Abstract Submitted
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Langmuir probe measurements of the electron energy probability function and laser scattering in nanodusty plasmas[1] NARULA BILIK, YUNXIANG QIN, University of Minnesota - Mechanical Engineering, ERAY AYDIL, University of Minnesota - Chemical Engineering and Materials Science, UWE KORTSHAGEN, University of Minnesota - Mechanical Engineering — A Langmuir probe was used to measure real-time electron energy probability distribution function (EEPF) in argon-silane dusty plasma generated by a RF capacitive reactor. The challenge of Langmuir probe measurements in dusty plasma is the coating of the probe surface: A dielectric layer formed by dust particles causes a series resistance and changes the probe work function, leading to inaccuracy in EEPF measurements. We addressed this problem by adding an actuated ceramic shield to the probe. With the actuated shield the probe was exposed to the dusty plasma only when it was measuring and under rapid I-V scan, minimizing the exposure and effectively preventing coating. EEPFs in dusty plasma were captured in 80mtorr and 40W dusty plasma (10sccm argon and 4.7sccm 5% silane in argon flow). Simultaneous measurements of the ion density with a capacitive probe and real-time laser scattering was performed to further characterize the plasma. As particles form in dusty plasma, the electron density dropped but electron temperature increased. The electron density in the dusty plasma dropped much more compared to the ion density due to the attachment of electrons to the growing particles.

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