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Concordant and discordant podiform chromitites: their origins revisited

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Podiform chromitites, commonly found in harzburgite-dominant peridotite complexes including ophiolites, and have been classified into two types, concordant and discordant chromitites in terms of attitude in the surrounding peridotites (Cassard et al., 1981). Their textural and structural differences are considered to be due to the difference in the degree of deformation: the concordant chromitites are older and more deformed than the discordant ones. As Ahmed and Arai (2002) stated the two types are sometimes different in spinel chemistry, PGE content, and presence/absence of hydrous mineral inclusions in spinel. In addition, the PGE pattern and PGM species are systematically different between the two types of chromitites: IPGE/PPGE ratio is higher in the discordant chromitite than the concordant one, and PGE sulfides are predominant in the former whereas PGE alloys are predominant in the latter. This clearly indicates the two types are completely different in origin: subsolidus deformation cannot produce such differences. There are two possible interpretations; (1) the melt composition involved in chromitite formation was different, e.g., MORB for the concordant chromitite and island-arc magmas such as boninites for the discordant one as Ahmed and Arai (2002) stated: or (2) the concordant chromitite is a deep recycled material (cf. Arai, 2010) whereas the discordant one is a shallow cumulate as Arai and Yurimoto interpreted (1994).

Keywords: podiform chromitite, ophiolite