

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**How droplets nucleate and grow on liquids and liquid impregnated surfaces**<sup>1</sup> SUSHANT ANAND, Massachusetts Inst of Tech-MIT, KONRAD RYKACZEWSKI, Arizona State University, SRINIVAS PRASAD BENGALURU SUBRAMANYAM, Massachusetts Inst of Tech-MIT, DANIEL BEYSENS, ESPCI-PMMH, KRIPA VARANASI, Massachusetts Inst of Tech-MIT — Condensation on liquids has been studied extensively in context of breath figure templating, materials synthesis and self-cleaning surfaces. However, the mechanics of nucleation and growth on liquids remains unclear, especially on liquids that spread on the condensate. By examining the energy barriers of nucleation, we provide a framework to choose liquids that can lead to enhanced nucleation. We show that due to limits of vapor sorption within a liquid, nucleation is most favoured at the liquid–air interface and demonstrate that on spreading liquids, droplet submergence within the liquid occurs thereafter. We provide a direct visualization of the thin liquid profile that cloaks the condensed droplet on a liquid impregnated surface and elucidate the vapour transport mechanism in the liquid films. Finally, we show that although the viscosity of the liquid does not affect droplet nucleation, it plays a crucial role in droplet growth.

<sup>1</sup>We acknowledge support from MIT Energy Initiative, Masdar Institute of Technology for Grant no. 69238330. SA thanks the support of Society in Science - Branco Weiss Fellowship.

Sushant Anand  
Massachusetts Inst of Tech-MIT

Date submitted: 14 Nov 2014

Electronic form version 1.4