

Identifying xenocrystic tourmaline in Himalayan leucogranites

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ABSTRACT

Tourmaline is a common autocrystic mineral in granitic and pegmatitic rocks that records valuable information on the physicochemical evolution of magmas. However, xenocrystic tourmaline that does not crystallize from host magmas is also common but seldom reported and notoriously difficult to identify. Here, autocrystic (Tur G) and xenocrystic (Tur P) tourmalines are identified in two-mica granites and granitic pegmatites from the Cuonadong leucogranites, eastern Himalaya. Electron backscatter diffraction (EBSD), coupled with electron-probe micro-analysis (EPMA) and laser ablation ICP-MS analyses (LA-ICP-MS), is used to discriminate xenocrystic from autocrystic tourmaline. Although both tourmalines have slightly different chemical compositions, the differences are insufficient to permit unambiguous discrimination. However, EBSD systematically shows complex intra-crystalline orientations and deformation xenocrystic grains, and undeformed crystal lattices are predominant in autocrystic grains. EBSD could be a useful tool to identify the origin of tourmaline in granitic rocks, particularly when geochemical analyses and/or geochronological measurements are inconclusive.

Keywords: Autocrystic and xenocrystic tourmaline, boron isotopes, Cuonadong leucogranites, electron backscattered diffraction analyses, Himalayan granites