

Abstract Submitted  
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**Realtime Visualization of Surface Nanobubbles Formation** MANISH ARORA, CHON U. CHAN, CLAUS-DIETER OHL, Nanyang Technological University — Nanobubbles nucleate and reach a stable state on the solid-liquid interface after ethanol-water exchange. Understanding the thermodynamic stability beyond their formation requires observation of their dynamical response. Total internal reflection microscopy [1] allows resolving the dynamics of nanobubbles, i.e. their formation, shrinkage, and coalescence. While the lateral resolution is limited by diffraction, their tens of nanometer height profile can be nicely resolved. Here we report on nanobubble dynamics induced by the exchange process in a microfluidic channel on a glass surface. The water-ethanol mixing results in non-monotonic changes in the refractive index of the medium which can be inferred from TIRF images. Formation of attached nanobubbles at 50 frames per second is observed during the transition from water-to-ethanol as well as ethanol-to-water. Bubbles dissolve within a second in ethanol but persist in water. Though new nanobubbles keep appearing over several seconds, no further change in their size is observed. However, we find occasionally spontaneous merging of neighbouring nanobubbles which we relate to the liquid flow.

[1] Chan and Ohl, Phys. Rev Lett. 109, 174501 (2012)

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