

Chemical variation of Chromian spinel compositions in a serpentinized peridotites: Implications for evolution of the Neoproterozoic ophiolites

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Tectonic setting of the Neoproterozoic ophiolites is poorly understood. Because of extensive serpentinization/metamorphism in the mantle section, accessory chromian spinel has been used as an important geotectonic indicator. Here, we present petrological characteristics and variations in a serpentinite body from Wadi Alam in the Eastern Desert (ED) of Egypt, one of the Neoproterozoic ophiolites members. We especially focus on the effect of chemical modification by serpentinization on spinel compositions in serpentinized peridotites of residual harzburgite after partial melting. Our data suggest that spinel core compositions are affected by chemical modifications, which shift the $Cr\# = (Cr/(Cr+Al))$ to higher than the primary compositions. According to the less modified compositions of chromian spinel in the studied serpentinite samples, although one shows arc-signature, i.e., high in the $Cr\# (> 0.6)$, most of them ($Cr\# = 0.5$) are overlapped with chemical range of those from mid-ocean ridge setting to arc setting. The data conclude that both mid-ocean ridge-type and arc-type peridotites exist in the studied serpentinized massif, which is similar to those from the Mesozoic ophiolites, such as the Tethys ophiolites. The results suggest that earlier works on tectonic reconstruction of the Neoproterozoic ophiolites based on spinel chemistry from serpentinite massifs might be carefully reexamined with the consideration of chemical modifications by serpentinization/metamorphism from the primary compositions.