

Abstract Submitted
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Carbon Film Deposition and Flaking Studies in Ion Thruster Environments JEREMY HANNA, RUSSELL DOERNER, TYNAN GEORGE, JOHNATHAN YU, EIDER OYARZABAL, KURT TAYLOR, UCSD — Sputtering of carbon atoms from carbon-composite acceleration grids in ion thrusters is a well known issue. Less is known of the effects of this sputtered material within the thruster. As this sputtered carbon is deposited on the thruster walls, this carbon layer grows in thickness, and will eventually begin to flake. If these carbon flakes are of substantial size, they could then cause serious problems with the plasma flow through the grid, as well as shorting issues for the high voltage ion optics. A series of studies of carbon deposition has been carried out at UCSD. Carbon is sputtered into a vacuum chamber using a magnetron sputtering source, and allowed to accumulate on a substrate. Deposition rates are measured in the chamber using a crystal microbalance. The substrate is temperature cycled from 200 ° C to -185 ° C to simulate thruster shutdown in deep space. After a given deposition time, this substrate is removed from the vacuum chamber and film quality and flaking is investigated by scratching the film with a razor and directly imaging the surface using an electron microscope. Results of relative film thickness versus film ‘quality’, or flaking potential and flake size, will be presented for various processed substrate surfaces.

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