Petrogenetic Implications of Garnet from Rb-rich Pegmatites in North Qinling Orogen, China

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A group of Variscan Rb-rich granitic pegmatites near Ziyugou, Danfeng in the North Qinling Orogen lack typical zoning and have simple mineralogy dominated by quartz + microcline + albite with garnet in minor quantities. Biotite is rare and muscovite was mostly formed during greseinization. Graphic texture can be observed within the pegmatites near the contact with the country rock. The pegmatites have localized garnet-rich zones that contain 5-15 vol.% garnet and accessory zircon, columbite, xenotime, and thorite.

The pegmatites are peraluminous (ASI = ~1.02 - 1.3) and contain low Ca but high alkali and elevated Rb (~600 - 1300 ppm). In REE patterns and spiderdiagrams, the pegmatites exhibit pronouced negative Eu anomaly, strong Ti, P, Sr, and Ba depletion, and enrichment of Rb, HFSE, and HREE. In addition, the garnet-rich part contains lower K and Rb but higher Na, Mn, Fe, Zr, Hf, Nb, Y, Th and U concentrations than the part with graphic texture and accessary garnet.

Two types of garnets occur in the pegmatites. **Type 1** garnet is well-zoned and closely associated with the above-mentioned HFSE minerals in the garnet-rich zones, whereas **Type 2** garnet included in either feldspar or quartz defining graphic texture has no associated HFSE minerals. Both types of garnets are almandine-spessartine solid solution and contain trace to minor amounts of pyrope, grossular, and uvarolite. Unlike garnets from LCT-type pegmatites but similar to those from NYF-type pegmatites [1, 2], the garnets from the Ziyugou pegmatites contain up to 1.1 wt.% Y_2O_3 and Yb_2O_3, which makes garnet main carrier of Y and HREE. This explains why the garnet-rich part contains higher Y and HREE. **Type 1** garnet has higher Mn/Fe ratio than **Type 2** garnet, indicating that the garnet-rich part of the pegmatites likely represents a more evolved melt. Although the pegmatites show S-type granite affinity, the HFSE and HREE enrichment of the pegmatites and garnet chemistry suggest that the pegmatites may have a hybridized source [3].

[1] Samadi *et al.* (2014) *Lithos* **208–209**, 378–392. [2] Müller *et al.* (2012) *Can Min* **50**, 1095–1115. [3] Černý *et al.* (2012) *Elements* **8**, 289–294.