Grossular is a secondary mineral commonly observed in Allende CAIs associated with monticellite, wollastonite, forsterite, anorthite, and wadalite [1–6]. Studies of the $^{26}\text{Al}^{26}\text{Mg}$ systematics in grossular yield $(^{26}\text{Al}/^{27}\text{Al})_0$ ranging from $\sim 5 \times 10^{-5}$ to $< 3 \times 10^{-6}$ suggesting grossular formation started almost contemporaneously with crystallization of CAIs and lasted $> 3$ My [1–3]. This interpretation has been recently questioned by [4]. Grossular has three main textural occurrences in Allende CAIs. (i) Lacy Alk-rich melilite+anorthite in Type A CAIs are pseudomorphed by a porous aggregate of grossular, monticellite, and forsterite [4]. $(^{26}\text{Al}/^{27}\text{Al})_0$ in this grossular has not been measured. (ii) In cores of Type B1 CAIs, Alk-rich melilite + anorthite are replaced by coarse-grained intergrowths of grossular, monticellite, wollastonite, and wadalite. This grossular has high $^{27}\text{Al}/^{24}\text{Mg}$ ratio (50–100), but shows no evidence of excess $^{26}\text{Mg}$ ($^{26}\text{Mg^*}$) $([^{26}\text{Al}/^{27}\text{Al}]_0< 5 \times 10^{-6}$). Our preliminary data indicate that melilite and grossular have nearly identical O-isotope compositions ($^{\Delta}\text{O} = -2.7 \pm 0.8\%$ and $-3.0 \pm 0.8\%$, respectively). We suggest both occurrences of grossular resulted from a metamorphic reaction between melilite and anorthite. (iii) In compact Type A CAIs and melilite-rich mantles of Type B1 CAIs, fine-grained grossular forms thin veins crosscutting Alk-poor melilite and closely associated with secondary anorthite. Secondary anorthite shows low or unresolvable $^{26}\text{Mg^*}$, whereas grossular $(^{27}\text{Al}/^{28}\text{Mg}< 50)$ contains $^{26}\text{Mg^*}$ corresponding to $(^{26}\text{Al}/^{27}\text{Al})_0 \sim 4.5 \times 10^{-5}$ [3]. We suggest these grossular veins resulted from a two-stage process during fluid-assisted thermal metamorphism: replacement of melilite by secondary anorthite, followed by reaction between anorthite and mellilitre to form grossular. $(^{26}\text{Al}/^{27}\text{Al})_0$ approaching the canonical value in this vein grossular reflects $^{26}\text{Mg^*}$ inherited from melilite, following $^{26}\text{Al}$ decay. A metamorphic origin of grossular-bearing assemblages in Allende CAIs is consistent with the absence of grossular in CAIs from the less metamorphosed CV chondrites – Leoville, Efremovka, and Kaba.

The Cl-bearing secondary minerals in Allende CAIs, sodalite (Na$_4$Al$_3$Si$_3$O$_{12}$Cl) and wadalite (Ca$_6$Al$_5$Si$_2$O$_{16}$Cl$_3$), have different textural occurrences and yield distinct $(^{36}\text{Cl}/^{35}\text{Cl})_0$ of $(< 1.6–4) \times 10^{-6}$ and $(1.72 \pm 0.25) \times 10^{-6}$, respectively [6–9]. Wadalite occurs as intergrowths with coarse-grained grossular, monticellite and wollastonite in Type B1 CAI cores, whereas sodalite together with nepheline replaces melilite and anorthite in CAI perripheries. These differences may indicate distinct origins for Cl in wadalite and sodalite. Chlorine in wadalite might have been originally dissolved in melilite and anorthite of the host CAIs, as suggested for Na [10], while Cl in sodalite reflects influx of volatiles during subsequent metamorphic processing. In this scenario, the $^{36}\text{Cl}$–$^{38}\text{S}$ and $^{26}\text{Al}$–$^{26}\text{Mg}$ systematics of wadalite, together with $^{10}\text{Be}$–$^{10}\text{B}$ systematics of primary CAI minerals, may provide constraints on the irradiation history of the Allende CAIs or their precursors.