EGU23-7042, updated on 28 Mar 2024
https://doi.org/10.5194/egusphere-egu23-7042
EGU General Assembly 2023

Texture formation in Trapiche rubies

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Abstract:Trapiche describes a gem texture that is characterized by the symmetric six “arms” radiating outward from the cores in gemstone minerals. These is a unique growth pattern, which however is still poorly understood. Here, we document the Trapiche in Trapiche rubies, and discuss formation mechanism of the patterns. The six arms of the Trapiche ruby radiate from a hexagonal core, which separate a single crystal into six growth sectors with internal bandings. Microscopic observations indicate a dendritic growth of the arms. Main branches are dominantly formed by the tube-shaped inclusions, and a part of which exhibit solid minerals, which including graphites, sulfides, calcites. The tube inclusions spatially have a 30° angle to the radiating direction of the arms, and pointing to the direction perpendicular to the hexagonal prism cylindrical {10$\bar{1}$0}. Our Raman and EPMA analyses suggest that the origin of the ruby may be related to marble. Original source of the inclusions is aluminum-rich fluid with a high amount of $CO_{2,}$ which originated and evolved from magma. Our detail textural and chemistry on Trapiche ruby may suggest that during the ruby formation, a high crystallization driving force is necessary for arms to be a dendritic pattern which can overcome the growth interface of the bandings.