

Abstract Submitted
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Plasma Production in Liquids: Bubble and Electronic Mechanisms¹ NATALIA YU. BABAEVA, MARK J. KUSHNER, University of Michigan, Ann Arbor, MI USA — Plasma production in or on liquids is of interest for water purification and plasma medicine. Modes of plasma formation in liquids include the bubble and electronic mechanisms. The first relies on the large E/N afforded by gas bubbles in the liquid to initiate plasmas which, through vaporization processes, eventually form gaseous conducting channels. This occurs in polar molecular liquids such as water. The second is similar to the breakdown of gases by electron impact ionization, and occurs in non-polar liquids having mobile charged particles such as liquid Ar (LAr). We have numerically investigated these processes using a 2-dimensional plasma hydrodynamics model in which liquids are treated the same as plasma with density dependent polarizations. Models for charge transport in high permittivity-polar liquids (e.g., electron solvation/hydration, proton hopping) and in low-permittivity non-polar liquids have been developed. We will discuss plasma propagation in water through chains of bubbles, bubble formation, the role of photo-ionization and charge injection from the liquid into bubbles. Breakdown in non-polar liquids (e.g., LAr) will be discussed from the perspective of gas streamer formation. Applications to wound healing will be shown.

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