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Compositional heterogeneity of picroilmenite from the Zarnitsa pipe according to the data of thermomagnetic analysis

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Abstract

Thirty-nine samples of picroilmenites from seven boreholes drilled along the submeridional profile in the Zarnitsa pipe of the Yakut diamondiferous province are examined. Individual microprobe determinations are conducted on two mutually perpendicular profiles of each sample in order to study compositional the heterogeneity of picroilmenite. Besides, the thermomagnetic curves are recorded for each sample. The model for processing the thermomagnetic curves based on the dependence of the parameters of the thermomagnetic curves (the Curie points and specific magnetic moment of picroilmenite) on hematite content in picroilmenite is suggested. The correct description of the experimental curve for each picroilmenite sample requires introducing two distributions of hematite concentration. The mean value of the first distribution coincides with the microprobe determinations, while the second distribution has a higher hematite content than the first one. It is shown that the areas with increased hematite content in the picroilmenite grains gravitate to the edges of the grains. It is hypothesized that the increase in hematite content is caused by epigenetic transformation of primary picroilmenite and it can probably serve as a proxy for the dynamics of picroilmenite formation. The applicability of the data of thermomagnetic analysis for the express determination of picroilmenite composition is assessed; the capabilities and limitations of the suggested procedure are demonstrated. © 2014 Pleiades Publishing, Ltd.

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Keywords

Curie temperature, picroilmenite, specific magnetic moment, thermomagnetic analysis