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Experimental study of electric discharge propagation in gas bubbles in liquid JESSICA FAUST, Worcester Polytechnic Institute, SOPHIA GERSHMAN, Princeton Plasma Physics Laboratory — The studies of pulsed electrical discharges in gas bubbles in liquids continue to generate interest by their practical applications to the water treatment as well their theoretical significance for the understanding of the discharge propagation along liquid surfaces. Computational models suggest that the discharge path depends on the ratio of the dielectric constant of the liquid and the gas [1]. This study investigates the formation and propagation of the discharge inside a gas bubble in water and glycerin (dielectric constants of approximately 80 and 41, respectively, at 20 C). The discharge is generated by a 1 μs pulse of 10 - 15 kV applied between a needle electrode piercing the bubble wall and a disk electrode submerged in the liquid. Time-resolved 5 - 10 ns exposure ICCD images are used to compare the discharge path in Ar, O_2, and air bubbles in the two liquid dielectrics. 10 nm bandpass filters are used to image the behavior of various excited species, ex. Ar+, OH. Experimental results are compared to the previous modeling results [1].

[1] N. Yu Babaeva, M. Kushner, J. Phys. D 42, 132003 (2009)

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