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AEROBRAKING EFFECTS INDUCED EROSION OF KAPTON

Abstract

Aerobraking is an important process for Mars exploration. During this process, satellites experience in explicit aeroheating, especially the solar panels, which may results in the erosion of related space materials. In this study, an aerobraking simulator is prepared, producing a CO₂ plasma environment. The aerobraking effects induced erosion is investigated by exposure of Kapton (a commonly used space material) in the simulated CO₂ environment. Before and after exposure, the surface morphology, surface compositions, and optical properties of Kapton are individually analyzed by SEM, FTIR, XPS, and UV-Vis. It is found that the Kapton suffers apparent erosion in the simulated environment. The exposed Kapton displays a roughed surface and its optical properties decrease. For developing of long-life solar panels, it is meanfully to use protective coatings on the exposed surface of Kapton.

Keywords: aerobraking, satellites, solar panels, space materials, Kapton