

# A Continuous Plasma-liquid Process for Controlled and Large-scale Production of Ag Clusters and Nanoparticles

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***Abstract***— Plasma-liquid systems have recently gained interest for the synthesis of metal nanoparticles. Eliminating a metal electrode allows reduction of metal cations to metal nanoparticles without the need for temperature or chemical reducing agents. However, plasma-liquid systems are batch schemes whereby metal nanoparticles are synthesized over time, in a volume of solution. Here, we present a continuous flow system to synthesize metal nanoparticles by reducing metal cations at the interface of a plasma and water jet. The process confines the reactant to a well-defined reaction zone with sharp temperature and concentration gradients so that nucleation and growth are spatially controlled. In addition, large amounts of material are easily produced. Details of the experimental setup and characterization of the metal nanoparticles by UV-vis absorbance spectroscopy and electron microscopy will be presented.