

Identification of polytypic groups in hydrous phyllosilicates using electron back-scattering patterns

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ABSTRACT

Electron back-scattering pattern (EBSP) analysis is shown to be capable of identifying polytypic groups (subfamilies) of hydrous phyllosilicates in a scanning electron microscope with spatial resolution far better than X-ray diffraction and with easier sample preparation than transmission electron microscopy. Polytypic groups are distinguished by the intensity distribution in the pattern. However, identification of individual polytypes in each group is difficult because the Kikuchi bands characteristic of each polytype are weak. In the case of 1:1 phyllosilicates and one-layer chlorite, the four and six groups, respectively, can be distinguished by the Kikuchi bands corresponding to reflections with $h \neq 3n$ and $k = 3n$ (orthohexagonal cell setting). Practical application for identifying the polytypic groups distributed in a small crystal of cronstedtite, an iron-bearing trioctahedral 1:1 phyllosilicate, is described.