Abstract Submitted
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Gas phase microreaction: nanomaterials synthesis via plasma exposure of liquid droplets[1] PAUL MAGUIRE, CHARLES MAHONY, COLIN KELSEY, NEIL HAMILTON, SADEGH ASKARI, MANUEL MACIAS-MONTERO, University of Ulster, DECLAN DIVER, GLASGOW UNIVERSITY, DAVIDE MARIOTTI, University of Ulster — Plasma-liquid interactions are complex but offer considerable scope for use in nanomaterials synthesis. The introduction of individual picolitre micro-droplets into a steady-state low temperature plasma at atmospheric pressure, offers opportunities for enhanced scope and control of plasma-liquid chemistry and material properties. The gas-phase micro-reactor is similar in concept to liquid bubble microfluidics currently under intense research but with enhanced opportunities for scale-up. For nanomaterials and quantum dot synthesis, the addition of a liquid phase within the plasma expands considerably the scope for core-shell and alloy formation. The synthesis and encapsulation within a liquid droplet allows continuous delivery of nanoparticles to remote sites for plasma medicine, device fabrication or surface coating. We have synthesized Au nanoparticles in flight using AuHCl4 droplets with plasma flight times <0.1 ms. Also, Ag nanoparticles have been synthesized downstream via the delivery of plasma exposed water droplets onto AgNO3 laden substrates.

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Paul Maguire
University of Ulster

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