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**Particle Charge Distributions in the Effluent of an Atmospheric Pressure Low Temperature Plasma**[1] ERIC HUSMANN, XIAOSHUANG CHEN, ELIJAH THIMSEN, Washington University, St. Louis, MURI FOR THE CONSOLIDATION OF NOVEL MATERIALS AND MACROSTRUCTURES FROM A DUSTY PLASMA TEAM — Atmospheric pressure low-temperature plasmas (AP-LTPs) are often utilized for aerosol synthesis, treatment, and removal systems. In these systems, dust particles become highly negatively charged in the plasma. However, little is known about how process parameters affect dust particle charge states after the spatial plasma afterglow. In this work, monodisperse aerosol streams were passed through a radiofrequency AP-LTP and dust particle electrical mobility distributions were measured using a scanning mobility particle sizer. Dust particle size, dust particle material, and flow velocity were varied. Increasing flow velocity made dust particles more positively charged after they had passed through the spatial afterglow, which is the opposite of what one might expect given that particles are highly negatively charged in the plasma. To describe this phenomenon in more detail, a model was constructed. After the diffusive loss mechanism of electrons and positive ions switches from ambipolar to free diffusion in the spatial afterglow, the ion density briefly becomes much higher than the electron density. Since the charging timescale for a particle is small, particles neutralize and can even become net positively charged in this ion-rich zone.

[1]The United States Army Research Office

Eric Husmann
Washington University, St. Louis

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