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Droplet Measurements in Misty Plasmas[1] DAISUKE OGAWA, LAWRENCE OVERZET, MATTHEW GOECKNER, UT Dallas — We present measurements on how plasmas affect micro-droplet evaporation. The size of liquid droplets was measured with and without the presence of plasma using laser scattering. A SprayTec®, droplet sizing instrument enables the continuous measurement of the size distribution of droplets with 100 μsec time resolution by utilizing Mie scattering theory and an equivalent spheres technique. In addition, our preliminary calculations indicate that an argon plasma density of $\sim 5\times10^{10}$ cm^{-3} and $T_e = 3$ eV at 100 mTorr should reduce the hexane droplet evaporation time by nearly an order of magnitude. Comparison to dusty plasmas also indicates that droplets smaller than 1 μm could be levitated by the plasma sheath. In our case, hexane droplets are found to be > 10 μm and are injected to vacuum with substantial kinetic energy. As a result the transport time of the droplets through the plasma is only 10 msec. The achievable plasma density and temperature in our present reactor are less than the values needed to fully evaporate hexane droplets in this short time. We will show our measurements of droplet size and evaporation for a series of liquid droplets including hexane, pentane, ethanol, and ethylene glycol.

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