Ba isotopic study of the Tagish Lake meteorite

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Aqueous alteration in the early solar system is one of the primitive activities in the early asteroidal bodies. The presence of hydrous minerals in the CI and CM2 chondrites provides evidence that aqueous alteration occurred on the meteorite parent body [1]. Understanding the process of early alteration is important for the study on the evolution of the early solar systems. The ^{135}Cs-^{135}Ba decay system including a presently extinct radioisotope ^{135}Cs ($t_{1/2}$=2.3 Ma) in primitive materials is expected to work as a sensitive chronometer for aqueous processes on the early planetary materials, because Cs is one of the elements that react sensitively with water. However, the Ba isotopic compositions in primitive materials are often disturbed by additional s-process nucleosynthetic component and hide isotopic evidence for the radiogenic ^{135}Ba [2, 3].

Our previous study of ^{135}Cs-^{135}Ba isotopic system in the Sayama (CM2) meteorite suggested the redistributioin of alkaline elements in association with the aqueous alteration [4]. In this study, 1 mm-sized chondrule in the Tagish Lake meteorite (TL) was selected to search for radiogenic ^{135}Ba. TL is known to be altered by a moderate degree of low temperature in the presence of water [5]. Using Raman spectoroscopy, serpentinized phases were heterogeneously found in the chondrule of TL. Elemental abundances of Rb, Sr, Cs and Ba, and isotopic analyses of Ba in micro-region scale by SHRIMP are in progress to find heterogeneous redistribution of alkaline elements and existence of radiogenic ^{135}Ba in association with the aqueous alteration.

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