

Investigation of polytypes in lepidolite using electron back-scattered diffraction

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ABSTRACT

In this paper we show that electron back-scattered diffraction (EBSD) is an effective technique for identifying polytypes of micas in a scanning electron microscope (SEM). Platy crystals mounted on a specimen holder are instantly analyzed and the polytypes are determined by comparing observed and calculated Kikuchi patterns. *Subfamilies* A and B are easily distinguished by trigonal and hexagonal symmetries, respectively, around the [001]* direction of the Kikuchi bands corresponding to family reflections. In *subfamily* A, *1M* and *2M₁* polytypes can be identified by means of several intense bands characteristic to each polytype, but *3T* and *1Md* are probably difficult to distinguish from each other. The EBSD identification has been applied to the investigation of polytype occurrence in lepidolite from a lithium pegmatite. *1M*, *2M₁*, and *2M₂* polytypes were unambiguously distinguished. Some crystals contained polytypes of the two *subfamilies* stacked along the [001]* direction. A combination of X-ray chemical analyses and EBSD in an SEM showed that the chemical compositions of *1M* and *2M₁* crystals were segmented, whereas those of *2M₂* were in the range of both *1M* and *2M₁* compositions.