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Effect of Vaporization on Aerosol Dynamics in Low Temperature Dusty Plasmas NECIP UNER, ELIJAH THIMSEN, Washington Univ — Low temperature dusty plasmas (LTDP) are known to display a wide range of emergent phenomena due to the complex interactions between particles and the plasma. Some of the unique properties of dusty plasmas, such as suppressed coagulation and particle heating, have been successfully utilized for synthesizing monodisperse nanoparticles of various materials with high crystallinity. The general conception of nanoparticle growth involves nucleation due to the rapid conversion of gaseous precursors, which is followed by surface growth. Coagulation is effectively suppressed if the particle concentration is lower than the ion density, due to electrostatic interactions between negatively charged nanoparticles. The absence of reports on the synthesis of metal particles suggests that there may be additional dynamics occurring in LTDP. By sending premade aerosols into a radio frequency argon plasma, we demonstrate that metal particles can vaporize in the LTDP, despite the low gas temperature. Due to the nonequilibrium vaporization process unique to LTDP, a monodispersed aerosol was found to emerge from a polydispersed aerosol. A theoretical model for the evolution of the size distribution will be presented along with experimental results for several materials.

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