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Gravitational Drainage of Superspreader Films Stabilized by Disjoining Pressure[1] SOUMYADIP SETT, RAKESH SAHU, SUMAN SINHA-RAY, ALEXANDER YARIN, University of Illinois at Chicago — Gravitational drainage from plane vertical films of two superspreaders SILWET L-77 and BREAK-THRU S278 and their respective "cousin" non-superspreaders SILWET L-7607 and BREAK-THRU S233 is studied experimentally and theoretically. The non-superspreader films showed ordered interferometric color bands, similar to those of ordinary surfactants and the film thickness decreased linearly in time. Their counterpart superspreaders showed complicated dynamic turbulent-like interferometric patterns and had an order of magnitude longer life time before bursting compared to that of the "cousin" non-superspreaders. The stabilization of the superspreader films and the nonlinear decrease of the film thickness with time are attributed to significant disjoining pressure associated with the van der Waals repulsion of the fluffy surfaces of the film formed by long superspreader bilayers hanging from the free surfaces. The non-superspreaders do not possess any significant disjoining pressure even in the film with thicknesses in the 30-50 nm range. The results show that gravitational drainage of vertical films is a useful simple tool for measuring disjoining pressure.

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Soumyadip Sett
University of Illinois at Chicago

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