Cometary Cell C2004

Track 44

Images

Aerogel Cell:
C004-02.jpg

Track and Grains:
C2004-BigBertha.jpg

Microtomed samples:
C2004,1,44,4,0.pdf

Track History: This is the largest impact feature in the cometary tray. The impact feature is large because the cometary particle struck the edge of the tray frame and then bounced into the adjacent aerogel. The cell is still in the tray. 5 grains pulled from track for analysis.

Track Characteristics
Type: Hedgehog / Crater
Length / Depth: ~ 0.8 cm
Grain diameters: Not measured

Allocation History

Results

Graqin 1 - T.Nakamura (SXRD): Seussite (Fe3Si), probably formed during capture.

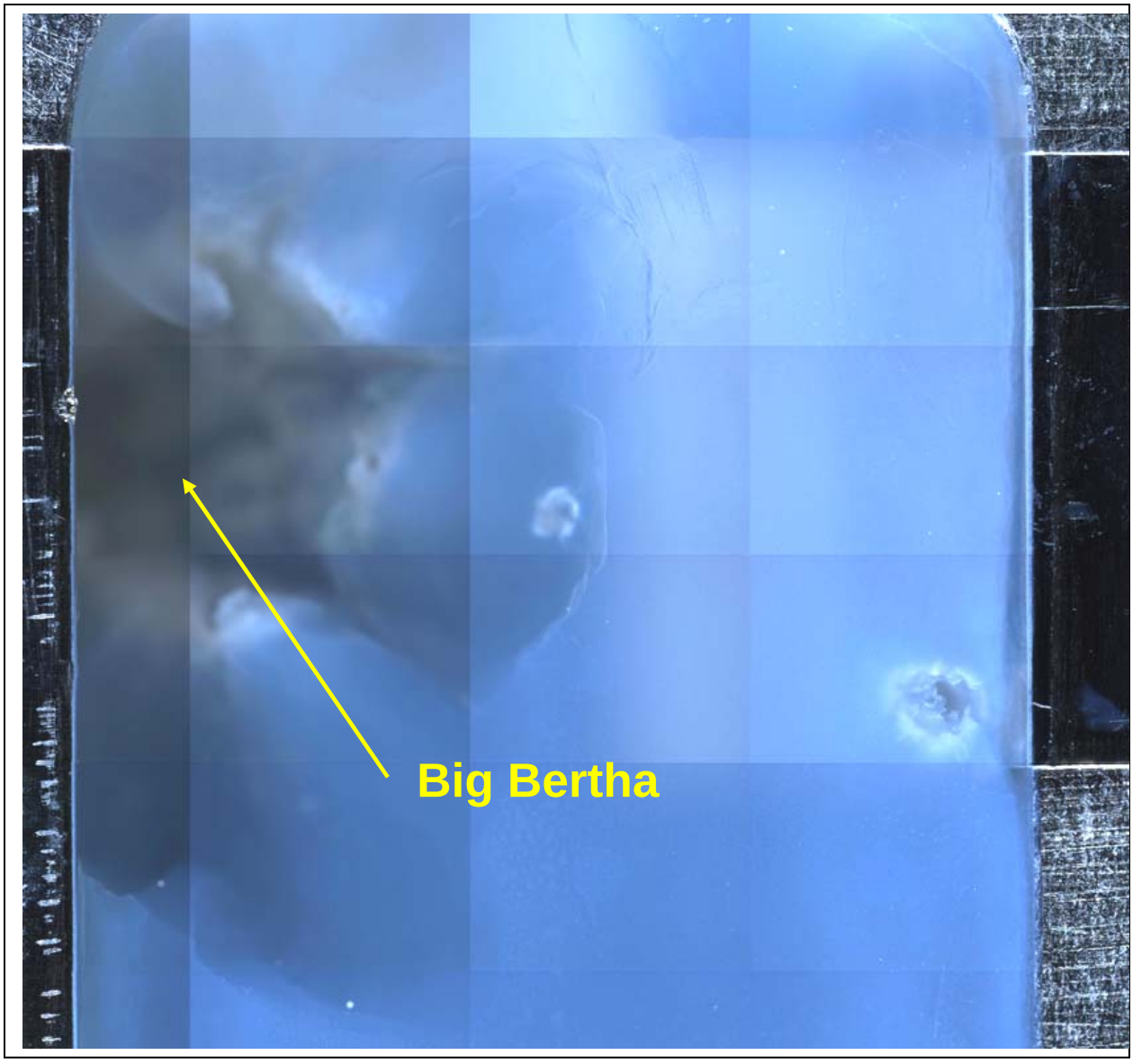
Grain 2 - T.Nakamura (SXRD): Seussite (Fe3Si), probably formed during capture.

Grain 3 - Tsuchiyama (CT tomography): Small grains of heavy minerals (kamacite?: the size must be less than the CT spatial resolution) are embedded in a porous material, which may be aerogel with or without very fine cometary dust samples. Presence of large voids in the porous material shows large-scale vesiculation, such as melting

Grain 4 - Rietmeijer (TEM): Particle contains extremely rare pyrrhotite, extremely rare grains that are a regular mixture (crystallographic controlled intergrowth?) of pyrrhotite and kamacite, round kamacite inclusions in the aerogel, $(Fe,Ni,Cr)_3Si$ spheres (seussite) scattered in aerogel, and single crystal forsterite. He provides many analyses of sulfides, olivine, seussite, Fe-Ni metal and Si-rich glass. He is confident that the Fe-silicide (seussite) spheres are the reaction product between iron from comet material and aerogel. If so, the Fe-Si phase diagram would suggest peak-heating temperatures at least on the order of 1200-1400 ^{o}C. The amorphous zone betwen forsterite and aerogel does not represent an “inert compressed aerogel”. It suggests chemical exchange between the comet dust and the aerogel capture medium. The process is unclear: it could be a melt zone or due to solid-state diffusion at very high chemical diffusion rates.

T. Stephan (Tof-SIMS): Most analyzed elements have essentially chondritic abundances; but K Co, Cu enriched up to 5 x CI.

Tomeoka (TEM): Fe-Ni metal (incl. kamacite) within Si-rich amorphous material.



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