SIMS analysis of REE and trace elements in CAIs in Ningqiang meteorite.

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By analyzing meteorites, we can learn about the processes which created our solar system and planets. Especially, carbonaceous chondrites are known for the presence of white inclusions called CAIs(Ca-, Al-rich inclusions) which consist mostly of refractory minerals. CAIs are known as the oldest solid materials in the solar system formed at about 4567 Ma, and may retain important information about the high temperature processes occurred in the early stage of the solar system.

CAIs are divided into two main varieties: coarse-grained and fine-grained inclusions. The coarse-grained inclusions in CV chondrites are Type A (melilite-predominant), Type B (melilite-Ti-Al-clinopyroxene-rich) and Type C (Ti-Al-clinopyroxene-anorthite-rich). In addition, Type A inclusions are subdivided into compact Type A (CTA) and fluffy Type A (FTA). Because of their highly irregular shape, FTAs are considered as direct condensates from the gaseous nebula, whereas CTAs probably condensed from melts.

Lin and Kimura (2003) observed mineral compositions of Ningqiang carbonaceous chondrite, and suggested bulk compositions of FTAs and CTAs were plotted on the condensation trajectory.

The purpose of this study is to analyze the abundance and distribution of rare earth and trace elements in CAIs from Ningqiang meteorite, and to understand the condensation conditions as well as later formation processes (e.g. melting) of CAIs.

In order to obtain accurate abundances of trace elements and rare earth elements, we prepared synthetic glasses and terrestrial rocks as standards for the SIMS analyses.

Concentrations of rare earth elements and trace elements in the standard samples were determinded by ICP-MS.

We applied an Energy Filtering Method for the analysis of rare earth elements and trace elements by SIMS to reduce the contribution of complex molecular ions.

We will present the results of our basic experiments for the standard samples to improve rare earth elements and trace elements analysis by SIMS. We also present some preliminary results for refractory inclusions in Ningqianf meteorites.