TWO INTERSTELLAR DUST CANDIDATES FROM THE STARDUST AEROGEL INTERSTELLAR DUST COLLECTOR

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Introduction: The Stardust Interstellar Dust Collector was exposed to the interstellar dust stream during the cruise phase of the Stardust mission, and is expected to have collected several dozen contemporary interstellar dust particles in aerogel and aluminum foil collectors. We report on the investigation of impacts on the aluminum foils in companion abstracts in this conference.

Stardust@home Phase III: Through the massively distributed volunteer search called Stardust@home, we have so far identified 28 tracks in the aerogel collectors. We report on the results of the recently-launched phase III of Stardust@home, which employs new calibration data for training and measurement of detection efficiency and noise rates [1], and uses optical imagery collected from aerogel tiles extracted from the collector tray. The new imagery is superior to the imagery searched during Phases I and II. Preliminary results show high efficiency for detection of fiducial marks in extracted aerogel tiles, which serve as analogs for tracks.

Synchrotron analyses of two interstellar candidates: We have conducted analyses by synchrotron x-ray fluorescence and diffraction (SXRF/SXRD) microprobe, scanning x-ray transmission microscopy (STXM) and Fourier-Transform Infrared (FTIR) microprobe analyses of two interstellar dust candidates. These candidates have trajectories approximately consistent with an origin in the interstellar dust stream (so-called “midnight” tracks)[2], and do not have compositions consistent with an origin as target material ejected from impacts on the spacecraft. FTIR analyses of these candidates gave only upper limits on the presence of organic material. I1043,1,30,0,0 consists of two prominent distinct Si-bearing grains, one Mg-rich (Sirius) and the other Al-rich (Orion). STXM imaging of Orion showed it to be fine-grained and to have a shell-like structure. SXRD also indicated the presence of fine-grained material in I1043,1,30,0,0. The second candidate, I1047,1,34,0,0, has so far been analyzed only by STXM. It is a Mg-rich grain with a Si signal too weak to suggest a silicate. Minor Al is present (Mg/Al ~ 20), and Fe is below detection limit for STXM. The Mg K-edge XANES spectrum is distinct from that of the Mg-rich particle, Sirius.

References [1] Westphal A. J. et al. 2009. *Meteoritics & Planetary Science Suppl.* 44:A217. [2] Westphal A. J. et al. 2010. Abstract #2050, 41st Lunar and Planetary Science Conference.