THE STARDUST INVESTIGATION INTO THE CR2 CHONDRITE GRV 021710.

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Introduction: Abundant presolar grains have been identified in CR3 chondrites [1, 2], but studies of CR2 chondrites so far have not shown very high abundances of presolar material [3-5]. We are investigating the presolar grain abundance of GRV 021710, which is a very fresh CR2 chondrite collected from Grove Mountains, East Antarctica [6].

Experimental: We used the Washington University Cameca NanoSIMS for isotopic mapping. Two C and three O isotopes were collected simultaneously. The total area of matrix analyzed was 10,700 μm^2. Isotopically anomalous grains were analyzed for their elemental compositions using the Auger Nanoprobe.

Results and Discussion: A total of 35 O-anomalous grains and 32 C-anomalous grains were found. Nine of the 35 O-anomalous grains are ^{18}O-rich and belong to Group 4, with likely origins in supernovae [7]. The remaining O-anomalous grains belong to Group 1, with enrichments in ^{17}O and close to solar $^{18}O/^{16}O$ ratios [7]. Most of the C-anomolous grains (25 out of 32) have $^{12}C/^{13}C$ ratios range from 25 to 76, similar to the compositions of mainstream SiC grains [8]. Six C-anomolous grains are ^{13}C-depleted, whereas the remaining one has a very low $^{12}C/^{13}C$ ratio ($^{12}C/^{13}C = 4$) like SiC A+B grains.

Auger elemental results show that 35 O-anomalous grains consist of 33 Fe- and/or Mg bearing silicates and 2 oxides, with an average grain size of 260 nm. Based on the (Fe + Mg + Ca)/Si ratios, these 33 silicate grains can be classified into five types: olivine-like grains (10), pyroxene-like grains (7), intermediate grains (6), Si-rich (6) and Si-poor (4) grains. Most of these silicate grains are Mg-rich (mg#s: 29-100). The two oxides include one spinel-like grain and one SiO_2 grain. More structural data is needed to comfirm the crystallinity of the SiO_2 grain.

Auger spectra and elemental maps of the 32 C-anomalous grains show 15 SiC and 16 carbonaceous grains. The remaining one was sputtered away during the NanoSIMS measurement and could not be located in the Auger Nanoprobe. Except one SiC A+B grain and one probable SiC Y grain, remaining grains are mainstream SiC grains. Most of the carbonaceous grains are dark in secondary electron images, could be graphites or insoluble organic matter.

Based on the total matrix area analyzed and the surface areas of the grains, we can calculate the abundances of O-anomalous and C-anomalous grains to be 174 ± 30 and 203 ± 36 ppm respectively, which are similar to the results from CR3 chondrites [1, 2]. We can also calculate an abundances of 165 ± 29 ppm for presolar silicates, 9 ± 6 ppm for presolar oxides, 135 ± 35 ppm for SiC grains and 50 ± 12 for carbonaceous grains.

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