

Have We Seen Comet Wild 2 Samples Before?

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Considering the ferromagnesian mineral dominated Wild 2 particles captured by the Stardust Spacecraft, olivine and pyroxenes have the same range of Mg, Fe, Mn and Cr compositions as those in anhydrous chondritic interplanetary dust particles IDPs, and very similar to those in type 2 carbonaceous chondrites. In general, the type 3 carbonaceous chondrites and hydrous chondritic (IDPs) have narrower, or somewhat equilibrated olivine and pyroxene compositional ranges. With the exception of the one pentlandite grain encountered in our examination, the Fe-Ni sulfide compositions for the Wild 2 grains are similar only to the anhydrous chondritic IDPs. Hydrous IDPs, and all chondrites, contain significant amounts of pentlandite and low-Ni pentlandite. In addition, the absence of any aqueous alteration products in the Wild 2 grains (no phyllosilicates, indigenous carbonates, etc.) eliminates the hydrous chondritic materials from comparison.

Thus, of known extraterrestrial materials, the anhydrous chondritic IDPs are most similar to the Wild 2 grains, although there are some intriguing differences. This is all as many expected, since a cometary origin has been suspected for these IDPs for many years [1]. It is clearly time to take a new look at the IDPs captured in Earth's stratosphere. The very wide range of olivine and low-Ca pyroxene compositions in Wild 2 require a wide range of formation conditions, including temperatures and fO_2 , probably reflecting very different locations in the protoplanetary disk.

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Reference: [1] Nier and Schlutter, *Meteoritics* **25**, 263-267 (1990).