Mineralogical study of Jadeite-bearing rocks from Kurosegawa zone in Kyushu

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1. Introduction

The pyroxene group minerals that are the main rock-forming minerals have more than 20 independent species depending on its chemical composition. Jadeite is relatively rare in pyroxene group. Jadeite exists as a jadeitite that occupies more than 90% of jadeite in serpentinite, or included in blueschist and eclogite in serpentinite mélange.

Several jadeite localities in Japan have been reported (Miyajima, 2016). Karakida and Ueda (1983) found albite-omphacite rock including jadeite in Itsuki area, Kumamoto Prefecture and Miyazoe *et al.* (2009) reported *P-T* conditions where the rock was formed at 350 ℃, 500 MPa to 1.08 GPa. Saito and Miyazaki (2006) reported that jadeite-bearing block-shaped metagabbro distributed in serpentinite mélange in Izumi, Yatsushiro city, Kumamoto Prefecture. They mentioned the decomposition reaction of the albite as the formation process of jadeite. Quartz diffused into the surrounding serpentinite via water. In the discussion on jadeite formation process, the decomposition reaction of albite is often cited, but there is a problem that quartz is missing leave process that occurs during the reaction has not been confirmed. Harlow *et al.* (2015) explain that the formation of jadeite caused by the metasomatism with hydrothermal fluid and direct crystallization from hydrothermal fluid, there is a possibility to explain natural occurence of jadeite. In this study, we described the mineralogical description of jadeite-bearing metagabbro in Izumi, Yatsushiro city, Kumamoto Prefecture, and we considered the process of formation of jadeite and omphacite.

2. Geology and sample

The serpentinite mélange of this region consists of Taneyama serpentinite unit, Hakoishi serpentinite unit and Hukami serpentinite unit from the north, distributed in strips in the east-northeast direction (Saito and Miyazaki, 2006). In this study, we investigated jadeite-bearing metagabboro in Hakoishi serpentinite unit reported by Saito and Miyazaki (2006).

3. Experimental method

We observed the thin section by polarized light microscope. Powder XRD analysis carried out by X-ray diffractometer (Bruker AXS, M18XHF22-SRA). Chemical analysis and microstructure observation performed by SEM (JEOL, JSM-7001F) and EPMA (JEOL, JXA-8530F).

4. Results and discussion

The outcrop of the jadeite-bearing flesh metagabbro is dark green. Polished cross section show green or bluish green. The bluish parts contained glaucophane more than the green part. Although most of the observed thin sections contained a pyroxene, jadeite that found with the naked eye was only the white vein with a width of several mm. the other jadeite was scattered as fine grains of about tens of μm. There was also white vein that consist of quartz and potassium feldspar. Fine jadeite grains contained in the vicinity, but it did not coexist with contact with quartz. Powder XRD analysis revealed that constituent minerals in the part without vein were mainly of chlorite, pumpellyite, glaucophane and augite, jadeite was low content compared with these minerals.

Observing the thin section of the rock, fine grains of scattered jadeite gathered with albite and several tens of μm in size. There was no coexistence of quartz. Some also coexisted with potassium feldspar. The part of the vein jadeite consisted of a combination of jadeite and albite in the central part, jadeite and potassium feldspar at the marginal part. Feature rich in Ca, Fe and Mg from the central part to the

marginal part was the same even in the case of scattered jadeite.The chemical composition of the marginal part of the jadeite vein showed the composition that entered the miscibility gap between jadeite and omphacite, possibly forming a very fine lamella.
From above results, it seemed that the quartz reacted with jadeite after it crystallizes out from the hydrothermal fluid, and it became a texture composed of jadeite and albite.

Keywords: Jadeite, Omphacite, Metagabbro, Izumi, Yatsushiro city, Kumamoto Prefecture

