Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Position-dependent rates of film growth in drying colloidal suspensions on tilted air-water interfaces

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Table S1 List of A for various conditions for which H, T, suspension (particle diameter d), or φ_0 is changed. For all of the drying experiments, W and θ_0 are equally set to be approximately 5 mm and 45°, respectively

	Suspension	H [mm]	T [°C]	φ_0 [-]	A [-]
Standard condition	KE-W30	0.1	20	0.10	2.1
	KE-W30	0.05	20	0.10	2.1
	KE-W30	0.2	20	0.10	2.1
	KE-W30	0.1	5	0.10	2.7
	KE-W30	0.1	40	0.10	2.1
	Snowtex-OL	0.1	20	0.11	2.7
	KE-W10	0.1	20	0.09	2.1
	MP-2040	0.1	20	0.25	2.9
	KE-W30	0.1	20	0.033	2.9
	KE-W30	0.1	20	0.020	2.9

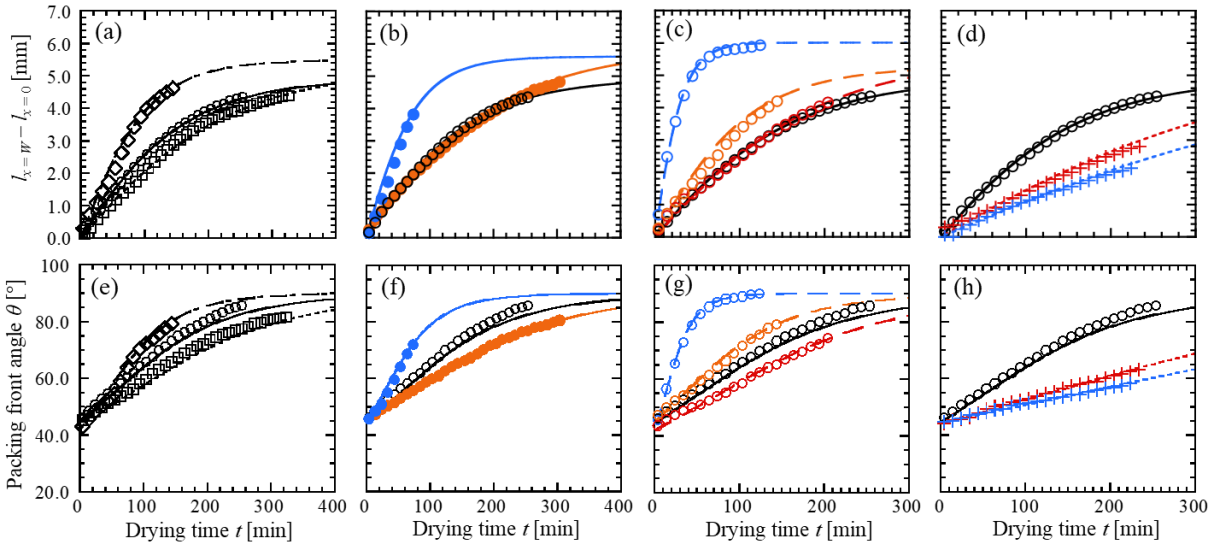

Figure S1 Time evolution of (a–d) $l_{x=W} - l_{x=0}$ (e-h) θ for a series of experiments listed in Table S1 whereas the lines show mathematical models calculated from Eq. (5) and (7). (a, d) H = 0.05 mm (black open diamonds and black chain line) and 0.2 mm (black open squares and black dotted line). (b, f) T = 5 °C (orange solid circles and orange solid line) and 40 °C (blue solid circles and blue solid line). (c, g) d = 62 nm (Snowtex-OL, orange open circles and orange broken line), 98 nm (KE-W10, red open circles and red broken line) and 2.9 × 10^2 nm (MP-2040, blue open circles and blue broken line). (d, h) φ_0 = 0.033 (red plus signs and red dotted line) and 0.020 (blue plus signs and blue dotted line). Black open circles and black solid line in each figure show the experimental results and the model calculations at the standard condition (H = 0.1 mm, T = 20 °C, d = 3.3 × 10^2 nm and φ_0 = 0.10). In the model calculation, A in Table S1 is used for each calculation.

