Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

Numerical investigation of the interaction of positive streamers with bubbles floating on a liquid surface[1] NATALIA YU. BABAEVA, GEORGE V. NAIDIS, Joint Institute for High Temperatures Russian Academy of Sciences, MARK J. KUSHNER, University of Michigan — Streamer discharges in air intersecting with liquids are being investigated to produce reactivity in the liquid. In this talk, we discuss results from a 2-d computational investigation of streamers in air intersecting an isolated liquid, air filled bubble floating on a liquid surface. The 15 mm diameter bubble is conducting water ($\varepsilon/\varepsilon_0$ =80, σ =7.5 x 10^{-4} Ω^{-1} cm^{-1}) or transformer oil ($\varepsilon/\varepsilon_0$ =2.2, σ =1.5 x 10^{-13} Ω^{-1} cm^{-1}) [1]. A needle electrode is positioned d=0–10 mm from the bubble center. With a water bubble (d=0) the streamer slides along the external surface but does not penetrate the bubble due to electric field screening by the conducting shell. If the electrode is shifted (d=3-10 mm) the streamer deviates from the vertical and adheres to the bubble. If the electrode is inserted inside the bubble, the streamer path depends on how deep the electrode penetrates. For shallow penetration, the streamer propagates along the inner surface of the bubble. For deep penetration the streamer takes the shortest path down through the gas. Due to the low conductivity of the oil bubble shell the electric field penetrates into the interior of the bubble. The streamer can then be re-initiated inside the bubble. Charge accumulation on both sides of the bubble shell and perforation of the shell will be also discussed. [1] Yu Akishev et al, *Plasma Sources Sci. Technol.* **24,** 065021 (2015).

[1]NYB, GVN supported by Russian Sci. Found. (14-12-01295). MJK by US Natl. Sci. Found. and Dept. of Energy.

Mark Kushner
Univ of Michigan - Ann Arbor

Date submitted: 09 Jun 2016 Electronic form version 1.4