Poster Presentation

MS74.P04

Unit Cell Determination of New Minerals by Using Electron Diffraction

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Many new minerals recently discovered in Kazakhstan had platy (niksergievite), fiber (kazakhstanite) or fine powder (mitryaevaite) structural appearance. In monoclinic minerals with perfect or good (001) cleavage, d100 и d010-spacings in the hk0 zone could be measured on selected area electron-diffraction pattern from monocrystal tilted the way that axis c is parallel to the electron beam direction. This method was used for measuring d-spacings in new minerals such as kazakhstanite, niksergievite as well as in new discovered micas – sokolovaite and orlovite. In minerals with triclinic structure (mitryaevaite) the same method was used to determine d100, d010 as well as γ=180°-γ* (γ* is an angle between reciprocal lattice axes a* and b*). hk0-indices of each ring were defined by comparison of the normal texture (ring type) pattern and selected area pattern. For example, hk0-indices for triclinic cell of mitryaevaite were (010), (100), (-110), (110), (020) etc. When specimen with preferred orientation is tilted under angle ϕ toward electron beam, an "oblique texture" electron-diffraction pattern is obtained. Arcs of the ellipses on such diffraction pattern are formed by intersection of Ewald sphere with ring nodes. The height of the arc's maximum above the tilt axis is calculated by using the following formula: D=hp+ks+lq, where p, s, q are measured on the diffraction pattern [1-3]. For example, on "oblique texture" electron-diffraction pattern from vanalite with perfect (010) cleavage, arcs are merged with layer lines that intersect the ellipses and D=ks. Allocation of indices on texture electron-diffraction patterns from monoclinic niksergievite, sokolovaite and orlovite with perfect (001) cleavage is more difficult. In these cases, D= hp+lq. Heights of the arcs are situated symmetrical in regards to each lq level. With the help of "oblique texture" diffraction patterns stacking polytypes were indicated for such minerals.

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Keywords: new mineral, electron diffraction, Kazakhstan