

Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

Generation and remote delivery of plasma activated species¹

PAUL MAGUIRE, CHARLES MAHONY, COLIN KELSEY, DAVID RUTHERFORD, DAVIDE MARIOTTI, MANUEL MACIAS-MONTERO, FATIMA PEREZ-MARTIN, Ulster University, DECLAN DIVER, Glasgow University — Plasma interactions with microdroplets offer new opportunities to deliver active chemical agents and nanoparticles to remote substrates downstream with many potential applications from cancer theranostics and wound healing in biomedicine, gentle food decontamination and seed germination in plasma agriculture to catalyst production and photonic structures fabrication, among others. We demonstrate plasma-liquid based pristine nanomaterials synthesis in flight and subsequent delivery up to 120mm from the atmospheric pressure plasma source. Monosized and non-aggregating metal nanoparticles are formed in the rf plasma in less than 100us, representing an increase in precursor reduction rate that is many (>4) orders of magnitude faster than that observed with standard colloidal chemistry or via high energy radiolytic techniques. Also the collection and purification limitations of the latter are avoided. Plasma activated liquid including OH radicals and H₂O₂ are transported over 120mm and have demonstrated high efficacy bacterial decontamination. These results will be compared with charge species and radical transport from the rf plasma without microdroplets. Reaction models based on high solvated surface electron concentrations will be presented.

¹Funding from EPSRC acknowledged (Grants EP/K006088/1 and EP/K006142/1)

Paul Maguire
Ulster University

Date submitted: 09 Jun 2016

Electronic form version 1.4