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Molecular Dynamics Simulations of Hypervelocity Impacts[1] ELI T. OWENS, MARTINA E. BACHLECHNER, Physics Department, West Virginia University — Outer space silicon solar cells are exposed to impacts with micro meteors that can destroy the surface leading to device failure. A protective coating of silicon nitride will protect against such failure. Large-scale molecular dynamics simulations are used to study how silicon/silicon nitride fails due to hypervelocity impacts. Three impactors made of silicon nitride are studied. Their cross-sectional areas, relative to the target, are as follows: the same as the target, half of the target, and a quarter of the target. Impactor speeds from 5 to 11 km/second yield several modes of failure, such as deformation of the target by the impactor and delimitation of the silicon nitride from the silicon at the interface. These simulations will give a much clearer picture of how solar cells composed of a silicon/silicon nitride interface will respond to impacts in outer space. This will ultimately lead to improved devices with longer life spans.

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