Abstract Submitted
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Impact of plasma induced liquid chemistry and charge on bacteria loaded aerosol droplets[1] DAVID RUTHERFORD, DAVID MCDOWELL, DAVIDE MARIOTTI, CHARLES MAHONY, University of Ulster, DECLAN DIVER, HUGH POTTS, EUAN BENNET, University of Glasgow, PAUL MAGUIRE, University of Ulster — The introduction of living organisms, such as bacteria, into atmospheric pressure microplasmas offers a unique opportunity to study the local chemical and electrical effects on cell structure and viability. Individual bacteria, each encapsulated in an aerosol droplet, were successfully transmitted through a non-thermal equilibrium RF coaxial plasma, using a custom-design concentric double gas shroud interface and via adjustment of transit times and plasma parameters, we can control cell viability. Plasma electrical characteristics ($n_e \sim 10^{13}$ cm^{-3}), droplet velocity profiles and aspects of plasma-induced droplet chemistry were determined in order to establish the nature of the bacteria in droplet environment. Plasma-exposed viable E coli cells were subsequently cultured and the growth rate curves (lag and exponential phase gradient) used to explore the effect of radical chemistry and electron bombardment on cell stress. The extent and nature of membrane disruption in viable and non-viable cells were investigated through genomic and protein/membrane lipid content estimation. We will also compare our results with simulations [1] of the effect of bacterial presence on plasma induced droplet charging and evaporation.

[1] E Bennet et al., New J. Physics (submitted).

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Paul Maguire
University of Ulster

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