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Discharges in liquids: Experiment and Simulations of plasma kinetics BILL GRAHAM, Queen's University Belfast UK, LEONIDAS ASIMAKOULAS, TOMO MURAKAMI, Seikei University, Tokyo, Japan, TOM FIELD, Queen's University Belfast UK — Plasma discharges in liquids interest researchers and users in areas such as bio-medicine, food safety and agriculture. Here a voltage (300 V) is applied to a metal electrode in grounded saline to produce a range of chemical and physical phenomena. Our focus is to use experiment and modelling to explore, understand and harness them. This follows some previous work on vapour layer production (Schaper et al P.S.ST. 20, 34004, 2011). Here we use a single-shot ICCD camera alongside a100,000 fps fast framing camera to image the vapour formation and the subsequent discharge characteristics. From these images synced with electrical measurements we have found that the electrical breakdown is due to a vaporization cycle of Joule heating of the electrode and then transfer to the bulk liquid. The electric field values within these time evolving vapour layers are obtained by importing the vapour - liquid boundaries for each frame into a Finite Element software model. This feeds into plasma kinetics and chemistry simulations to predict the space and time evolution of the electric fields. Early results show that at very high gas temperatures (2000 K) the electron density can have a value of up to 2.1x1011 cm-3.

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