

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Dynamic Wetting at MHz Vibration: Simple and Complex Liquid Films on an Ultrasonic Actuator OFER MANOR, GENNADY ALTHSHULER, SAMEER MHATRE, LUDMILA ABEZGAUZ, Technion — We excite simple and complex liquid films on ultrasonic actuators that produce a MHz substrate vibration in the form of a surface acoustic wave (SAW). Transfer of momentum from the MHz vibration in the solid substrate to the neighboring liquid translates to convective stresses within the liquid and on the film free boundary. These stresses further invoke various flow mechanisms, also known as acoustic streaming and may support dynamic wetting or dewetting of liquid films. In particular, we use theory and experiment to study the interplay between viscous, capillary, and the vibrational dynamics of liquid films and their internal structure. We employ MHz ultrasonic actuators to study the dynamic wetting and dewetting of free and confined films of oil and water/surfactant solutions on flat surfaces and within microfluidic channels. We further excite films of evaporating solutions and suspensions in order to study the active influence of the solid vibration on the geometry of the molecule and particle patterns that are deposited in this process. We show the physics underlying these different systems may be explained using the convective dynamics the MHz substrate vibration excites in liquid films.

Ofer Manor
TECHNION

Date submitted: 23 Jul 2015

Electronic form version 1.4