Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

Studies of discharges in high conductivity liquids using fast imaging and simulations. LEONIDAS ASIMAKOULAS, MOHAMMAD KARIM, TOM FIELD, BILL GRAHAM, Queens University Belfast, Centre for Plasma Physics, LOW TEMPERATURE PLASMA GROUP TEAM — Discharges can be produced in high conductivity liquid at low voltages (˜300 V). Here this is achieved within a cathodic, 500 nm radius pin-to-grounded plate electrode environment. The investigation is centered around a Photron SA-X2 fast framing camera operating at between 60-100 kHz framing rates with synchronized current and voltage measurements. The discharges are observed from their light emission with no backlighting. Shadowgraphy shows they are generated in low-density regions formed close to the pin. This fine tip structure allowed confirmation of vapour growth beginning at the highest electric field gradient. The first observable bubble, with 30 um diameter, is formed at the tip within 2 microseconds of the 300 V, 60 ns rise time pulse. More bubbles then coalesce up the electrode and down from the tip. The discharges with us lifetimes are contained within the bubbles and depend on liquid's conductivity and applied voltage. A finite element analysis simulation of the vapour, electrical field and discharge behaviour will be presented. The authors want to gratefully acknowledge Prof Franta Krcma for his assistance.

Leonidas Asimakoulas
Queens University Belfast, Centre for Plasma Physics

Date submitted: 07 Jun 2017 Electronic form version 1.4