

## Accepted Manuscript

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PII: S0169-1368(18)30069-6

DOI: <https://doi.org/10.1016/j.oregeorev.2018.04.021>

Reference: OREGEO 2565

To appear in: *Ore Geology Reviews*

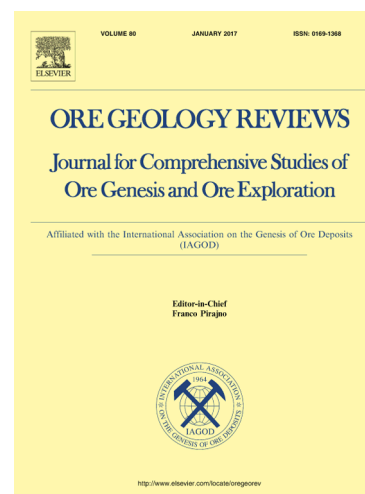
Received Date: 24 January 2018

Revised Date: 17 April 2018

Accepted Date: 19 April 2018

Please cite this article as: H. Huang, T. Wang, Z. Zhang, C. Li, Q. Qie, Highly differentiated fluorine-rich, alkaline granitic magma linked to rare metal mineralization: a case study from the Boziguo'er rare metal granitic pluton in South Tianshan Terrane, Xinjiang, NW China, *Ore Geology Reviews* (2018), doi: <https://doi.org/10.1016/j.oregeorev.2018.04.021>

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Highly differentiated fluorine-rich, alkaline granitic magma linked to rare metal mineralization: a case study from the Boziguo'er rare metal granitic pluton in South Tianshan Terrane, Xinjiang, NW China

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#### Abstract

Rare metal-bearing, alkaline granites have attracted extensive interests because of their economic significance. The Early Permian (~290 Ma) Boziguo'er alkaline granitic pluton, exposed in the middle segment of the South Tianshan Terrane, Xinjiang, NW China, contain Nb-Ta-, Zr-, Th-U- and REE-bearing accessory minerals, and host a large-scale rare metal deposit. The unaltered alkaline granites are mainly composed of alkali feldspars (~40 vol.% orthoclase/microcline and ~30 vol.% albite), quartz (~20 vol.%), arfvedsonite (~5 vol.%) and biotite (~5 vol.%), with accessory minerals at least including zircon, monazite, pyrochlore, Fe-Ti oxides, xenotime, bastnasite and astrophyllite. The existence of two types of alkaline feldspars, which respectively show nearly pure Ab and Or end member compositions, suggest that the Boziguo'er pluton can be classified as "subsolvus granites". Rare metal elements in the pluton are mainly contained by pyrochlore (Nb-Ta), zircon (Zr-Hf, Th-U and HREE) and monazite (LREEs) grains. Mineral chemistry suggests that the pyrochlore and monazite are of primary igneous mineral. Based on morphology, internal texture and mineral chemistry, four types of zircons have been identified. Type-I zircon may have crystallized from

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