**A MINERALOGICAL COMPARISON OF STARDUST WILD 2 GRAINS AND CARBONACEOUS CHONDRITES.**

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**Introduction:** We propose that the returned Stardust Mission samples (from the Jupiter family comet Wild 2) are recognizably different from the bulk of materials in outer belt asteroids, because of their different formation positions and times in the early solar system. We believe this despite similarities found between some Wild 2 grains and components of carbonaceous chondrites (i.e. some CAI and chondrules). Kuiper Belt samples must preserve measurable mineralogical and compositional evidence of formation at unique positions and times in the early solar nebula, and these formational differences must have imparted recognizable special characteristics. We hypothesize that these characteristics include: (1) Unique major element compositional ranges of common astromaterial minerals, especially olivine and pyroxene; (2) Unique minor element compositions of major silicate phases, especially olivine and low-Ca pyroxene; (3) Degree and effects of radiation processing – including amorphous rims, metal coatings, and Glass with Embedded Metal and Sulfides (GEMS) [1-3].

**Analysis:** We have begun to analyze TEM grids of the Wild 2 samples. We plan to survey 1-2 non-consecutive viable TEM grids from each possible extracted Wild 2 grain as we are given access to them. We especially prefer TEM grids from grains for which complete mineralogical details have not been published (the majority of the extracted grains). In parallel, we are currently analyzing ultra-microtomed thin sections of grains from the matrix of each primitive C-chondrite class. Initially, we perform a basic mineralogical survey, with E-beam techniques, to establish the essential features of these grains. Secondly, we are making a particular effort to carefully and accurately measure minor elements of olivine and pyroxene since these minerals are widespread in astromaterials. This is a difficult and time-consuming process due to the typical sub-micron grain size of these crystals in matrix and the typical very low abundances (< 0.5 atomic %) of minor elements. Therefore, good measurements over a range of these samples are unavailable. Comparisons of these measurements will test whether there are fundamental differences between the Wild 2 silicates and those found in the various C-chondrites [1-6]. We are also making a special effort to search for mineralogical products of aqueous alteration, since their presence would reveal that Wild 2 was once internally heated, a result with dramatic implications for models of early solar system primitive bodies. Thus far carbonates are the only potential evidence for aqueous alteration for Wild 2.

**Results:** In particular, a preliminary analysis of grains extracted from Wild 2 tracks 16 and 111 show a relatively common Mn presence of .1-.2% in olivine. We also report on the presence of Ca/Al rich sub-micron pyroxene crystals with measurable minor elements Na, Ti, V, Cr, Mn that appear to be unique to the Wild 2 collection.

**References:** [1] Bradley (1994) *Science* **265**, 925-929. [2] Chi et al. (2007) *Lunar And Planetary Science XXXVIII*. abstract. [3] Nakamura-Messenger et al. (2008) *MAPS* **43**, paper id. 5247. [4] McKeegan et al. (2006) *Science* **314**, 1724-1728. [5] Westphal et al. (2008) *Lunar and Planetary Science XXXIX*. Abstract. [6] Zolensky et al. (2006) *Science* **314**, 1735-1740.