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Nano-granite and glass inclusions in zircon from the migmatite zone of the Aoyama area, Ryoke metamorphic belt, Japan

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Glass inclusions and nano-granite inclusions in Zrn are the important evidence of Zrn growth in the presence of melt. In this contribution, we report the first finding of the nano-granite inclusions [1] in Zrn from the migmatite of the Ryoke metamorphic belt at the Aoyama area, SW Japan.

In the Aoyama area, pelitic-psammitic metamorphic rocks of the upper amphibolite to granulite facies grade are widely exposed. Pelitic-psammitic schists dominate in the northern half (Sil-Kfs zone and low-T part of the Grt-Crd zone), and migmatites dominate in the southern half (mid- to high-T part of the Grt-Crd zone) [2].

The zircon in metatexites and diatexites from the mid-T to high-T parts of the Grt-Crd zone has a thin, bright annulus under BSE image along which tiny inclusions of several microns are aligned [3]. Some of the inclusions with the similar mode of occurrence are identified to be the glass that was included during the Ryoke metamorphism. The nano-granite inclusion is newly found from the same kind of annulus.

The nano-granite inclusions are about 2 um in diameter, which is the largest size among the inclusions found in the bright annulus under a BSE image. Based on the FE-SEM observation and EDS qualitative analysis, nano-granite consists of plagioclase, biotite and other several unidentified minerals or glass ([4] uses the term 'nano-granite' even if it contains some glass portions). In the zircon grains from the same metatexite sample, in addition to the totally glass inclusions, partially solidified glass inclusions with biotite-like mineral developed at the boundary between host zircon and glass are found. The fact that nano-granite and glass inclusions are found from the zircon rim developed at 90.3 +/- 2.2 Ma in metatexite [3] shows that partial melting took place during the Ryoke metamorphism. Composition of partial melts formed during the dehydration melting of micas is being determined using these glass inclusions [5]. It is difficult to quantitatively analyze the melt inclusions in zircon from the Aoyama area because they are too small in size as in the case of other areas [5]. However, the CIPW normative composition (Qtz-Ab-Or) of leucosomes segregated in the boudin necks that is found near the migmatite front of the Aoyama area [6] are plotted in between the compositions of melt inclusions from El Hoyazo and Kerala Khondalite Belt on the cotectic line between primary phase fields of Or and Qtz for P(H2O) = 0.5 GPa. This supports the idea that the leucosome in boudin necks are possible partial melts formed during the prograde metamorphism during Ryoke metamorphism [6].

[1] Cesare et al. (2003) CMP 146, 28-43. [2] Kawakami (2001) JMG 19, 61-75. [3] Kawakami et al. (2012) CMP DOI 10.1007/s00410-012-0824-7. [4] Cesare et al. (2011) J. Virtual Explorer, 38, paper 2. [5] Acosta-Vigil et al. 2010 J. Pet. 51, 785-821. [6] Kawakami (2002) JMPS 97, 241-253.

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