

Abstract Submitted
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Homogeneous cavitation in microfluidics: a record high dynamic tensile threshold KEITA ANDO, AI-QUN LIU, CLAUS-DIETER OHL, Nanyang Technological University — An experimental technique is presented which allows one to measure the rupture strength of water using a microfluidic approach. A transparent microfluidic channel is filled with clean water, partially leaving an air-water interface. A focused infrared laser pulse within the liquid creates a spherical shock wave near the interface. The shock reflects, due to acoustic impedance mismatch, as a strong tension wave with high negative pressures. The liquid becomes stretched and at the homogeneous cavitation threshold ruptures with the nucleation of vapor bubbles. These bubbles are captured using an optical delay and very short exposure times. Reproducible observations of the bubble nucleation are obtained, supporting our claim of homogeneous bubble nucleation. Multicomponent Euler flow simulation estimates a tensile stress threshold of -60 MPa, which is the largest reported tension for dynamic measurements.

Keita Ando
Nanyang Technological University

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