

Determination of fluid composition by LA-ICP-MS: an example from fluid inclusion in jadeite-quartz rock from the Kanto Mountains, Japan

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The multi-element analysis of fluid inclusion by LA-ICPMS (laser ablation-inductively coupled plasma mass spectrometry) would provide the direct information of chemical composition of fluid during formation of host minerals. In this study, we established the fluid inclusion analysis by LA-ICP-MS and present detailed analytical protocol. Q-ICP-MS (Agilent 7700) coupled to an excimer laser ablation system (NWR 193 UC) at Akita University was utilized for the fluid inclusion analysis. NWR 193 UC was equipped IVA (infinitely variable aperture) system supplied from ESI Co. to focus laser beam from 1 to 150 μm with 1 μm steps. Thus we can easily change laser beam diameter to fit diameter of the inclusion, minimizing ablation of its host mineral. The standard reference material NIST SRM 610 was used as external standard for the calibration of all analyses, and was analyzed at least twice at the beginning and at the end for sample measurement to investigate elemental sensitivity and instrumental drift.

The two-phase (liquid + vapor) primary fluid inclusion without daughter minerals from jadeite crystals in jadeite-quartz rock from the Kanto Mountains, Japan was selected in this study. The jadeite-quartz rock occurs in serpentinite mélange related to the Sanbagawa metamorphic event. The rock had formed by metasomatic replacement in the subduction zone [1]. Fluid inclusions are observed in jadeite, quartz, albite, and zircon [2]. The size of fluid inclusions varies from 3 to 30 μm in diameter. Although most of analytical elements are lower than detection limit, the analytical results show that fluid contains high concentration of Cr, Li, Pb, and Zn. The chemical composition of fluid which formed jadeite-quartz rock, suggests that fluid was derived from dehydration of ultramafic rock.

[1] Yui & Fukuyama (2015) *JAES*. **108**, 58-67.

[2] Fukuyama et al. (2013) *JAES*. **63**. 206-217.