

The role of water in the concentration of Cr

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The role of water in the formation of chromitites, which have been designated as a typical orthomagmatic ores, has been long controversial. Johan et al. (1983, 2017), for example, concluded that chromites are precipitated from water-rich fluids at relatively low temperatures ($< 1000\text{ }^{\circ}\text{C}$) to form podiform chromitites in the mantle. Those arguments are mainly based on two observations; (1) podiform chromitites and surrounding peridotites have been preferentially hydrated, which may mean the initial water enrichment, and (2) chromite grains contain fluid and hydrous mineral inclusions of apparently primary origin. I criticize the related interpretations based on those observations. The selective hydration in and around chromitite pods is due to the Mg-rich character of olivines, which has been obtained during a subsolidus cooling stage (Arai, 1978), and does not definitely show the involvement of water-rich fluid in chromitite formation. The origin of the chromite-hosted hydrous mineral inclusions has not been left unclear. Many authors a priori interpreted the inclusions as being representative of the trapped melts or fluids that precipitated the host chromites. This is, however, highly questionable. The inclusions are most probably formed during a stage of peridotite-melt reaction within a complicated igneous stage of podiform chromitite generation in the mantle. Hydrothermal fluids can transport Cr and precipitate chromite, but may not form most of the podiform chromitites.

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