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Micrometeoritic Impact Effects: Peak Pressure versus Spectral Variation

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Abstract:

At the Experimental Impact Laboratory at NASA Johnson Space Center, we have investigated the surface properties of asteroids caused by collisions in the mid-infrared (2.5 to 16 microns) by impacting forsterite and enstatite across a range of velocities (as predicted by the Nice Model) and at varying temperatures. The crystal structure in these minerals can be deformed by the shock wave from the impact as well as sheared into smaller particle sizes. Our current focus is on the differing effects between 2.3 and 2.6 km/sec, as well as the differences between a cold sample at -20C and a room temperature sample at 25C. We find that the spectral variation and crystal deformation varies non-linearly with the peak shock pressure. Funding was provided by the NASA PG&G grant 09-PGG09-0115, NSF grant AST-1010012, and a Cottrell College Scholarship through the Research Corporation.