

SPALLOGENIC NEON-21 IN SUBMICRON DUST FROM STARDUST AEROGEL CONFIRMED

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Introduction: Recently we observed small but statistically significant ^{21}Ne enrichments in the surface layer of two particle- and track-free aerogel blocks C2101–7.0.0.0 and C2017–4.0.0.0 exposed to the comet Wild-2 [1, 2]. If this enrichment is a real these findings would imply the presence of spallation-produced Ne in submicron dust released by the subliming comet. If exposed while part of the comet, the spallation Ne is likely due to CGR irradiation, and if irradiated as individual grains, it may be due to irradiation by energetic particles during the naked T-Tauri phase of the Sun due to the low energy is required to retain recoiling fragments. However, the ^{21}Ne enrichment could simply be an intrinsic property of aerogel, possibly due to the presence of unusual organics reportedly observed on flown aerogel surfaces [3].

To evaluate the possibility of aerogel contamination we have analyzed a special kind of aerogel, the “witness tile”, which was flown on the back side of Stardust spacecraft and never exposed to particles from the comet coma.

Experimental: The fragment WCARM11CPN, 17 of witness tile aerogel was cut into approximately 8×5 mm nearly rectangular slices, ~ 0.5 mm thick. We analyzed, in duplicate, a sequence of aerogel slices from three different depths from the surface of the “witness tile”, first slice representing 0–0.5 mm depth, the second 0.5–1.0 mm and the last 1.0–1.5 mm. Special care was taken to insure exactly the same experimental conditions as employed in the earlier analyses of track-free aerogel [1, 2] and the duplicate sets provide confirmation of the results.

Results: No statistically significant excess of ^{21}Ne in any particular slice was found in any of the “witness tile” aerogel slices. The isotopic composition of “witness tile” Ne was nearly atmospheric, indistinguishable from procedural blank.

Conclusion: The ^{21}Ne concentration of $2.2 \pm 0.9(2\sigma) \times 10^{-14}$ cm^3 STP/ cm^2 in the aerogel surface exposed to the comet is not an experimental artifact of surface contamination and thus not an intrinsic property of aerogel exposed during the mission. It therefore must be of spallation origin and indicates the presence of irradiated submicron dust released from the comet.

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References: [1] Meshik A., Hohenberg C., Pravdivtseva O., Frank, D. and Zolensky M. (2009) *Meteoritical Society Meeting*, Nancy, Abstract #5285, [2] Meshik A., Hohenberg C. and Pravdivtseva O., (2010) *Lunar and Planetary Science Conference*, Abstract #2706. [3] George Flynn, personal communication.