**OXYGEN ISOTOPE MEASUREMENTS OF SIMULATED WILD 2 IMPACT CRATER RESIDUES**

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**Introduction:** Oxygen isotope measurements of samples from Comet 81P/Wild 2 collected by NASA's Stardust mission have provided surprising similarities to minerals in carbonaceous chondrites which have been interpreted as evidence for large scale radial migration of dust components from the inner solar nebula to the accretion regions of Jupiter-family comets [1, 2]. If this interpretation is correct, what the studies have so far not achieved is a measurement of the average oxygen isotope composition of the dust component of a known comet parent body. The reason is that the analyses have so far been restricted to large terminal particles because the fine-grained component of impacting particles suffered from intimate mixing with oxygen-rich aerogel. However, the aluminum foil substrates on the Stardust collector provide an opportunity for a low background alternative to the aerogel collectors for measuring the O-isotopic composition of both the coarse and the fine-grained components of impacting dust particles. We have been developing the experimental approaches necessary to assess potential fractionation effects of capture by measuring impact craters produced by projectiles of known composition. Here we present results of oxygen isotope measurements of San Carlos olivine residues shot into aluminum foil targets at Stardust encounter velocities.

**Results:** Simulated impacts were produced by firing San Carlos Olivine into foil targets at ~ 6 km/sec using a light gas gun at the University of Kent in Canterbury [3]. Craters ranging from 20-50 microns in diameter were cut from the foil target, flattened and pressed into Indium. The samples were then mounted with a San Carlos Olivine standard for ion probe analysis by the UCLA IMS-1270. Measurements were made using a 10keV, 1-2 nA Cs primary beam; spot size was ~20 μm. The detectors were configured for 2-oxygen isotope composition measurements; a Faraday cup was used to measure the $^{16}O$ signal, while the $^{18}O$ signal was measured using an electron multiplier. Four measured craters contained enough residue to sustain a $^{16}O$ count rate > $10^6$ counts/sec; $\delta^{18}O$ values for these craters, normalized to the San Carlos Olivine standard were 3.1 ± 0.2 ‰, 2.6 ± 0.4 ‰, 2.0 ± 0.8 ‰, 0.9 ± 1.2 ‰, and 4.2 ± 0.7 ‰. Quoted uncertainties are 1 S.D.

**Discussion:** Crater measurements with $^{16}O$ count rates > $10^6$ counts/sec reproduced the standard value of San Carlos olivine to within 4‰. The most accurate measurements are correlated with higher $^{16}O$ count rates. Sample preparation of impact craters has a strong effect on the level of precision that can be achieved; craters must be flattened in order avoid distortion of the accelerating electric field and inaccuracies in the instrumental mass fractionation correction.

**References:** [1] McKeegan, K.D., et al. 2006. *Science* 314: p. 1724-1728. [2] Nakamura, T., et al. 2008. *Science* 321: p. 1664-1667. [3] Kearsley, A.T., et al. 2006. *Meteoritics & Planetary Science* 41: p. 167-180.