OSUMILITE-LIKE PHASES IN CHONDRULES OF THE NIO CHONDRITE, YAMAGUCHI, JAPAN.

Yasunori Miura, Yamaguchi University, Chuou 4-1-23, Yamaguchi753-0074, Japan (dfb30@yamaguchi-u.ac.jp)

Introduction: Primordial minerals in composition are formed originally by dynamic collisions from the solar nebular period to show different compositions and formation process. Among the primordial minerals osumilite-group minerals have mixed compositions of feldspar and mafic minerals in general [1]. The main purpose of this paper is to elucidate classification of osumilite-group minerals and its application to osumilite-group minerals of the Nio chondrite (H3/4) fallen in Niho, Yamaguchi, Japan [2-7].

Classification of osumilite-group minerals: Osumilte-group silicate-minerals on the Earth are classified by main cations of K, Ca, Na, Fe and Mg as follows (Table 1) : 1) K-Fe type (merrihueite, sugilite [2, 3], klochite, and almarudite etc.), 2) K-Mg type (chayesite, trattnerite and friedrichbeckeite), 3) Na-Mg type (eifelite, yagiite and roedderite), and 4) Ca-K type (milarite). Therefore, K, Fe-rich osumilites are strongly characteristic in granitic rocks of the Earth. However, extraterrestrial osumilite-group minerals in composition1 have been reported as Mg-rich type as new Ca-Mg type in the Nio meteorite by using normal EPMA analyses more than1 μ melectric beam-size [1].

Analytical SEM analyses of Nio osumilite types: In-situ observation with nano-scale has been performed with special analytical SEM analyses (with FE-SEM) [4-7], which is clearly focused less than 1 μ m in size. In order to discuss nano-grains formed at primordial ages, three kinds of osumilite-group types are obtained in the Nio chondrite as follows (Table 1). 1) Ca-Mg and Na-Fe types: New osumilite types in composition are found in granular and barred pyroxene chondrules with K-rich matrix. 2) Na-Mg type: Similar terrestrial type is found in the matrix of pyroxene chondrule, but the Nio chondrule has Na-Mg type with less K and Mg compared with terrestrial phases.

Formation of the Nio osumilite-group grains: Pyroxene chondrule with K-bearing matrix shows tiny grains of Ca-Mg type osumilite in the matrix of albite plagioclase (glassy) and needle shaped K-rich orthoclase (crystalline), as shown in Fig.1. The K-bearing chondrule is mainly found in pyroxene chondrule, by showing Ca-Mg type osumilite (new type in composition), K-feldspar and albite plagioclases. Na-Fe type osumilite with K and Ca is found in the matrix with taenite Fe-Ni grains of barred pyroxene chondrule. The present analytical results indicate that there are osumilte-group minerals in the Nio chondrules are formed by pyroxene and Ca, Na, K-rich fluids of plagioclase composition to form separately in the matrix of chondrule during formation of chonditic asteroids.

Table 1. Osumilite-group minerals in composition.

1) *Terrestrial osumilite-group types:*
K-Mg, Fe; Na-Mg and Ca(K) types i**n Earth**
2) *Extraterrestrial osumilite-group types:*
Ca-Mg, **Na-Fe** and Na-Mg types in **Nio (H3/4)**

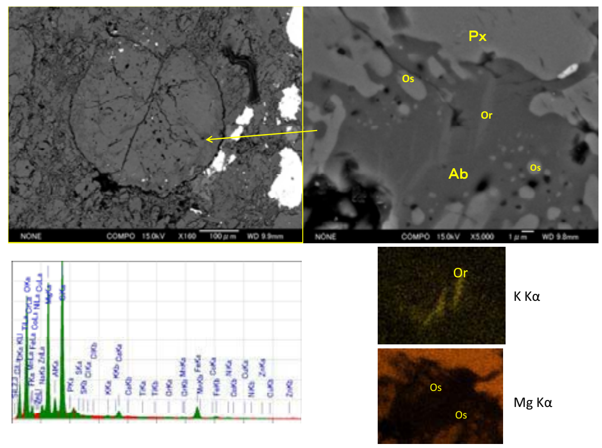

Fig.1. Ca-Mg type osumilite-group grains (Os) in the Nio chondrite (H3/4). PX: pyroxene. Or, Ab: K or Na feldspar.

Compositional changes from chondrule to crust: Carbon contents of the in-situ SEM analyses indicate as follows [4-7]: Amounts of Na, Na, Ca, Mg and Fe in the chondrules are clearly decreased in the fusion crust formed by meteoritic shower in terrestrial air, whereas carbon contents are increased due to meteoritic shower burring in air of the Earth.

Summary: The present results are summarized as follows: 1) The Nio chondrite contains new types of osumilite-group grains with Ca-Mg and Na-Fe types. 2) Ca-Mg type osumilite grains are formed are formed by melting with pyroxene and Ca, Na, K-rich fluids of plagioclase composition during formation of chondritic asteroids. 3) Carbon contents are increased in the fusion crust due to meteoritic shower evaporation in the air.

References: [1] Miura Y. (1986): LPSC XVII, 559-560 (#1285). [2] Kato T., Miura Y., Murakami N. (1976): Mineral. Jour., 8, 184-192. [3] Kato T. and Miura Y. (1977): Mineral. Jour., 8, 419-430. [4] Miura Y. (2001): Met. Soc., 64, #5364. [5] Miura Y. (2001): LPSC XXXII, #2075. [6] Miura Y. (2008): Met. Soc., 71, #5189. [7] Miura Y. (2008): Early Solar System Impact Bombardment, #3001.