Magma evolution processes in Mars: implications from REE composition of Dhofar 378.

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The shergottite, nakhlite and chassignite (SNC) meteorites are widely accepted as being of martian origin (McSween, 1994), and have been studied extensively in relation to martian magmatism. Much research has therefore been conducted on the SNC meteorites in order to elucidate the nature of martian magmatism. Although each meteorite has been well studied (e.g., Wadhwa and Crozaz, 1995), the magma evolution processes in Marts are not yet fully understood.

Recently, Shimoda et al. (2003) have proposed a model that constrains the geochemical characters of source materials of martian magmas. Although this model can successfully explain the origin of martian magmas and the relation among the SNC meteorites, the magma evolution processes at shallow level, probably in the crust, are still obscure. Dhofar 378 meteorite is a basaltic shergottite that was collected in Oman. This meteorite is considered to be an evolved magma because of existence of Fe-rich pyroxene and absence of Mg-rich olivine (Ikeda et al., 2002). In addition, Dhofar 378 is enriched in incompatible elements (Dreibus et al., 2002). These petrological and geochemical features will provide a key constraint for the magma evolution processes in Mars. In this study, we will provide a new REE data for Dhofar 378 and discuss the magma evolution processes in Mars.