Electronic Supplementary Material (ESI) for Soft Matter.


(Electronic Supplementary Information)

# Kinetics in directional drying of water that contain deformable non-volatile oil droplets

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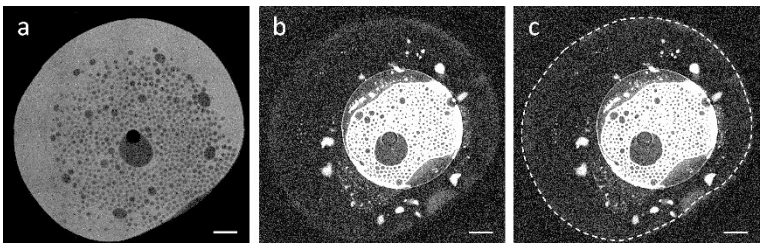


Fig. S1 Fluorescent images of a drying sample with the C12EO30. Emission from fluorescein in water phase was detected. (a) 1 min and (b) 88 min after drying. (c) is the same image as (b) but the initial contact line in (a) is superimposed as the dashed line. We note that contrast and brightness of (b) and (c) are changed to emphasize weak emission. We observed weak emission from the “dried” initial contact area even after the contact line had moved inward. We also observed several bright spots around the drying sample in (b). These images clearly show that there were residues within the dried area, probably because condensed surfactant was left there, which would affect distribution of water vapour between the two parallel plates. Scale bars are 0.5 mm. See the main text for more detailed discussion.

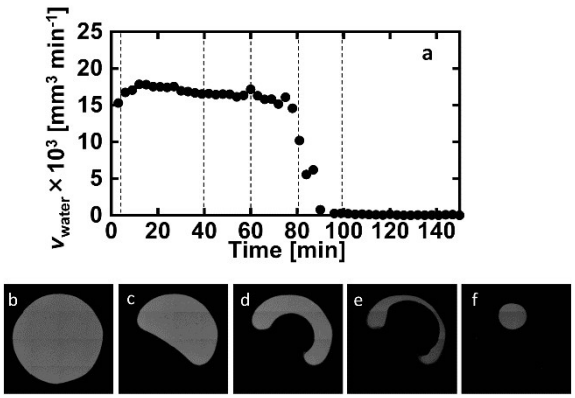


Fig. S2 Drying kinetics of an aqueous solution made using the C12EO15 without oil droplets. (a) Time-dependent drying rates and images of the whole shape of the solution at each drying time, (b) 3 min, (c) 39 min, (d) 60 min, (e) 81 min and (f) 99 min, respectively. The dashed vertical lines in (a) correspond to the drying times for images of (b) to (f). Diameter of the whole solution in (b) is about 4 mm. This drying experiment was conducted at 37°C and a relative humidity of about 60%. We note that the initial concentration of the C12EO15 was 100 mM in this experiment, 10 times higher than that used in the main manuscript. Actually, we conducted drying of the 10 mM aqueous solution of the C12EO15 without oil droplets. However, it buckled in the last stage of drying and therefore only limited data of drying rates after buckling was available in this case. In this work, drying sample which buckles in an early stage of drying is more preferable to examine the effect of buckling on drying rates. Therefore we used the 100 mM sample in this experiment. We also note that a high initial concentration of surfactant shortens the drying time for buckling. This indicates that a rheological property of drying samples relates to the buckling.