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Microstructural Evolution of Chromite from Luobusha: Implication for Plastic Deformation of Yarlung Zangbo Suture

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Podiform chromitites are an important type of chromite deposit that is widely distributed in ophiolites and modern oceanic peridotites, underlying the uppermost part of mantle. The ophiolites play a crucial role in our understanding of the history of plate tectonics with regards to the recycling of oceanic crust. The Luobusha ophiolite is one of the well-known ophiolites in the Tibetan Plateau that formed during the Mesozoic era. It is an important site for the study of the evolution of the Neo-Tethyan ocean and the associated orogenic belts.

In this study, the microstructures of chromite and hosting peridotites from the Luobusha ophiolite were analyzed by electron backscatter diffraction (EBSD), to understand the formation of the chromitites orebody and related geodynamic processes. The results showed that both nodular and disseminated type chromite exhibit a consistent crystallographic orientation with low misorientation within grains. The interstitial olivine grains from two types of crystallographic preferred orientation (CPO). The one appearing as interstitial septa in nodular chromitite are B-type fabric, which shows a concentration of [001] axes parallel to the lineation and [010] normal to the foliation. The other olivine in the disseminated chromitities exhibit D-type fabric with gridle distribution in the [010] and [001] axes, normal to the foliation . These findings suggest that the chromitites and ophiolitic dunite deformed under similar processes. We also analyzed the CPOs of olivine from surrounding ophiolitic dunite without chromitites, which show D-type fabric. Considering the former deformation experiments results, the D-type olivine fabrics should be common at high stress and water-poor conditions, and the B-type olivine fabrics develop under high pressure (~6.7 GPa) without water. It provides new constrains into the processes that led to the formation of the chromite in the Luobusha ophiolite. The chormitites in Luobusha of Neo-Tethyan ophiolite have undergone deformation in the deep mantle at a depth of approximately 200 kilometers.