Microtexture of pseudomorph textures of serpentinites from Oshima Peninsula, Fukui Prefecture, Japan

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ABSTRACT

Pseudomorph textures in serpentinite which preserve the features of the original rock are efficient to consider the process of serpentinization. The formation process of pseudomorph textures has been estimated in several studies, but the discussion about microtextures of complex pseudomorph textures is not enough. We conducted the microtextural analyses of complicated pseudomorph texture in serpentinites from Oshima peninsula, Fukui prefecture and considered the mechanisms of these pseudomorphs formation.

The ultramafic bodies, which are generally serpentinized at low temperature, are widely exposed in the southern and eastern parts of Oshima peninsula. The bodies consist of serpentinite blocks, and the blocks decrease hardness toward north of the peninsula. The samples can be divided into light colored serpentinites, light grey or grey rocks with brown veins, and dark colored serpentinites, dark grey rocks with black veins. Serpentinites contain many veins which are named as “vein texture” in this article. Mesh texture and vein texture are commonly observed in these serpentinites. The serpentinization of mesh texture is strong near wide vein texture. It is considered that vein texture obviously contributes to the formation process of mesh texture. Awaruite is often observed in mesh texture and vein texture. The textural features are similar between several serpentinites.

Mesh texture has evident zoning with rim and core which are composed of lizardite and forsterite. Most rims near wide vein texture consist of outer rim and inner rim, and it indicates several changes of forming condition. The multiple rims are mainly

composed of oriented poorly crystalline lizardite (OPC-lizardite) which shows bended structure, and elongated lizardite are also observed. Mesh texture near narrow vein texture contains relict forsterite and has single rim which is composed of only elongated lizardite. Outer-inner rim boundary and mesh cell boundary are filled with serpentine fine grains. Awaruite fine grains are observed in mesh texture indicating the concentration of Ni and Fe, whereas serpentine contains less Fe and few Ni. The awaruite grains array along cell boundary, outer-inner rim boundary and rim-core boundary, and this occurrence of awaruite is characteristic compared with general examples. Mesh cores in the light colored serpentinites consist of serpentine or forsterite, while the blue cores which are mixture of lizardite and brucite are generally observed in the dark colored serpentinites denoting the remains of excess elements in cores. Vein texture which form network is divided into colorless inside, composed of polygonal serpentine, and brownish outside, showing the aggregate of lizardite and pyroaurite enriched in Fe, Ni and C. Opaque minerals in vein texture are magnetite, awaruite, pentlandite and others which should occur from relatively oxidative environment in whole and locally high H_2,aq and H_2S,aq activities, while awaruite in mesh texture shows the reductive environment with high H_2,aq and low H_2S,aq activities.

The process of serpentinization shows three stages. First, primary mesh rims were formed which are generally observed in typical mesh texture. Next, the formation of cleavages along the cell boundaries of mesh texture and inflow of water occurred. The cleavages and the surroundings changed to vein texture, and the rapid formation of added mesh rims progressed near wide vein texture. Finally, mesh cores were formed by the decrease of water supply. The rough outline of formation process is similar to previous study, but more changes of forming condition are observed.