Mineralogical study of lepidolite in Nagatare, Fukuoka Prefecture, Japan

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1.Introduction
Li pegmatite of Nagatare in Fukuoka prefecture is known to produce various rare element rich minerals, and research on various minerals has been done since 1920’ s. Recently, we conducted a study on elbaite (Shirose ·Uehara, 2013) and reported on changes in the chemical composition of elbaite in the central part from the margin of the pegmatite rock. Especially the elbaite in Nagatarre was characterized by a trace amount of Zn contained compared with other domestic production areas. In this study, we conducted a study on lepidolite which is a representative Li mineral produced in Nagatare, which was insufficiently described. Lepidolite is the name of a solid solution series consisting of trilithionite $K_2(Li_3Al_3)(Si_6Al_2)O_{20}(OH,F)_4$ and polylithionite $K_2(Li_4Al_2)Si_8O_{20}(OH,F)_4$ as an endmember. There is also zinnwaldite series with polylithionite and siderophyllite as an endmember, and this is also a series of mica containing Li. In this study, we aimed to clarify the occurrence and macroscopic characteristics of lepidolite produced in Nagatare, select representative samples, and clarify chemical composition and crystal structure (polytype). Studies of the Muscovite-lepidolite series have been made since long ago, for example Foster (1960) describes the composition and structure change from muscovite to lepidolite, especially the middle part between muscovite and lepidolite is still being discussed.

2. Analysis methods
Samples used in this study were obtained from field survey so far. We classified by macroscopic observation and analyzed using representative samples among them. As a feature of lepidolite in Nagatare, the color is colorless to pink and purple most, and the size of crystals is from 0.1 mm or less to a few centimeters. Symbiotic minerals of lepidolite include quartz, albite, K-feldspar, columbite and the like. For the experiments, identification of mineral species and determination of polytype were carried out by X-ray diffractometer (Rigaku RINT RAPID Ⅱ), and the chemical composition was analyzed using electron probe micro analyser (JEOL JXA-8530F FE-EPMA).

3.Result
Three types of polytype of lepidolite are confirmed, 1*M*, $2M_1$, $2M_2$, and the most common polytype is $2M_1$. Crystals were not confirmed with 1*M* polytype alone, and it was confirmed that $2M_1$ or $2M_2$ was mixed. Fig.1 shows the relationship between chemical analysis values and polytype of each sample in SiO_2 - Al_2O_3 (wt%). From this result, lepidolite is close to the end member of trilithionite, and some samples also contain components of the zinnwaldite series. Considering distinguishing polytype, $2M_2$ lepidolite is closer to polylithionite composition than $2M_1$. Fig.2 shows zoning of lepidolite observed under polarizing microscope. When chemical analysis using EPMA was carried out, Al decreased from the center to the outside, and Si, Li, Mn and F tended to increase.

Keywords: Nagatare, Li pegmatite, lepidolite, polytype, trilithionite, polylithionite

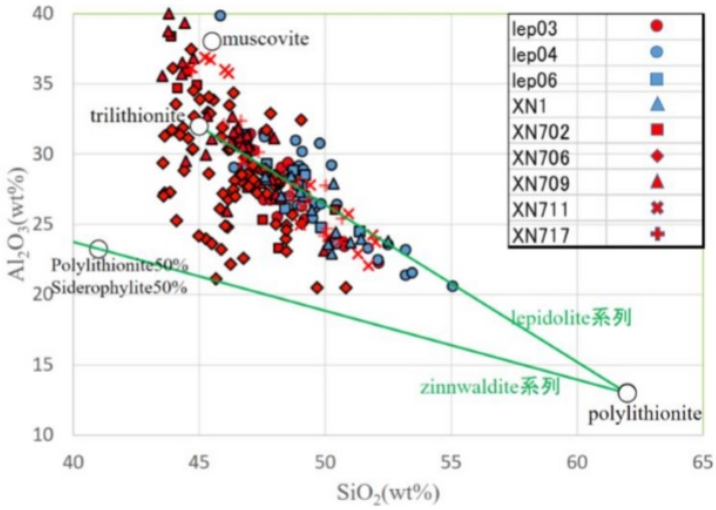

Fig. 1. SiO_2-Al_2O_3(wt%)
red circle shows polytype $2M_1$, blue circle shows polytype $2M_2$.

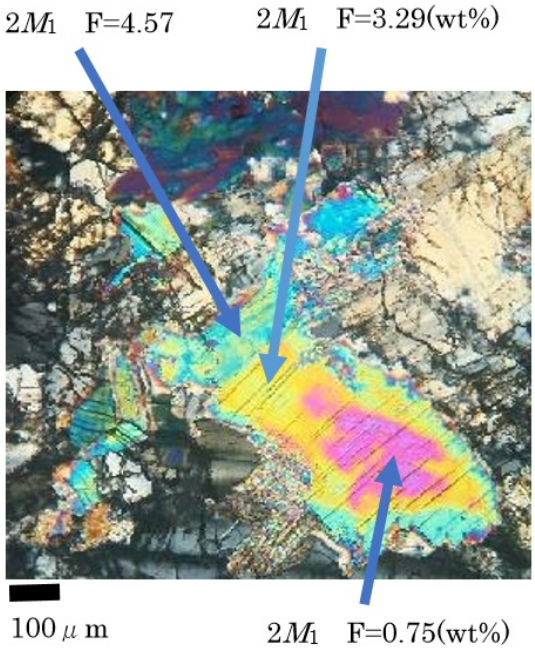

Fig. 2. zoning part of lepidolite (cross polarized)

