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Plasma formation in water vapour layers in high conductivity liquids[1] C.P. KELSEY, L. SCHAPER, Queens University of Belfast, K.R. STALDER, Stalder Technologies and Research, W.G. GRAHAM, Queens University of Belfast — The vapour layer development stage of relatively low voltage plasmas in conducting solutions has already been well explored.[2] The nature of the discharges formed within the vapour layer however is still largely unexplored. Here we examine the nature of such discharges through a combination of fast imaging and spatially, temporally resolved spectroscopy and electrical characterisation. The experimental setup used is a pin-to-plate discharge configuration with a -350V, 200μs pulse applied at a repetition rate of 2Hz. A lens, followed by beam splitter allows beams to one Andor ICCD camera to capture images of the plasma emission with a second camera at the exit of a high resolution spectrometer. Through synchronization of the camera images at specified times after plasma ignition (as determined from current-voltage characteristics) they can be correlated with the spectra features. Initial measurements reveal two apparently different plasma formations. Stark broadening of the hydrogen Balmer beta line indicate electron densities of 3 to 5 $\times 10^{20}$ m^{-3} for plasmas produced early in the voltage pulse and an order of magnitude less for the later plasmas.

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[2]L. Schaper et al Plasma Sources Sci. Technol. **20**(2011) 034003

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