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Petrogenesis of chromitite pods in Andaman ophiolite: magmatic evolution in two stages of melt-rock interaction

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The Andaman ophiolite belt occurs in the active subduction zone of Burma-java subduction complex [1].This Phanerozoic Andaman ophiolite bears the signature of suprasubduction zone tectonics, melt - rock interaction [2]. The restitic mantle sequence and the lower crustal cumulate sequence of any ophiolite host abundant magmatic Chrome-spinel having variable composition. The chrome-spinel is also regarded as an important indicator of petrogenesis of the host rock. Chrome-spinels as disseminated phases can crystallize from the melt produced by partial melting. But the mechanism for huge Although Cr is a minor component in the melt, mechanism for huge concentration of Cr in the melt to form podiform chromites is still enigmatic. Melt- rock interaction process to produce podiform chromites has been suggested by many as a viable mechanism [3, 4]. In Andaman ophiolites, chromitite pods although rare, occur in two levels of ophiolite stratigraphy. The chromites occurring as chromitite pods in different host rocks has been evaluated attempting mineralogical and petrological approaches. In one level of Andaman ophiolite section ellipsoidal to spheroidal chromitite pods with variable dimension (2m to 3.5m diameter) occurs within tectonite (serpentinised harzburgite) of mantle section (Type-1). Whereas in the upper level chromitite in the form of spheroidal to ellipsoidal pods ranging in size from 5 cm to 25 cm in diameter occur within dunite layer of the crustal section (Type-2). Chromites both Type 1 chromitite (Chr-1) and chromites of Type-2 chromitite (Chr-2) show well developed liquidus features but the post magmatic deformation features are more pronounced in Chr-2. EPMA results show that both Chr-1 and -2 falls in Al-chromite field but Chr-1 have more Cr content than Chr-2. The Cr # vs TiO2 bivariant relation and the Al_2O_3 and TiO_2 contents of the parental melts derived from chromite composition show that Chr-1 is derived mainly from boninitc melt. Whereas the Chr-2 has influence of both mixed boninite- MORB magma (Figure1). The bivariant plot of the melt Al_2O_3 vs melt TiO_2 also reflects typical boninitic parentage for Chr-1 and mixed magma parentage (MORB and boninite) for Chr-2. The association of high-Cr podiform chromitites with low Cr-high Al chromites in the host peridotites argues for involvement of melt-rock interaction rather than simple partial melting. Petrographic features, composition of chromites, and high magnesia olivine of the peridotites also suggest that the melt-rock interaction was a major process rather than partial melting in the formation of chromitite pods of Andaman ophiolite. Suprasubduction zone (SSZ) setting being suitable locale for the melt-rock interaction and melt-mixing therefore led to the formation chromitites in the SSZ Andaman Ophiolite. Interaction of melt and rock modified the melt composition continuously resulting in crystallization of chromite alone to form chromitite bodies.

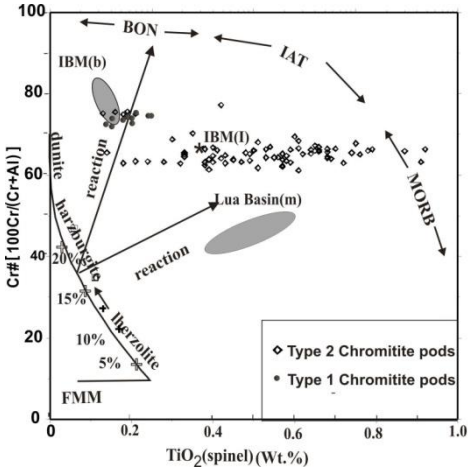

Figure 1Cr# vs TiO2 plot of the chromites indicates the influence of different melts for the origin of chromitite pods ,Bon-boninite,IAT-Island arc tholeiite,IBM-Izu-Bonin-Mariana

References:

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