Similarities between discordant chromitites from northern Oman ophiolite and chromitite xenoliths from Takashima alkali basalt, southwest Japan arc

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We examined some discordant podiform chromitites in the mantle section of northern Oman ophiolite along Wadi Hilti, Fizh and Rajmi, to consider their origin. They are clearly discordant to the foliation of the surrounding mantle harzburgite. In outcrops, they show various texture (layered, massive, schlieren, anti-nodular and rarely nodular texture). Chromian spinels from all chromitites examined are full of minute orbicular inclusions of hydrous (pargasite and Na-phlogopite) and anhydrous (pyroxenes) silicates. They usually show a concentric distribution indicating a primary origin.

Their chromian spinels in all discordant chromitites show a relatively high Cr# (=Cr/(Cr+Al) atomic ratio), 0.7 to 0.8, and a low TiO_2 content, 0.15 to 0.2 wt%. The Oman discordant chromitites are comparable in chemical characteristics of chromian spinel with some arc-related plutonic rocks [1].

Their chromitite xenoliths from Takashima alkali basalt, southwest Japan arc, are similar to the Oman chromitites in spinel chemistry and texture [2]. In addition, we found laurite, one of platinum-group minerals, in the Takashima chromitite. The Takashima laurite is included in the compositional range of laurites in Oman chromitite [3]. Chondrite-normalized PGE pattern of the Takashima chromitite shows a slightly negative slope from Ru to Pt, which is also analogous to that of some chromitites from Oman.

These similarities between the Oman discordant chromitite and Takashima chromitite xenoliths, strongly suggest that some ophiolitic podiform chromitites are of sub-arc origin.

[1]Arai *et al*. (2011) *Island Arc* 20, 125-137. [2]Arai and Abe (1994) *Mineral Deposita* 29, 434-438. [3]Ahmed and Arai (2002) *Contrib Mineral Petrol* 143, 263-278.

Discovery of coesite and stishovite from eucrite

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The existence of a high-pressure polymorph in a meteorite is a critical evidence for a dynamic event occurred on its parent-body. It is expected that HEDs meteorites originate from an asteroid, 4 Vesta. Although recent Dawn mission clarified that 4 Vesta suffered from heavy meteorite bombardments, a high-pressure polymorph has not been found in HEDs meteorites so far. We got one of eucrite samples, Béréba. Béréba sample studied here has several shock-melt veins, implying that it was heavily shocked. We investigated Béréba using a laser micro-Raman spectroscopy, FEG-SEM and FIB-TEM techniques to clarify a record of a dynamic event and its possible parent-body.

We focused our interests on a silica phase of Béréba in this study. Raman spectroscopy analyses showed that silica grains in the host-rock of Béréba are quartz and minor cristobalite. Most quartz grains entrained in the shock-melt veins transform to coesite. Some silica grains entrained in or adjacent to the shock-melt veins have network-like and/or lamellae-like textures. Raman spectroscopy and TEM observation indicate that such silica grains include coesite, stishovite and silica glass along with quartz. This is the first report of a high-pressure polymorph in HEDs meteorites.

The existence of stishovite indicates that pressure condition recoded in Béréba should be ~8 GPa at least based on a phase diagram obtained from static high-pressure and high-temperature synthetic experiments. U-Pb radio-isotope age of apatite entrainned in the shock-melt vein is ca 4.2 Ga [1], which is relatively younger than bulk-rock Pb-Pb radio-isotope age (ca 4.5 Ga) [2]. The young U-Pb radio-isotope age of apatite would be due to disturbance by a thermal event such as a dynamic event. When a high-pressure polymorph is heated under ambient condition, it vitrifies easily. Accordinglly, a dynamic event formed coesite and stishovite in Béréba occurred at least after ca 4.2 Ga ago.

[1] Zhou Q. *et al*., 42nd LPSC., 2575pdf (2011). [2] Carlson R.W., *et al*., 19th LPSC., 166-167 (1988).

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