MANGANESE-CHROMIUM CHRONOLOGY OF OLIVINES IN L CHONDRITES. T. Tomiyama[1] and K. Misawa[2], [1]Dept. of Polar Sci., School of Phys., and Math., Grad. Univ. for Advanced Studies. [2]Antarctic Meteorite Research Center, National Institute of Polar Research. 1-9-10 Kaga, Itabashi, Tokyo, 173-8515 Japan. (tomiyama@nipr.ac.jp)

The parent bodies of ordinary chondrites (OCs) accreted within a very short time scale in the early stage of the formation of the solar system. After accretion, parent bodies might have been internally heated by sources such as the decay of short-lived radionuclides (e.g., ^{26}Al [1]). In such case, parent bodies should initially have had onion-shell structures, in which metamorphism increased with burial depth. Hence, the time scale of thermal metamorphism should have correlated with petrologic types. If a parent body of ~100km size was heated by the decay of ^{26}Al, the time scale of thermal metamorphism would have been ~10 Myr for type 3-5 chondrites and ~100 Myr for type 6 chondrites [2]. The Pb-Pb and ^{40}Ar-^{39}Ar ages, and ^{244}Pu fission-track thermochronology of some H chondrites are consistent with the onion-shell model [3,4].

However, if there is any disturbance of the structure of a parent body, cooling histories of OCs could have been different from those predicted by the onion-shell model. In fact, the Pb-Pb ages of L and LL chondrites have no correlation with petrologic types [3], and there is no clear relationship between petrologic types and cooling rates estimated from the chemical zoning in Fe-Ni metal [5]. The OC parent bodies, especially those of L and LL chondrites, could have experienced disruptive collision during thermal metamorphism. In this case, some source materials of OCs could have been excavated from the hot interior and cooled rapidly.

If the ^{53}Mn-^{53}Cr ($t_{1/2}$= 3.7 Myr) system is applicable to OCs, we can constrain the duration of thermal metamorphism of these meteoritic materials [6,7]. Because many chondrites are brecciated, in-situ analysis by ion-microprobe is useful for comparison of the isotopic and petrographic characteristics. We performed isotopic analyses of ^{52}Cr, ^{53}Cr and ^{55}Mn in olivines in equilibrated L chondrites with the SHRIMP II. For the precise determination of the ^{53}Mn-^{53}Cr ages, we selected olivines with very low Cr contents using electron probe microanalyzer. We found that some of them have very high Mn/Cr of up to several hundreds by SHRIMP analysis. The ^{53}Mn-^{53}Cr ages of meteoritic materials suggest that the formation of OC chondrules predated LEW 86010 formation by 10 Myr [7]. If this was the case, the ^{53}Cr excess would be detectable only when the thermal metamorphism occurred at a very early stage in the solar system or when the parent body experienced disruptive collision.

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