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A generalised view of high frequency substrate vibration induced wetting (Acoustowetting) OFER MANOR, Chemical Engineering, Technion - Israel Institute of Technology, Haifa, Israel, AMGAD REZK, JAMES FRIEND, LESLIE YEO, Micro/Nanophysics Research Laboratory, RMIT University, Melbourne, Victoria, Australia — High frequency surface vibrations, at frequencies comparable to the HF and VHF radio frequencies O(1–100 MHz), may be used for generating flow at the micron and submicron scale. Such high frequency vibrations are generated by piezoelectric actuators that transfer electric signals to kinetic energy, exciting different types of flow regimes when in contact with viscous fluids that are known in general as acoustic flow. Here we unravel a recently found wetting mechanism, observed in laboratory under the excitation of high frequency vibrations in the form of piston-like substrate motion and surface acoustic waves (SAWs). Wetting is excited by introducing acoustic flow layer of usually submicron thickness near the three phase contact line of liquid/solid systems. This wetting effect further gives rise to various peculiarities including film spreading at different directions according with periodic stability of the film thickness, formation of wave pulse trains, SAW diffraction induced film fingering, etc. We show high frequency vibration induced wetting is governed by a generalised theory that predicts the various physical peculiarities observed.

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