# Chronology of multiple melting of a Type C CAI from Allende CV3

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Disequilibrium O isotopic distributions among inter- and intra-crystals of CAIs correspond to multiple melting events in the solar nebula [1]. Thus $^{26}$Al-Mg systematics may be applicable for age differences between the melting events. We have carried out coordinate study of O and Mg isotopes by SIMS and precise petrographic observation for a Type C CAI, EK1-04-2 from Allende CV3 in order to determine melting events and the ages. The CAI mainly consists of spinel, anorthite, olivine and diopside, and has a core and mantle structure. Petrography in the core suggests that crystallization sequences of core minerals are spinel, anorthite, olivine and diopside. The mantle has the same mineral assemblage as the core, and shows partial melting and solidification texture. O isotopic compositions of all minerals are distributed along CCAM line ($\delta^{18}O$ = –44 to +9‰) indicating disequilibrium in the CAI. Spinel is $^{16}$O-rich ($\delta^{18}O$ ~ –43‰), while anorthite is $^{16}$O-poor ($\delta^{18}O$ ~ +9‰). Core olivine and core diopsides have the same O isotopic composition ($\delta^{18}O$ ~ –15‰), indicating their equilibrium. Mantle olivine and mantle diopsides have variable O isotopic compositions and are slightly depleted in $^{16}$O ($\delta^{18}O$ = –13 to –4‰) comparing with these minerals of core. $^{26}$Al-Mg systematics is consistent to the disequilibrium observed by petrography and O isotopes. Spinels are plotted on a line of $^{26}Al/^{27}Al_0$ = (3.52 ±0.15) $\times10^{-5}$, anorthites are (0.5 ±1.6) $\times10^{-6}$, and core olivine and core diopsides are (–0.8 ±7.4) $\times10^{-6}$, indicating in equilibrium each other. Plots of mantle olivine and mantle diopside are scattered below the isochron of these minerals of core, suggesting partial melting of mantle. Only inconsistency among petrography and isotopic distributions is $^{16}$O-poor nature of anorthite. However, diffusivities [2,3] and crystal sizes imply that re-equilibrium of O and Mg isotopes was achieved for anorthite grains by secondary processes on the parent body. Therefore, our study revealed that the CAI had retained in the protosolar nebula at least for 1.7 Myr and experienced multiple melting events in the nebula.

[1] Yurimoto *et al* (1998) *Science* 282, 1874-1877 [2] Ryerson and McKeegan (1994) *GCA* 58, 3717-3734 [3] LaTourette and Wasserburg (1998) *EPSL* 158, 91-108