

**OH DEFECTS IN SPODUMENE:
A COMPARATIVE STUDY OF SPODUMENE OF VARIOUS GENETIC TYPES**

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Lithium-bearing pyroxene, spodumene (ideally $\text{LiAlSi}_2\text{O}_6$), is a nominally anhydrous mineral (NAM). As recent research shows, many of NAMs (including pyroxenes) contain various concentrations of incorporated OH defects (ROSSMAN, 1996). Polarised FTIR absorption spectra of spodumene single-crystals were measured to compare the water contents in spodumenes of four genetic types (magmatic, hydrothermal, secondary – after petalite, and metamorphic) with other pyroxenes. Well developed spodumene crystals of hydrothermal origin (kunzite and hiddenite) were studied to understand the OH bonding system in spodumene. Sections parallel to (100), (010) and (110) were measured. On the basis of these measurements and due to the excellent cleavage of spodumene crystals, only polished cleavage plates parallel to (110) were used in cases of spodumenes of other genetic types. OH defect concentrations were calculated using the Lambert-Beer's law (for details see LIBOWITZKY & ROSSMAN, 1997).

FTIR spectra of all samples are characterized by pleochroic absorption bands in the 3400 to 3500 cm^{-1} spectral region (predominantly two bands at around 3409 and 3423 cm^{-1}). From the pleochroic behaviour of these spectra it seems that the OH dipole direction is oriented approximately parallel to n_γ in the spodumene structure, as observed for other pyroxenes (BERAN & LIBOWITZKY, 2003). Small variations of water content in spodumenes of various genetic types were detected: magmatic spodumenes contain <0.1 to 3.3 wt. ppm H_2O , hydrothermal spodumenes 0.1 to 0.2 wt. ppm H_2O , spodumene after petalite contains up to 0.6 wt. ppm H_2O and metamorphic spodumene contains up to 2.0 wt. ppm H_2O . Heterogenous distribution of OH defects within one single crystal was observed.

Water content calculations from sections or cleavage plates parallel to (110) produce slightly overestimated values (< +10 % rel.). Therefore, and because of high background from fluid inclusions and interference fringes, the calculated concentrations of OH defects have relatively large errors. In comparison with other pyroxenes (usually 1200 to 20 wt. ppm H_2O , depending on geological environment; SKOGBY et al., 1990), all spodumenes contain significantly lower contents of OH in the structure.

This work has been supported by a Marie Curie Fellowship of the European Commission under contract number HPMT-CT-2000-00138. We thank U. Kolitsch, A. Wiczorek and A. Wagner for technical assistance and A. Beran and E. Libowitzky for constructive criticism that significantly improved the manuscript. Samples for this study were kindly provided by Moravian Museum in Brno, Czech Republic, and by E. Libowitzky.

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