Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

Characterization of a Flow-Through Low Temperature RF Plasma Reactor for Nanomaterial Synthesis NECIP UNER, ELIJAH THIMSEN, Washington Univ — Flow-through low temperature plasmas are being increasingly studied in the laboratory, especially for producing nanomaterials. Low temperature radio frequency (RF) plasmas have been very successful for synthesizing crystalline and monodisperse semiconductor nanocrystals. Although used by many groups worldwide, thorough characterization of the reactor itself is largely missing from the literature. The flow-through reactor used in this study was a simple and easy-to-build capacitively coupled RF design comprised of a glass tube with two ring electrodes wrapped outside of the tube. Using a Langmuir double probe, electron temperature and ion density were measured as a function of axial position, input RF power, and pressure. Neutral gas temperatures were determined using a fluorescence decay temperature probe. The reactor was found to have a distinct distribution of ion density and gas temperature along its central axis. Gas temperatures were found to be significantly higher than room temperature at moderate applied RF powers. Along with a complete set of plasma parameters as a function of axial position, calculated nanoparticle temperature histories and the energy efficiency of the reactor will also be presented.

Necip Uner
Washington Univ

Date submitted: 24 May 2017 Electronic form version 1.4