A METAMORPHOSED OLIVINE-RICH AGGREGATE IN THE CV3 CARBONACEOUS CHONDRITE Y-86009. K. Jogo1 and T. Nakamura1. 1Department of Earth and Planetary Sciences, Kyushu University, Fukuoka, Japan. E-mail: kaoril@geo.kyushu-u.ac.jp.

A metamorphosed olivine-rich aggregate was found in the least metamorphosed CV3 Y-86009. Although such aggregates were observed in CV3 Mokoia and Vigarano, and CO (CM) Acfer 094 [1-3], their precursors and formation mechanism have not been fully understood. Here, we report mineralogical observations of an olivine-rich aggregate in the Y-86009.

The olivine-rich aggregate is embedded in matrix. It consists of coarse grained (~10-50 μm in size), olivine (Fa33-35), Al-diopside (Fs10Wo51-52), plagioclase (An54-60Ab39-46), and a large Ni-troilite (~200 μm in size). Some triple junctions of this aggregate indicate prolonged annealing of pre-existing materials. Electron probe analysis shows that bulk chemical composition is almost consistent with solar abundances, suggesting that its precursors are not highly differentiated achondrites. In addition, heterogeneous oxygen isotope compositions of olivine grains [4] imply that it had not metamorphosed enough to equilibrate oxygen isotope ratios. Therefore, precursors of the aggregate would be primitive materials. While, olivines show no Fe-Mg zoning within each grain although they are in direct contact with matrix olivines (Fa48-52). Thus, the olivine-rich aggregate had not heated after agglomeration to the Y-86009.

The large troilite fills margin of olivine, diopside and plagioclase grains. If we assume that troilite was melted during growth of these silicate grains, the annealing temperature would be >1000 °C [5]. No melting texture of olivine, diopside and plagioclase grains suggests that the temperature was <1300 °C [6]. Therefore, the olivine-rich aggregate was annealed at about 1000–1300 °C. Within the olivine grains (up to 50 μm in size), Fe-Mg zoning is not observed. This suggests that Fe-Mg diffusion completely occurred during annealing, if precursor olivine grains had different Fa#. However, different oxygen isotopic composition of each olivine grain [4] implies that oxygen diffusion had not completed. Based on Fe-Mg and oxygen diffusion coefficients on olivine grains [7, 8], calculated annealing duration is from 104 hours to 107 years at 1000 °C and from 100 hours to 100 years at 1300 °C, which are consistent with [9]. These conditions could be occurred in both of nebular and asteroid. However, formation age of olivine-rich aggregate may constrain its origin. Al-Mg dating of plagioclase in this aggregate is now in progress.