

LIU Pingping, ZHOU Meifu, Béatrice Luais, Damien Cividini and Claire Rollion-Bard, 2014. Disequilibrium Iron Isotopic Fractionation During the High-temperature Magmatic Differentiation of the Baima Fe-Ti Oxide-bearing Mafic Intrusion, SW China. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 297.

Disequilibrium Iron Isotopic Fractionation During the High-temperature Magmatic Differentiation of the Baima Fe-Ti Oxide-bearing Mafic Intrusion, SW China

LIU Pingping¹, ZHOU Meifu^{1,*}, Béatrice Luais², Damien Cividini² and Claire Rollion-Bard²

¹ Department of Earth Sciences, University of Hong Kong, Pokfulam Road, Hong Kong, China

² Centre de Recherches Pétrographiques et Géochimiques (CRPG), CNRS, Université de Lorraine, UMR 7358, 15 rue Notre-Dame des Pauvres, BP 20, F-54501 Vandoeuvre-lès-Nancy Cedex, France

Iron isotopic compositions of olivine, clinopyroxene and titanomagnetite of the Baima Fe-Ti oxide-bearing layered mafic intrusion, SW China, are used to investigate Fe isotopic fractionation during the formation of the Fe-Ti oxide ore bodies and to constrain the origin of silicate minerals and Fe-Ti oxides. The Baima intrusion comprises the Lower Zone of interlayered troctolite, clinopyroxenite and oxide ores and the Upper Zone of gabbros. Significant differences of Fe isotope values between olivine ($\delta^{56}\text{Fe} = -0.01$ to $+0.11\text{‰}$), clinopyroxene ($\delta^{56}\text{Fe} = +0.11$ to $+0.22\text{‰}$), and titanomagnetite ($\delta^{56}\text{Fe} = +0.20$ to $+0.31\text{‰}$) were observed in rocks and ores of the Lower Zone. Iron isotopic fractionation between olivine and clinopyroxene, olivine and titanomagnetite and clinopyroxene and titanomagnetite exhibits large variations of 0.06‰ to 0.22‰ , 0.12‰ to 0.27‰ and 0.00‰ to 0.20‰ , respectively, suggesting disequilibrium fractionation. This disequilibrium cannot be explained by thermal or chemical gradient-induced kinetic fractionation or by possible

subsolidus exsolution of granular ilmenite from titanomagnetite. Instead, it could be attributed to crystallization of silicates and titanomagnetite from two immiscible Si-rich and Fe-rich liquids. Continuous segregation of the Fe-rich liquid changed the Fe isotopic composition of the Si-rich liquid and thus the Fe isotopic compositions of olivine and clinopyroxene crystallized from it, resulting in disequilibrium Fe isotopic fractionation between them. The effect of oxygen fugacity on the crystallization order of titanomagnetite and ilmenite from the Fe-rich melts, on the other hand, gave rise to the disequilibrium Fe isotope fractionation between titanomagnetite and olivine/clinopyroxene.

Acknowledgements

This study is supported by the Research Grant Council of Hong Kong (HKU707012P) and CRCG of the University of Hong Kong (201011159078).

* Corresponding author. E-mail: liupingping11@126.com