Cell C2054

Track 35

Images
Level 2 - C2027-1.jpg
Level 3 – C2027_t1_20x.jpg

Track and Grains:
C2027-5-48-0-0.ppt

Level 3: No Data.

Microtomed samples:

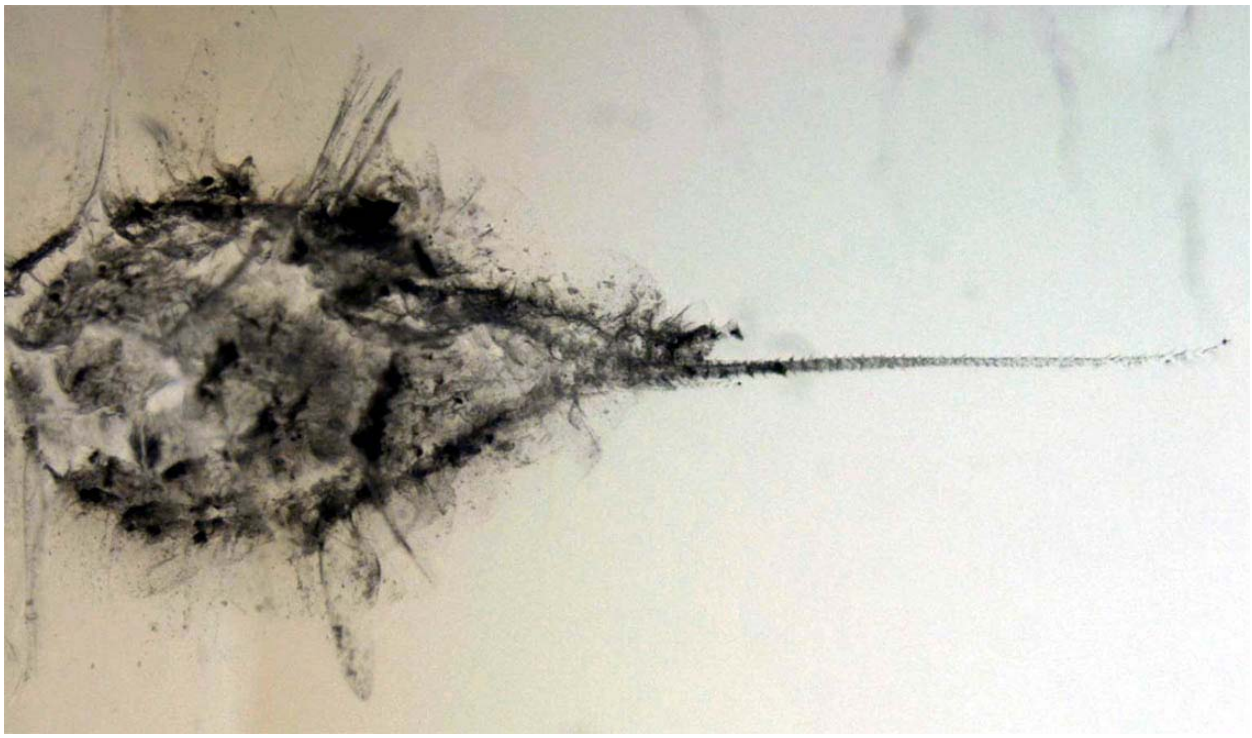
Track History: Track was cut from the aerogel cell by Keiko Nakamura, and then sectioned into separate pieces for easier removal of wall and termini grains. Over 50 grains were removed from the track during Stardust PET

Track Characteristics:
Type: Type C Bulb with multiple stylii.
Length / Depth: ~1.17 cm
Grain diameters: Multiple < 40 µm.

Allocation History

Results

Track:



Data:

Grain 1: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Grain 3: Tsuchiyama (CT Tomo): Small grains of heavy minerals (kamacite and Fe-Ni sulfides, presumably: the size of some grains must be less than the CT spatial resolution) are embedded

in a porous material (aerogel + sample?). Presence of large voids in the porous material shows large-scale vesiculation, such as melting. The porous material has smooth and rough surfaces

Grain 4: T.Nakamura, Ohsumi and Mikouchi (SXRD): Crystalline, having olivine, both high and low Ca pyroxene (OPX), and plagioclase (probably anorthite). Ohsumi did site occupancy of olivine, and it is Fo89.

