:

$$(\hat{x}_1) = \frac{2m_1}{\hat{m}} = \frac{m_1}{(m_1 + m_2)} \text{.....(2)}$$

$$(\hat{x}_2) = \frac{2m_2}{\hat{m}} = \frac{m_2}{(m_1 + m_2)} \text{.....(3)}$$

Based on the above consideration the values of m_1, m_2, $\hat{x}_1$ and $\hat{x}_2$ for surfactant containing different NaCl solutions calculated by us is given in Table SI1

$\mathbf{C_n}$ **(M)**	0.08	0.1	0.3	0.5	0.7	1.0	2.0
$\mathbf{C_{SDS}}$ **(M)**	0.017	0.017	0.017	0.017	0.017	0.017	0.017
$\hat{m}$ **(m)**	0.197	0.234	0.634	1.034	1.434	2.034	4.034
$\hat{X}_1$	0.825	0.854	0.946	0.967	0.976	0.983	0.992
$\hat{X}_2$	0.175	0.145	0.054	0.033	0.024	0.017	0.0084

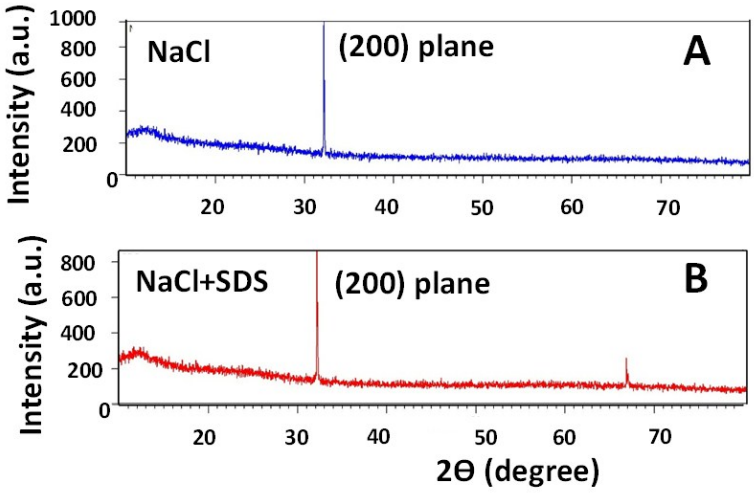

Figure S1: *XRD spectra of the deposits obtained from a droplets with* C_n *= 2.0 M with (A) No surfactant and (B)in presence of surfactant.*

From figure S1 it can be seen that the crystal structure of the deposited NaCl crystals remain same even when SDS is added, though the deposition morphology differs significantly in the two cases.

References

1 H. Iyota, R. Krastev, *Colloid Polym Sci*, 2009, **287**, 425–433.