

## **A study of ruby (corundum) compositions from the Mogok Belt, Myanmar: Searching for chemical fingerprints**

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### **ABSTRACT**

For centuries the Mogok metamorphic belt of Myanmar (a.k.a. Burma) has been famous for producing classic, pigeons-blood ruby (corundum:  $\text{Al}_2\text{O}_3$ ) specimens. The present model for the formation of rubies hosted in marble from the Himalayan arc is a closed-system metamorphism of former clays from evaporitic/organic-rich shale units in margin basins. Mogok has still not been fully included in this model. Involvement of igneous intrusions and the formation of skarn with the marble has been an outstanding topic. Twenty-three red corundum samples (nominally rubies) from eight sources in the Mogok belt marbles, including a skarn setting and local alluvial samples, have been analyzed using the electron microprobe and a laser ablation-inductively coupled plasma-mass spectrometer system to measure trace element compositions for evidence of different geological formational environments. Although inclusions, such as baddeleyite ( $\text{ZrO}_2$ ) and srilankite ( $[\text{Ti,Zr}]\text{O}_2$ ), as well as associated painite ( $\text{CaZrAl}_9\text{O}_{15}[\text{BO}_3]$ ), indicate skarn-related paragenesis of some samples, no signatures of B or Zr enrichment were found. Rather high levels of Si (300+ ppm) are found, possibly indicating nano-silicate inclusions when above 500 ppm. A distinct Fe enrichment, as in the case of metasomatic ruby, is observed. Sensitivity to the sub-ppm level may be necessary to resolve, if even possible, whether there is a compositional signature from the skarn formation. Samples from individual sources in the belt show some distinct trace-element characteristics, in particular a discretely limited variation in V/Ti while the Cr content can vary considerably and independently. With the potential of V, Ti, and Cr being sourced from blackshale components in shelf carbonates that were transformed to marble, these Mogok belt rubies may record an informative intersection of organic chemistry, geochemistry, plate tectonics, metamorphism, and metasomatic processing.

**Keywords:** Ruby, corundum, Mogok, Myanmar, chemical compositions, geological source