

Poster Presentation

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Crystallographic orbits analysis of staurolite twins

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Staurolite is an enigmatic mineral characterized by a high degree of pseudo-symmetry, which frequently occurs twinned. It gives two twins with different occurrence frequency, the 90° or Greek cross (lower frequency) and the 60° or Saint Andrews cross (higher frequency). To date no explanation has been found for their different occurrence frequency. We have analyzed the structure of staurolite in terms of the pseudo-eigensymmetry of the crystallographic orbits building this structure [1]. The union of the crystallographic orbits based on oxygen atoms has a pseudo-cubic eigensymmetry which contains the twin operations of both twins: the operations restore, with good approximation, the whole set of oxygen atoms, which justifies the high frequency of twinning of this mineral but does not discriminate between the two twins. On the other hand, a subset of the tetrahedral cations has a pseudo-eigensymmetry which contains the twin operation of the Saint Andrews cross, but not that of the Greek cross. Also, a subset of the octahedral cations has a pseudo-eigensymmetry which contains the twin operation of the Greek cross and a larger subset has an eigensymmetry which contains the twin operation of the Saint Andrews. The substructure approximately restored by the twin operation is thus more extensive for the Saint Andrews cross, which justifies its higher occurrence frequency.

[1] M.A. Marzouki, B. Souvignier, M. Nespolo, *IUCrJ*, 2014, 1, 39-48

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