Tsuchiyama (Tomo): Crystalline sample. Very small grains of heavy minerals (Fe sulfide or magnetite?: metal is also possible) are present along the grain boundaries of silicates. Portions which seem to be mesostasis are also seen. If this is mesostasis, this sample has prophyritic texture. Small voids are also present. The particle is partially covered with a porous material (aerogel + sample?). Fractured surface without covering the porous material is also seen.

Grain 5: T. Nakamura (SXRD): chondritic composition, sulfide and kamacite are only crystalline phases, suggesting that silicates are amorphous.

Tsuchiyama (Tomo.): Grain has vesicular texture.

Grain 6: T. Nakamura (SXRD): Olivine, low-Ca pyroxene.

Tsuchiyama (CT Tomo.): This particle shows micro-porphyritic texture. If the phenocrysts are olivine, the Mg# estimated from the CT values (linear attenuation coefficients in the CT images) is approximately 0.8. This needs verification. Relatively large kamacite grains are also seen (mode: ~1 vol.%). Small voids are also present. The particle is partially covered with a porous material (aerogel + sample?). The particle surface is rounded and any fractured features are not seen

Grain 16: Keller (FTIR): Mostly melted aerogel.

Tsuchiyama (Tomo.): Microporphyritic texture, with feromags and kamacite.

T. Nakamura (SXRD): Crystalline olivine, low-Ca pyroxene, kamacite.

Aleon et al (SIMS: No presolar grains.

Velbel &Harvey (TEM/SEM): Provide many Fe-Ni sulfide analyses. All Fe-Ni sulfides are S-depleted. Give bulk analyses of Si mixed with chondritic material, and suggest that these are not merely GEMS. Provide many SEM images of same. Observe pyrrhotite, troilite, kamacite by ED, possibly also graphite and an Fe carbide by EDX-ED.

T. Stephan (TOF-SIMS): Measured trace elements, most elements chondritic, Ba, Cu, K, Na, Al, Rb, Sr, 10-100 x CI.

K. Tomeoka (TEM): microcrystalline material includes closely-located grains if kamacite, troilite and pyrrhotite (all verified by ED), within the amorphous glass.

Grain 17: Keller (FTIR): aerogel + melt + weak CH (IDP like)

Grain 18: Keller (FTIR): Melted aerogel

Grain 19: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Grain 20: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Grain 21: Keller (FTIR): Aerogel with strong CH band by FTIR

Meibom (SIMS): Stable Isotopes reported

Borg (Raman): Organics investigated

Taylor (SEM): (Reported at CalTech meeting) Grain is largely Carbonaceous material, or at least has a lot of C. Small Ca-rich grains present. Also see elevated Ti in this particle.

Herzog (MS): C/N ratio is 45-51

Grain 22: Keller (FTIR): Aerogel with strong CH band by FTIR

Grain 23:
Keller (FTIR): Aerogel plus strong CH

Herzog (MS): (Reported at CalTech meeting). C/N ratio is 17-21

Grain 24: Bridges (TEM): EDX spectra reveal dominant aerogel, with 2 types of cometary material: Mg-Fe-(Ca)-silicate; Fe-sulphide. Some of the EDS spectra are mixtures of these 2 types, One spectrum contained Ca in addition to the Mg-Fe-(silicate).

Keller (FTIR): All analyses + Si-O (aerogel presence).

T. Stephan (SIMS): Mg, Ca, Ti, V, Fe, Mn, Co, Ni are chondritic; Na, Al, K, Cr, Cu, Rb, Sr, Ba 10-100 x CI.

Rietmeijer (TEM): Finds the amorphous Si-bearing material to be un-GEMS like. He sees another Si-rich glassy material which has Mg,Fe,S, etc, that appear more GEMS like. He reports Fe-Ni sulfide compositions, including some that are *enriched in S*, and some that have very high Ni, and cannot have originated from partial volatilization of troilite. He sees both kamacite and taenite (by ED). He sees brookite grains which appear to be in the epoxy only and are probably contamination (?).

