LA-ICP-MS study of apatite from the Arsentyev Fe-Ti-V-P deposit, Transbaikalia, Russia

BADMATSYRENOVA, R. A.

Geological Institute SB RAS, Russia, brose@gin.bscnet.ru

Magmatic rocks containing economic concentrations of iron, titanium, vanadium and phosphorous are comonly associated with gabbro and related rocks. Apatite is a nearly ubiquitous accessory phase in igneous rocks due to the low solubility of P_2O_5 in silicate melts and the limited amount of phosphorus incorporated into the crystal lattices of the major rock-forming minerals [3]. Apatite is an important carrier of many trace elements, and can control the budget of Sr and REE, especially in rocks with high apatite contents. This study presents apatite LA-ICP-MS trace element concentrations data from layered gabbro and disseminated apatite-titanomagnetite ores from Arsentyev intrusion, Transbaikalia [1]. Apatite is one of the main REE carriers in this simple and exhibit flat REE patterns. The apatite crystals from the all gabbro and ores samples can be classified as apatite-(Ca, F) with 2 - 3.5 wt % of F. In the layered gabbro apatite crystals are 0.1 to 0.8 mm long and 0.1 - 0.2 mm wide. No zonation was noted. Sr contents ranges from 835 to 1095 ppm (mean value 920 ppm). Chondrite (C1)-normalized REE patterns of apatite are dominated by strong REE fractionation (La_N/Yb_N = 0.66 - 12.20), weak negative Eu anomalies (Eu/Eu^* = 0.65 - 0.79).The content of REE in apatite from gabbro find out usual for basalts character of distribution.

Equant apatite-(Ca, F) crystals from apatite-titanomagnetite ores are 0.1 to 0.6 mm long and up to 0.7 mm wide. They are unzoned. Analysed crystals show moderate and relatively consistent Sr contents (819 - 2064 ppm; mean value 1100 ppm). REE patterns are characterized by very strong fractionation (La_N/Yb_N = 1.45 - 20.96). At the same time, apatite from disseminated apatite-titanomagnetite ores in comparison with apatite from gabbro does not find out europium minimum (Eu/Eu^* = 0.62 - 0.98).

A range of magmatic processes may be responsible for the formation of this deposit. Fractional crystallization is an efficient mechanism that adequately explains compositional variations in this deposit [2].

[1] R.A. Badmatsyrenova and M.V. Badmatsyrenov (2011) *Rus. Geol. Geoph.*, **52**, 571-580 [2] B. Charlier, E. Sakoma, M. Sauvé, K. Stanaway, J. Vander Auwera and J.-C. Duchesne (2008) *Lithos*, **101**, 359–378 [3] P.M. Piccoli and P.A. Candela (2002) *Review in Min. Geoch.*, **48**, 255–292.