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Particle Decharging and Agglomeration in Pulsed Dusty RF Plasmas[1] TOSHISATO ONO, ZICHANG XIONG, CHRIS HOGAN, UWE KORTSHAGEN, University of Minnesota — The spatiotemporal evolution of dust particles in plasmas is of interest for applications in semiconductor processing and particle synthesis in plasmas. In this work, particle visualization by laser light scattering and ion density measurements by a double Langmuir probe have been conducted carried out in a dusty argon plasmas generated in an RF capacitive reactor. We particularly focus on the particle dynamics in the afterglow of a pulsed plasma. We find that periodic pulsing of the plasma containing micrometer-sized particles leads to particle decharging, and at high particle loadings, rapid particle agglomeration, which is made possible because Coulombic repulsion is minimized upon decharging. A double Langmuir probe was utilized to obtain ion densities through comparison between measured probe characteristics and a model accounting for collisional ion motion. The Pparticle visualization showed that the mechanism of decharging is not simply ion-particle collisions, but may be driven by electron emission, which is material (dielectric constant) dependent. High dielectric constant particles appear to agglomerate significantly less, suggesting they decharge more slowly.

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Uwe Kortshagen
University of Minnesota

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