Crater Calibration: The conversion of a measured crater diameter to projectile diameter will be much simpler and more precise on Stardust than on any previous, space-exposed surface, because all Stardust craters were produced at a constant encounter speed of 6.1 km/s, which is well within experimental capabilities of light gas guns. All previously studied crater populations had to be interpreted via assumed mean velocities and via substantial extrapolations of experimental observations. As a consequence, interpretation of the Stardust craters will be fairly straightforward, provided suitable calibration experiments exist.

We conducted such experiments using the small caliber light gas guns at the University of Kent and at the NASA Johnson Space Center for inter-laboratory comparisons and cross calibration [see 7]. We employed spare flight hardware foils (Al 1100 series; 0.004” ~100 µm thick, and precision-sieved, spherical soda lime glass projectiles ranging in diameter from 11 µm to ~100 µm; the foil was backed by a massive plate of Al 6061 T6 identical to the Stardust collector tray, thus assuring a high-fidelity target structure. The experimental impact velocities varied from 5.9 to 6.2 km/s, with most at 6.0 to 6.1 km/s. The results are illustrated in Figure 1 and yield a linear relationship of crater diameter (Dc) and projectile size (Dp) of Dc/Dp = 4.62 for projectiles of some 2.2 g/cm³ density. Impactors >50 µm will penetrate the foil and terminate in the underlying collector frame.

Projectile Residues: We produced additional foil craters using monomineralic powders (e.g., olivines, various pyroxenes and plagioclases, hornblendes, carbonates, oxides, sulfides) or ground rocks (e.g., basalt, Allende meteorite, coal) to sharpen sample preparation methods and analytical procedures for the compositional, spectral and isotopic analyses of the projectile residue that will reside in the Stardust foil craters. We demonstrated in a series of papers [8, 9, 10] that such compositional studies are possible and that substantial science may be extracted from projectile residues in microcraters using state of the
art instrumentation. Some of these papers also introduce significant advances in sample preparation methods that were not available earlier.

**Preliminary Investigations:** The Stardust sample capsule will land January 15, 2006 in Utah; current plans are to distribute foil-samples to the Cratering Team by early February. We will report at LPSC on the preliminary characterization of the crater populations and their implications for particle fluxes, possibly on the compositional diversity of Wild 2 particles using electron and ion beam instruments.


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**Figure 1.** Projectile size versus crater diameter, measured from rim crest to rim crest, in soft aluminum 1100 foils. The open symbols relate to free-standing foils.