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Petrological Evolution of Spinel Peridotite and Websterite in the Purang Ophiolite Complex, Western Tibet

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Spinel peridotites and associated websterite occur as huge ultramafic massif and build up the base of the Purang ophiolite complex of the western Tibet. The spinel peridotites consist of lherzolite, harzburgite and dunite. Analyses of the peridotites in the Purang ultramafic massif are rich in MgO, but all depleted in fusible elements Al₂O₃, CaO and TiO₂ in compared with primary mantle, indicating available degree depleted residual mantle rocks by variable melt extractions, while olivine websterite reflects more melt/rock reaction genesis. Petrological textures of the Purang ultramafic rocks preserved the complex mineralogical evolution from lherzolite through harzburgite, dunite to olivine websterite, indicating multistage melting and melt/rock reaction processes. Melted textures such as exsolution lamellae of clinopyroxene and spinel from orthopyroxene, embayed and blade-like shape spinel and partial chain spinel texture are pervasively observed in ultramafic rocks of the Purang ophiolite complex. Impregnation texture in which clinopyroxene is typically intergranular as late interstitial clinopyroxene occurs in harzburgite, dunite and olivine

websterite, reflecting pervasively melt/rock reactions in these rocks. Lherzolite may form in mid-ocean ridge system or an evolved back-arc basin with Cr/(Cr+Al) ratios 26–33; while harzburgite has Cr/(Cr+Al) ratio 39–57, recording both abyssal and supra-subduction zone peridotite characteristics. Dunite and olivine websterite with Cr/(Cr+Al) ratios 60–64, 52–87 respectively, reflecting super subduction zone environment related genesis or modification. TiO₂ to Al₂O₃ plots of spinel and minor elements Al₂O₃, TiO₂ and Cr[#] vs Mg[#] relationship of orthopyroxenes of the Purang ultramafic rocks also support this conclusion. The Purang spinel peridotites thus provide a good example for the multistage melting extraction and melt/rock reactions of the ophiolite mantle rocks (This study was supported by the Chinese Geological Survey Project (1212011221116, 1212011221117) and NSFC 41272072).

Key words: ultramafic rocks; melt/rock reaction; petrological evaluation; the Purang ophiolite; western Tibet

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