

## オマーンオフィオライト北部 フィズ岩体の 蛇紋岩化したかんらん岩の岩石学的特徴

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### Petrological characteristics of serpentinized peridotites from Fizh block, Oman ophiolite

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The Fizh mantle section of the northern Oman ophiolite is exposed at the surface from basal thrust to mantle-crust transition over 25 km east-west and 50 km north-south. The N-S-trending fast-spreading ridge axis has been inferred and the center and end of ridge segment are to be in the south (Wadi Thuqbar) and north (Wadi Zabin), respectively<sup>[1][2]</sup>. Fizh mantle section records partial melting at high temperature to alteration process at low temperature, making it a very suitable for investigation of those variations along axis and with depth in the mantle section<sup>[3][4]</sup>.

In the vicinity of spreading ridge, residual peridotites accreted to the lithospheric mantle. Hydrothermal fluids reached deep into the mantle, possibly causing an alteration reaction from the top to the bottom. On the other hand, at the basal thrust of the ophiolite, alteration may have been caused by hydrothermal fluid supplied from the metamorphic sole<sup>[5][6][7]</sup>. However, how fluids penetrated the entire mantle and promoted serpentinization, and what reactions produced the alteration minerals, are not yet fully understood.

The objective of this study is to elucidate the alteration reactions, temperature and change in mineral composition, and fluid infiltration processes that resulted in serpentinization in Fizh mantle section.

We conducted microscopic observation of 458 thin sections, Raman spectroscopy and SEM-EDS analyses of alteration minerals in partially serpentinized peridotites. Low-temperature serpentine (lizardite) universally occurs in all specimens. However, some samples (33 out of 458) contain antigorite and talc that are thought to be formed at relatively high temperature. For instance, talc, tremolite, antigorite and chlorite occur together coexisting with other secondary minerals such as mesh or veins of lizardite and/or magnetite. Talc and tremolite commonly occur in the vicinity of antigorite vein.

Major element compositions of alteration minerals determined by SEM-EDS do not show pure theoretical composition but those mixed with serpentine or chlorite in various degree. For example, antigorite vein is composed of mixture among pure antigorite, lizardite, chlorite and brucite. Additionally when olivine is adjacent to talc, olivine at the contact is enriched in Fe. Olivine in Fe-enriched domain does not contain sharp grain edge but is partially replaced by talc.

First possibility to explain their formation is replacement of antigorite to form talc and Fe-rich olivine. It requires secondary olivine formation and dehydration at prograde reaction. However, it might be difficult to indicate this so far because the clear antigorite vein still remains and only some part is replaced by talc. Second possibility is replacement of talc to form antigorite. In this scenario, addition of fluid is required in retrograde reaction with the expense of olivine. We cannot be certain about this, as the antigorite vein does not appear to have preserved the talc prior to replacement. No transition is detected so far and the grain boundary of talc and antigorite is quite clear. A third possibility is the formation of secondary mineral assemblage by hydrous reactions of primary minerals such as olivine and orthopyroxene. However, there is still a lack of evidence and examples to discuss the order of alteration stages. More careful observations of serpentinized peridotites are needed.

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