Grain 25: Keller (FTIR): Aerogel plus minor melt.

Grain 26: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Borg (Raman): Organics investigated

Meibom (SIMS): Stable isotopes.

Grain 27: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Meibom (SIMS): Stable isotopes.

Grain 28: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Meibom (SIMS): Stable isotopes.

Grain 29: Keller (FTIR): Mostly melt

Meibom (SIMS): Stable isotopes.

Grain 30: Keller (FTIR): Organic-rich plus melt (?)

Meibom (SIMS): anomalous ^{13}C and ^{15}N.

Grain 31: Keller (FTIR): aerogel plus melt

Grain 32: Keller (FTIR): aerogel + distinct melt above 10 um, weak CH

Bridges (TEM): The sample is dominated by aerogel with MgFe-silicate. S contamination reflecting the mounting medium is present. All analyses + Si-O (aerogel presence).

Langenhorst (TEM): Reports sulfides and amorphous Mg-silicates, also TiO2 and among the grain, but TiO2 appears to be a contaminant.

Grain 33: Keller (FTIR): melt plus aerogel

Grain 34: Keller (FTIR): aerogel only

Grain 35: Keller (FTIR): aerogel plus melt

Grain 36: Keller (FTIR): aerogel only

Grain 37: Keller (FTIR): aerogel plus melt

Grain 38: Keller (FTIR): aerogel plus melt

Grain 39: Keller (FTIR): aerogel plus melt plus contaminant

Grain 40: Keller (FTIR): aerogel plus melt plus contaminant

Grain 41: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Grain 42: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Zega (TEM): Nanocrystalline Fe-Ni sulfides embedded within amorphous material is the major component. Sulfides contain minor Cr and P. Amorphous material is composed of O, Mg, Al, Si, and Ca. One slice contains graphitic C (is this contamination?) and noncrystalline Cu (contaminant from grid?).

Bajt: Organics

Grain 43: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

Grain 44: Stephan (TOF-SIMS): Chondritic Li, Na, Mg, Ca, Ti, V, Cr, Mn, Fe, Co, Ni; while Al, K, Sc, Cu, Sr, Rb, Ba 10-100 x CI.

Grain 45: Keller (FTIR): aerogel plus strong CH

Zega (TEM): Nanocrystalline Fe-Ni sulfides embedded within amorphous material is the major component. Sulfides contain minor Cr and P.
Amorphous material is composed of O, Mg, Al, Si, and Ca.

Stephan (TOF-SIMS): Only Li, Na, Fe, Ni are chondritic.

T. Nakamura (SXRD): No crystalline silicates, only amorphous materials and metal.

S. Wirick (STXM): Bit of poorly-ordered “graphite” in grid 5.

Grain 46: Keller (FTIR): olivine plus melt plus aerogel

T. Nakamura (SXRD): No crystalline silicates, only amorphous materials and metal

Grain 47: Keller (FTIR): aerogel + distinct melt above 10 um, v weak CH

T. Nakamura (SXRD): No crystalline silicates, only amorphous materials and metal

Grain 48: Keller (FTIR): aerogel+minor melt + weak C

Grain 49: Keller (FTIR): pyx+oliv+melt+aerogel

T. Nakamura (SXRD): crystalline olivine and low-Ca pyroxene

Grain 50: Keller (FTIR): aerogel+minor melt + weak CH

Grain 51: Keller (FTIR): aerogel+minor melt + weak CH

Grain 52: Keller (FTIR): aerogel+minor melt + weak CH

Mikouchi (SEM/TEM): Mainly composed of amorphous silica with scattered small particles of Fe, Ni metal or Fe sulfide. Some areas show the enrichment of Mg, suggesting that they are Mg-rich silicates. No Fe was detected for these Mg-rich silicate phases.

Bajt: Organics investigated.

Grain 53: Keller (FTIR): aerogel+minor melt + weak CH.
Bajt: Organics investigated.