Abstract Submitted
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Dropper for micron and submicron size powders for a plasma mass filter[1] EUGENE S. EVANS, STEWART J. ZWEBEN, RENAUD GUEROULT, NATHANIEL J. FISCH, Princeton Plasma Physics Laboratory, FRED LEVINTON, Nova Photonics, Inc. — The goal of the Plasma Mass Filter (PMF) experiment at PPPL, in collaboration with Nova Photonics, Inc., is to achieve separation between high-Z and low-Z atoms, for possible application to processing of nuclear waste to remove the highly radioactive high-Z components. The PMF features a rotating plasma column in which centrifugal forces push high-mass ions out of the plasma radially, while low-mass ions exit the plasma axially. In order to control the injection location, high-Z materials are introduced in powder form into the PMF plasma. The current experiment is limted to $\sim$1 kW RF, giving a calculated maximum flow rate of $\sim$0.1 mg/s. An electron temperature of a few eV and assumptions about the residence time of the dust particles in the PMF plasma limits the calculated maximum particle size to $\sim$1 μm. While previous dusty plasma experiments have dealt with particles on the order of 2-3 μm, submicron particles are comparatively more difficult to manipulate under vacuum due to increased Van Der Waals and electrostatic forces. A powder dropper capable of reliably dropping micron and submicron-size particles at this flow rate is being developed, consisting of a mesh-bottomed container that is coupled to vibration motors.

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