18e RENCONTRE DU NON LINÉAIRE (17-19 mars 2015)

Self-patterning induced by evaporation and a solutal Marangoni effect

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Motivation…

→ Applications in printing, painting

and coating processes

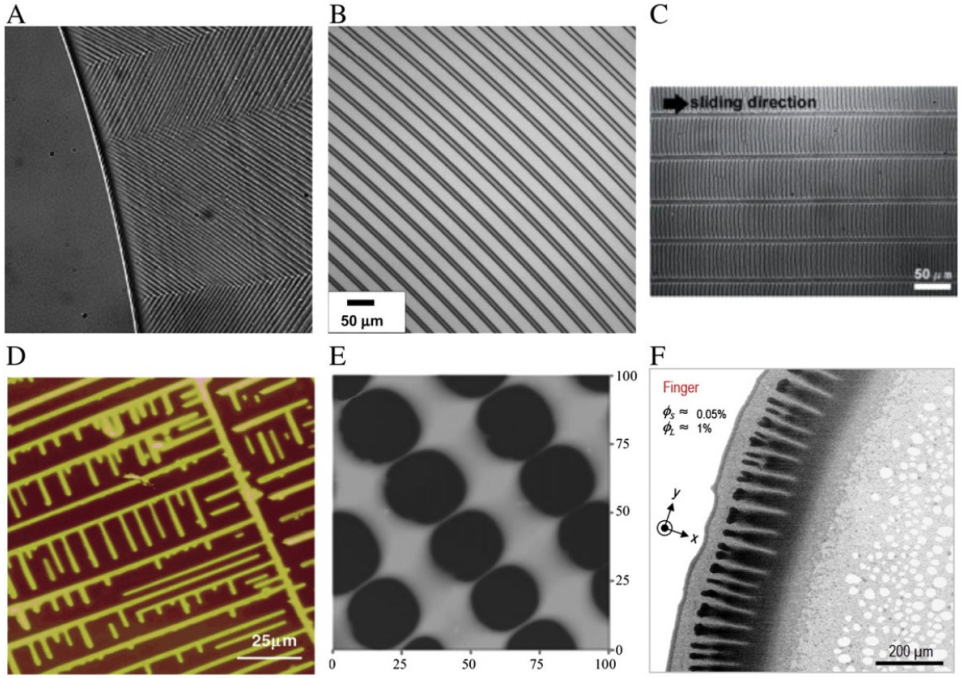
→ Understanding the underlying inter-facial effects on small scale responsible for deposition of such patterned homogeneous layers

Phenomena…

→ Drying of a binary solution in a meniscus: volatile solvent (water) + non-volatile solute (polymer)

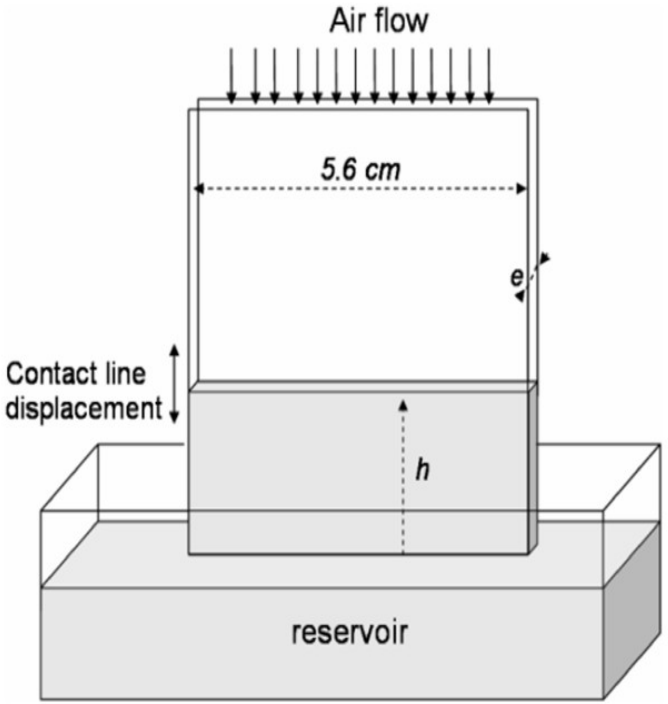
→ Processes involved: Solutal Marangoni effect, Evaporation, Substrate motion, Diffusion

Patterns…

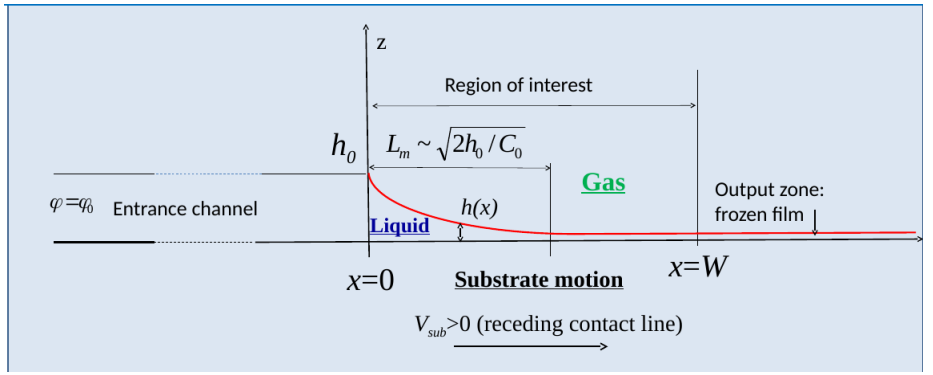


U. Theile, Adv. In Colloid and Interface Science 206 (2014) 399-413.

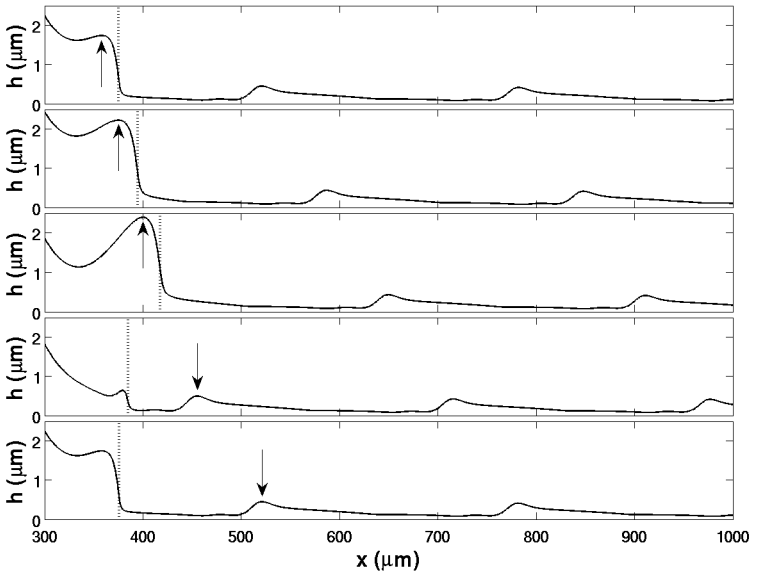
Experimental Set up…



Hydrodynamic model…



Numerical Results…



Periodic time evolution of the meniscus edge Vsub = 30 μm/s, f_o=0.01, τ = 8.69s. The black arrow indicates the bump top. The vertical dotted line is the position of the drying front.