

Abstract Submitted
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Experimental and Modeling Analysis of the Single Micro Bubble Generation by Micro Plasma in Water¹ PENG XIAO, DAVID STAACK, Mechanical Engineering Department, Texas A&M University, PLASMA ENGINEERING AND DIAGNOSTIC LABORATORY TEAM — A single micro bubble (maximum diameter 50 to 600 μm) is shown to be formed by a single nanosecond duration micro plasma in liquid. The micro scale corona plasma discharges are created at the tip of a micro-electrode with high energy density. Discharge conditions are controllable with tip diameter 1 μm , applied voltage 5 kV to 10 kV, discharge duration 10 ns to 1 μs and discharge energy 1 mJ to 50 mJ per pulse. The energy input from the micro plasma to generate the micro bubble and to support its growth vary, which leads to variations in the rate of growth, maximum diameter, and the number of growth-collapse cycles of the micro bubble. These micro plasma based micro bubbles are visualized using a microscope based shadow graph system and two high speed cameras. The micro plasma discharge is captured with nano-second gating using an ICCD and the micro bubble generation and growth is recorded using million fps CCD video camera. The micro bubbles are found repeatedly generated. A Payleigh-Plesset model for growth and collapse of cavity bubble are compared to micro bubble videos and used to estimate the time dependent pressure, temperature and mass of the micro bubbles.

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