**RELICT AMORPHOUS SILICATES IN STARDUST SAMPLES**. L. P. Keller and S. Messenger. Robert M Walker Laboratory for Space Science, ARES, NASA Johnson Space Center, Houston, TX 77058. Lindsay.P.Keller@nasa.gov.

**Introduction:** Cometary grains impacting the Stardust aerogel collector experienced wide ranges in thermal alteration and mixing with aerogel during capture. Fine grained materials appear to have experienced the most severe alteration. Although amorphous silicates are common in Comet Wild-2 samples, their original nature is clouded by variable thermal alteration and intimate association with ubiquitous molten/compressed aerogel. Electron microscopy observations show that most of these grains contain abundant nanophase FeNi metal and FeNi sulfides inclusions dispersed in an amorphous silicate matrix. This structure is characteristic of the most common amorphous silicates in interplanetary dust particles (IDPs): GEMS grains (glass with embedded metal and sulfides), but they differ in several respects [1-3]. Few data exist on the bulk elemental compositions of the amorphous grains in Wild-2 samples [2-4]. Here we present results of nanometer-scale quantitative compositional mapping of Stardust amorphous silicate grains using the JSC JEOL 2500SE scanning-transmission electron microscope. Our objective is to gain insight into the nature of the precursor cometary materials that impacted the collector and the degree of their preservation.

**Results and Discussion:** We obtained quantitative x-ray maps of "melt" particles from 4 different tracks (C2044 track 41, C2054 track 35, FC3 track 2 and Arianna track 7). Our results show that the silicate matrices of these particles are compositionally heterogeneous on a sub-μm scale. The Mg maps are particularly illuminating, showing ~0.1-0.25 μm Mg-rich domains enclosed within melted/compressed aerogel. The average bulk element/Si (at.) ratios of 20 such domains are Mg/Si=0.42, Al/Si=0.05, S/Si=0.19, and Fe/Si=0.21. Disregarding Si, the average Mg/Fe and Fe/S ratios for the Mg-rich domains are chondritic. Interestingly, the compositional range of the Mg-rich domains overlaps that of GEMS grains in anhydrous IDPs [5], although they are somewhat enriched in Si compared to GEMS probably due to contributions from melted aerogel. The Mg-rich domains in Stardust melt particles and GEMS grains in IDPs both contain nanophase metal and sulfide inclusions, but the metal/sulfide inclusions in Wild-2 samples reflect melting and re-equilibration during capture.

**Conclusions**: The amorphous silicates in Wild-2 samples appear to span a broad range of compositions, but chemical imaging reveals relict Mg-rich domains partially preserved within molten aerogel. The sizes and compositions of the Mg-rich domains are consistent with them being cometary GEMS grains that have been variably modified or mixed with aerogel. GEMS grains have not been reported from meteorite samples and are an abundant component of anhydrous IDPs. This observation suggests that comet Wild-2 bears a closer resemblance to anhydrous IDPs than to any of the chondritic meteorite classes.

**References.** [1] Chi, M. *et al*. (2007) *LPS XXXVIII*, #1766. [2] Keller, L. P. *et al*. (2006) *Science*, 314, 1728. [3] Ishii, H. *et al*. (2008) *Science*, 319, 447. [4] Leroux, H. *et al*. (2008) *LPS XXXIX*, #1292. [5] Keller, L. P. and Messenger, S. (2004) *LPS XXXV*, #1985.