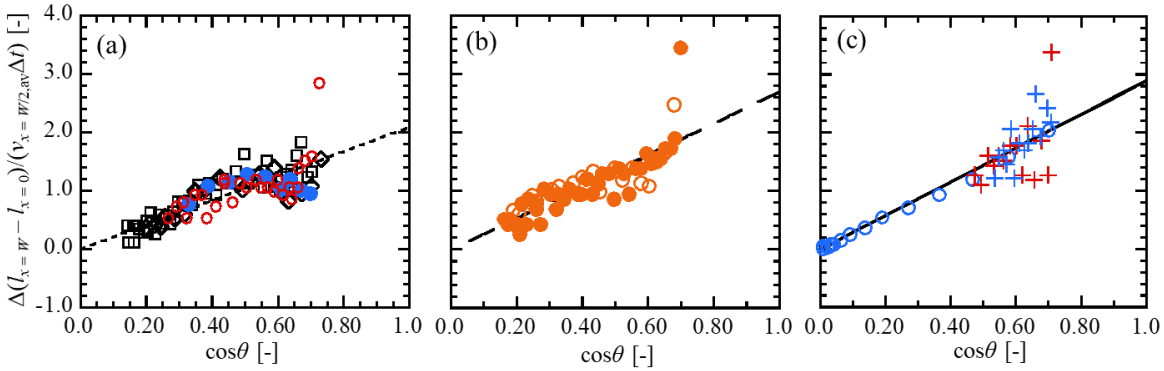

Figure S2 Normalized $\Delta(l_{x=W}-l_{x=0})/\Delta t$ by $v_{x=W/2,\mathrm{av}}$ in terms of cosθ for the data in Fig. S1. Time interval Δt is set to be 16 min for the samples of φ_0 = 0.033 and 0.020, and 8 min for the other samples. Each symbol corresponds to that in Fig. S1 and these data are summarized by different A values as listed in Table S1. (a) Samples of H = 0.05 mm (black open diamonds), H = 0.2 mm (black open squares), T = 40 °C (blue solid circles) and d = 98 nm (red open circles). (b) Samples of T = 5 °C (orange solid circles) and d = 62 nm (orange open circles). (c) Samples of $d = 2.9 \times 10^2$ nm (blue open circles), φ_0 = 0.033 (red plus sign) and φ_0 = 0.020 (blue plus sign). Dotted, broken, and solid lines in (a), (b), and (c) correspond to Eq. (3) in which A is set to be 2.1, 2.7, and 2.9, respectively.

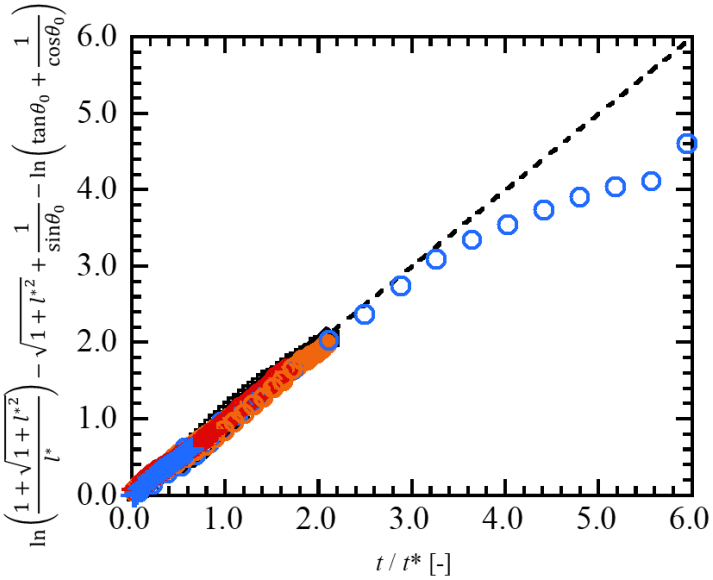

Figure S3 Correlation between the left-hand and right-hand sides in Eq. (5) calculated from the experimental data in Fig. S1(a-d). Dotted line indicates the theoretical line expressing Eq. (5). Each symbol corresponds to that in Fig. S1 and A is set for each drying experiment as listed in Table S1.

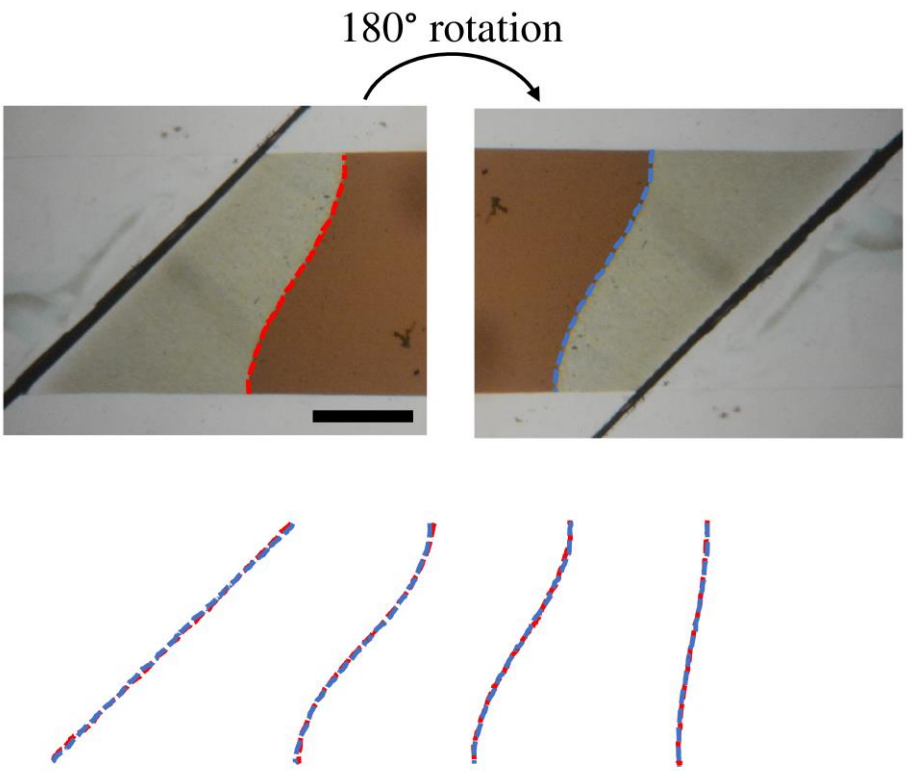

Figure S4 (Top) Shape of packing front at t = 120 min before (red dotted line) and after rotation (blue dotted line) by 180°. The drying interface of the cell, θ_0, was set as 45°. Scale bar shows 2 mm. (Bottom) Superimposition of the two dotted lines at t = 0, 80, 120, 240 (Left to right).

Movie S1

Growth of the packed film in the drying cell in which the drying interface is set to be perpendicular to spacers ($\theta_0 = 92°$). 0.1 s in the movie corresponds to 1 min in real observation.

Movie S2

Growth of the packed film in the drying cell in which the drying interface is set to be tilted with an angle of 45° to the spacer ($\theta_0 = 45°$). 0.1 s in the movie corresponds to 1 min in real observation.