

Abstract Submitted
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Plasma-Surface Interactions in Electric Thrusters DAN GOEBEL,
Jet Propulsion Laboratory, California Institute of Technology — Of critical importance in electric propulsion missions in space is thruster life, which is determined to a large extent by wall erosion from plasma-materials interactions. While the plasmas generated in different thrusters vary, the particle fluxes, energies and temperatures in contact with the walls are somewhat similar. The erosion rates are then determined by details of materials, incident angles, etc. In ion and Hall thrusters commonly used today, for example, cathode life is determined by low energy (≤ 100 eV) Xe ion erosion of the cathode electrodes. Erosion of ion thruster accelerator grids is dominated by charge exchange ion bombardment with energies of 200 to 400 V. The incident angle of these ions is near normal, but the sputtered particles are ejected with a butterfly distribution that directs particles along the thruster axis and causes build up of material on the upstream and downstream surfaces. In Hall thrusters, the plasma materials interactions at the wall are complicated because the walls are typically ceramic and selected for a low secondary electron yield for thruster performance. The erosion rates at the wall vary due to non-uniform plasma contact with the surface causing grooves and surface changes. These effects will be discussed for various thrusters.

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