Abstract Submitted
for the GEC19 Meeting of
The American Physical Society

Nanosecond-pulsed discharges in liquid nitrogen for synthesis of polynitrogen materials[1] DANIL DOBRYNIN, ROMAN RAKHMANOV, ALEXANDER FRIDMAN, Drexel University — Low power nanosecond-pulsed discharges in liquids are typically characterized by relatively small sizes (on the order of mm) and high densities (from 10^{17} to 10^{20} cm^{-3} in different experiments) and are believed to be generated, or at least initiated, directly in liquid phase before formation of gaseous voids or bubbles. Although spectroscopic measurements of heavy particles temperature ("gas" temperature) is extremely difficult in low energy nanosecond-pulsed discharges, especially in the case of water discharges where the emission spectra show broad-band continuum, estimations from OH emission from the secondary "bubble" phase of the discharge show that the discharge is actually non-thermal (˜100-200 K increase of associated temperature). In this study we focus on characterization of nanosecond-pulsed discharge in liquid nitrogen, specifically, imaging and estimation of temperature from spectroscopic measurements. First temperature estimations from the molecular nitrogen emission shows maximum temperature increase on the order of 60 K which is advantageous for non-thermal material synthesis in liquid phase. In addition, we report on observations of generation of unstable "energetic" material directly from liquid nitrogen, which may be preliminarily identified as a form of polynitrogen compound.

[1]This work was supported by the Army Research Office (grant W911NF-17-1-0597, PI: Dobrynin).

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Date submitted: 29 May 2019 Electronic form version 1.4