Groundbased Studies of Spacecraft Glow and Erosion Caused by Impact of Oxygen and Nitrogen Beams


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To simulate surface reactions in the space environment we have developed a groundbased facility that produces a very high flux \((10^{14} \text{ to } 10^{16}/\text{cm}^2/\text{s})\) of low energy \((2-20 \text{ eV})\) neutral atoms and molecules. The neutral beams are created using a novel method involving neutralization and reflection of ions from a biased limiter, where the ions are extracted from a toroidal plasma source. We present spectra of emission due to beam-solid interactions on targets of Chemglaze Z-306 optical paint and Kapton. We measured erosion yields for carbon and Kapton targets with low energy (\(\sim 10 \text{ eV}\)) nitrogen and oxygen beams. The reaction rates and surface morphology for the erosion of Kapton are similar to those measured in experiments on STS-5.

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