Electrical and Optical Characteristics of Dusty Plasmas

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Abstract

My Ph.D. research was focused on using plasmas as tools for materials synthesis and processing, but my current projects center on understanding these plasmas more fundamentally. I’m researching the electrical and optical characteristics of dusty plasmas in two applications. In the first, construction of a brand-new parallel-plate plasma reactor will allow us to experimentally verify computational simulations on the characteristics of argon/silane dusty plasmas, such as the spatial distributions of electrons, ions, and nanoparticles as well as the charging of nanoparticles and the energy distributions of the gas species. In the second application, I’m studying how the plasma power influences the crystallization of silicon nanoparticles in a flow-through reactor: what powers are necessary for nanoparticle crystallization, and what are the electron and ion energies and densities associated with the onset of crystallization. In a side-project, I’m attempting the synthesis of new compound nanomaterials such as ZnS in nonthermal plasmas.

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