

In search of pre-solar silicates from an ungrouped C3 meteorite

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Pre-solar grains are mm to sub-mm sized refractory grains that survived the homogenization process of solar formation, and are thus able to provide us the stellar sources that have contributed to the solar system, and the materials made of the interstellar mediums. Previously, we have started to look for pre-solar silicates from a CO3 meteorite, DAG192, via the in situ NanoSIMS image scan, and a total of 30 grains have been uncovered thus far, and the preliminary O isotopic data of these grains show excess in ¹⁷O and ¹⁸O, as well as deficit in ¹⁸O, consistent with the published pre-solar silicate data [1,2]. In this study, we have extended the search of pre-solar silicates to a previously not-studied ungrouped C3 meteorite, in order to compare the results of this meteorite to the published data, and to broaden the understanding of the evolution history of pre-solar grains. In general, we have uncovered fewer pre-solar silicates from this ungrouped C3 sample than that of the DAG192 (CO3), and a total of 16 grains were found over a period of one month via the in situ NanoSIMS image scan. The majority of the pre-solar silicates found in this study belong to the group 1 grains, that are enriched in ¹⁷O and with near solar ¹⁸O/¹⁶O [1], and are considered as products of RGB/AGB stars [1,2]. In addition, two grains rich in ¹⁵N but with near solar O isotopic ratios were found. Lastly, a grain showing both ¹⁷O and ¹⁸O excesses, most likely belong to group 4 [1] pre-solar silicates, was also found. While certain AGB stars and Type-II SN can produced the observed group 4 isotopic signatures, other data, e.g., Mg and Si isotopic compositions, may help determined their potential astrophysical origins, which will be performed via O⁺ primary ion beam after the O isotopic measurements were done for these grains.

[1] Nittler, L.R. and Ciesla, F. (2016) *Annu. Rev. Astron. Astrophys.* **54**, 53-93.

[2] Sanghani, M. N. et al. (2021) *Astrophys. J. Suppl. Ser.* **253:41**, 1-26