Crystallography and chemistry of a naturally occurring alexandrite encapsulated in emerald

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The study of naturally occurring minerals, specially at the grain interface is fundamental in the study of the genesis of the geological region. Alexandrite and emerald/beryl are two gem-quality varieties of chrysoberyl (BeAl2O4) and beryl (Be3Al2Si6O18), respectively. Alexandrite is orthorhombic, space group Pmnb [1] and emerald is hexagonal, space group P6/mcc [2]. The sample is an alexandrite surrounded by emerald, and the boundary between the two minerals is being studied. A thin FIB lamella was prepared and studied using selected area diffraction (SAED) in a transmission electron microscope.

Figure 1: (a) Low magnification image of an emerald grain on the upper left (lighter) and the alexandrite grain lower part (darker). (b) Selected Area Diffraction Pattern (SAED) of a region at the boundary between the two minerals. There is a 120 degree angle between [10-1]* emerald and a* alexandrite directions.

Further studies to try find how the mineral was formed and consequently contribute to the genesis of the geological formation of the region are being performed.


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