

Viscous Fingering Instability in Liquid Crystals

Qing Zhang*, Shuang Zhou#, Irmgard Bischofberger*

*MIT, #UMass Amherst



Dendritic growth



Dense-branching growth

Patterns created as silicone oil displaces the higher viscosity liquid crystal Sunset Yellow. An increase in the flow rate induces a morphology transition from dendritic growth to dense-branching growth.

Sunset Yellow in the nematic phase has different viscosities along different shear directions. This anisotropy in the interfacial dynamics leads to dendritic growth at low flow rate. The liquid crystal is in the nematic phase and aligned planar circularly in a Hele-Shaw cell (top half of images).