Magma chamber processes and Fe-Ti oxide mineralization in the Baima layered intrusion: Evidence from crystallized melt inclusions

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Melt inclusion is the best documentation of the melts present during the evolution of the deep-seated magma chamber. The crystallized melt inclusions found in plagioclase in the Upper Zone of the Baima intrusion, SW China consist mostly of anhedral clinopyroxene, plagioclase, magnetite, ilmenite and apatite with minor orthopyroxene, sulfide and muscovite (Fig. 1). Plagioclase tends to crystallize on the walls of the host plagioclase primocryst, leading to normal zoning towards the central mineral aggregates. The composition of the daughter plagioclase is typically 5-6 An% lower than that of the host plagioclase, whereas the daughter clinopyroxene has similar Mg-number but lower Ti and Al compared to the primocryst clinopyroxene. These compositional differences can be attributed to equilibrium crystallization in a closed system of the trapped melt inclusions in contrast to fractional crystallization and possible magma replenishment in an open system typical for primo-cumulates of large layered intrusions. The presence of the melt inclusions demonstrates that these Fe-Ti-P-rich melts were probably separated from Si-rich liquids and produced Fe-Ti oxide ores rich in apatite and absent from olivine. We thus conclude that the Fe-Ti oxide mineralization in the upper part of the Baima intrusion resulted from an immiscible separation of Fe- and Si-rich melts. The Si-rich melts could be responsible for the syenite on top of the Baima layered intrusion.

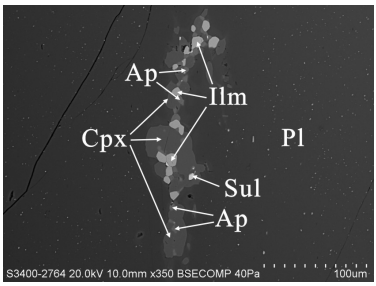

Figure 1 Crystallized melt inclusion in theUpper Zone of the Baima intrusion. Ap-apatite, Cpx-clinopyroxene, Ilm-ilmenite, Pl-plagioclase, Sul-sulfide