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In search of pre-solar silicates

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Pre-solar grains are micron to sub-micron 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. We have started to look for pre-solar silicates from a CO3 meteorite, DAG192, via the in situ NanoSIMS image scan. A total of 30 grains have been uncovered thus far, and the preliminary O isotopic data of these grains show excess in ^{17}O and ^{18}O, as well as deficit in ^{18}O, consistent with the published pre-solar silicate data[1,2]. Overall, the preliminary O isotopic data of these pre-solar grains can be divided into three groups, as previously defined from the existing literature data [1,2]. In general, group 1 grains are enriched in ^{17}O and with near solar $^{18}O/^{16}O$[1], and are considered as products of RGB/AGB stars [1,2]. One of the grains shows moderate to large ^{18}O depletion accompanied with ^{17}O excess, the characteristic of a group 2 pre-solar silicates [1,2], and which probably also came from an AGB star [1,2]. Lastly, a number of the grains show both ^{17}O and ^{18}O excesses, and are thus belong to group 4 [1] pre-solar silicates. 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.

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