

## 40Ar-39Ar chronology of chondrites: Significance of Cl-bearing phases

# Yuko Takeshima[1]; Chitaro Gouzu[2]; Tatsuki Tsujimori[3]; Hironobu Hyodo[4]

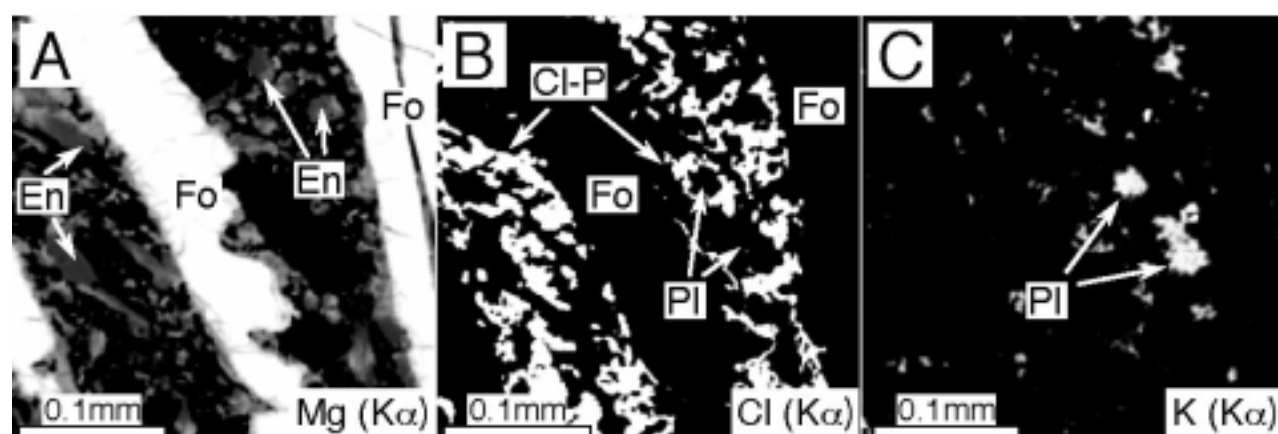
[1] Applied Sci., Okayama Univ. of Sci.; [2] Grad. Sch. of Sci. and Tech., Kobe Univ.; [3] Res. Inst. Nat. Sci., Okayama Univ. of Sci.; [4] RINS, Okayama Univ. of Sci., Kobe Univ.

The petrographic and mineralogic features of chondrules from Allende meteorite were examined for the purpose of the 40Ar-39Ar dating. Particularly, Cl-bearing phases in Allende chondrules were focused.

The 40Ar-39Ar dating of terrestrial and extraterrestrial materials needs an estimation of non-radiogenic component. In terrestrial materials, the non-radiogenic component may be estimated from 36Ar content. However, 36Ar in chondrules include cosmogenic 36Ar from 35Cl. Thus, if chondrite includes Cl-bearing phases, the radiogenic argon is underestimated by the presence of cosmogenic 36Ar, yielding apparently younger 40Ar-39Ar age.

The investigated chondrules were separated from Allende meteorite. The Allende chondrules consist mainly of prismatic olivine (Fo85-99) with minor amounts of pyroxene (En94-97, Wo1-5) and plagioclase (An87-94, Or ~0.2). F-bearing apatite (up to 2 wt% F), sulfides, metals and Cl-bearing phases occur as accessory minerals. The Cl-bearing phases are ubiquitous in the grain boundary of prismatic olivine (Fig. 1). The Cl-bearing phases contain up to 6.0 wt% Cl, and have 21.7-43.0 wt% SiO<sub>2</sub>, 0.9-32.3 wt% Al<sub>2</sub>O<sub>3</sub>, 0.2-28.2 wt% MgO, 0.9-27.2 wt% FeO, 0.2-14.5 wt% CaO, and 3.6-11.4 wt% Na<sub>2</sub>O. The X-ray mappings by EMP confirmed that K-bearing plagioclase does not contain Cl.

Considering these results, bulk analyses of chondrules with Cl-bearing phases can be adversely affected by the cosmogenic argon. Therefore, Cl-free materials such as plagioclase must be selected for 40Ar-39Ar analyses. In-situ microanalysis of plagioclase using pulse-laser techniques can be effective for 40Ar-39Ar chronology of chondrite.



**FIGURE 1.** X-ray images of (A) Mg  $K\alpha$ , (B) Cl  $K\alpha$ , and (C) K  $K\alpha$ . Fo = Mg-rich olivine; En = enstatitic pyroxene; Pl = plagioclase; Cl-P = Cl-bearing phases.