Abstract Submitted
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Atomic Oxygen Modification of the Nanodielectric Surface Composition of Carbon-Loaded Polyimide Composites[1] KELBY PETERSON, JR DENNISON, Utah State University — Black Kapton is a nanodielectric composite of carbon particles (100-500 nm) embedded in an insulating polyimide polymer matrix (100-5000 nm depth). Analysis of this nanodielectric composite has been done via optical imaging, scanning electron microscopy, and energy-dispersive x-ray analysis in order to gain insight into its nanodielectric properties. The insulating polyimide is known to be inert and impervious to strong bases and acids, but is affected by atomic oxygen exposure. We have observed changes in the surface structure and relative carbon-polymer concentrations in MISSE-6 samples that were exposed to the low earth orbit environment for 18 months outside the International Space Station. The MISSE-6 sample tray arrangement permitted studies of the effects due to varied atomic oxygen exposure. MISSE samples received maximum atomic oxygen exposure on the ram side with decreased exposure on the wake and shielded sides, respectively. Early observations suggest that the atomic oxygen modifications reduce the polymer matrix on the surface, whilst the carbon-loaded regions remain largely unaffected by the exposure. Affects of the surface modifications on spacecraft charging and cathodoluminescence will be discussed.

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Kelby Peterson
Utah State University

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