Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

PPS22-P05 Room:Convention Hall Time:May 25 11:45-12:15

Two types of orthopyroxene in a micrometeorite

MIYAKE, Akira[1*], IMAE, Naoya[2]

[1]Kyoto Univ., [2]National Institute of Polar Research

[Introduction]

Four stable pyroxene polymorphs have been identified: Ca-rich clinopyroxene (Ca-rich Cpx, space group: C2/c), Ca-poor clinopyroxene (pigeonite) (Ca-poor Cpx, C2/c or P2_1/c), protoenstatite (Pen; Pbcn), and low-temperature orthopyroxene (LT-Opx, Pbca). Moreover, Ohi et al. (2008, 2010) established the stability field of high-temperature orthopyroxene (HT-Opx, Pbca) in enstatite (Mg2Si2O6) - diopside (CaMgSi2O6) system. However, LT- and HT-Opx have never been reported in natural sample. Micrometeorite which has about 100 um in size is collected from the ice in Antarctica. The most of them is like to be condritic meteorite and consistent with olivine, pyroxene and so on. Two types of Opx which have the different chemical composition although the same space group (Pbca) are found in a micrometeorite, TT001c5-48.

[Methods]

Major elements in the micrometeorite were analyzed using an electron probe microanalyzer (EPMA) and the phase of pyroxene was investigated using a Raman spectroscope. Thereafter, the specimen for transmission electron microscope (TEM) was made using a focused ion beam (FIB) and microtextures and electron diffraction patterns were obtained using a TEM.

[Result and Discussion]

Two types of pyroxene, which have a little different Wo content, were observed from EPMA and both of pyroxenes have the Ca-poor rim. Moreover, these pyroxenes have more Mn component than other micrometeorite. Raman spectra from these pyroxenes have almost same and indicate Opx with Pbca symmetry according to Wang et al. (2001). Electron diffraction patterns show that both phases have Pbca and no microtextures are obseverd in both cores of these pyroxene. On the other hand, both rims have the micro twin. These results suggests that two types of Opx with a little different Wo content are LT- and HT-Opx.

Keywords: orthopyroxene, micrometeorites, FIB-TEM