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Nonequilibrium liquid plasma - dynamics of generation and quenching ANDREY STARIKOVSKIY, YONG YANG, YOUNG CHO, ALEXANDER FRIDMAN, DREXEL UNIVERSITY TEAM — Typically plasmas in liquids are only considered to exist through the ionization of gases and typical production of plasmas in liquids has generated bubbles through heating or via cavitation and sustains the plasmas within those bubbles. Is it possible to produce liquid plasma without cracking and voids formation? We used a pulsed power system with 32 and 224 kV pulse amplitude, 12 and 0.4 ns pulse duration, 150 ps rise time. Discharge cell had point-to-plate geometry with a tip diameter of 100 μm. The measurements were performed with the help of 4Picos ICCD camera. It was found that discharge in liquid water forms in picosecond time scale. Emission intensity increase and plasma formation took 200-300 ps. Excited region size was $\sim$ 1 mm. After this initial stage emission rapidly decreased and plasma region becomes almost invisible in 500 ps. The absence of the emission during the rest of the pulse is explained by electrical field decrease on the boundary of conductive zone. Thus we have demonstrated possibility of formation of nonequilibrium plasma in liquid phase and investigated the dynamics of excitation and quenching of nonequilibrium plasma in liquids.

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