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Study of coke microstructure by combination of XRD analysis and SEM

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Abstract

The article is devoted to research of microstructure of coke. Coke is the main most suitable component for the production of anode masses and baked anodes due to its availability in large volumes, chemical purity and ability to acquire electrical conductivity during heat treatment of coke. The properties of the anodes are largely determined by the properties of coke. Investigation was carried out by mean of complex methods of XRD analysis and SEM. In the work, a number of industrial samples of needle cokes of various manufacturers were studied by mean of complex of structural methods: X-ray diffraction and analytical scanning electron microscopy. The main characteristics of the crystal structure of the samples, that is the interplanar spacing (d*00l*), the dimensions of the structural components (La and Lc), and the degree of ordering, were obtained. To describe the morphology of the coke samples results on SEM analysis were used, the obtained data are compared with the crystallographic data from XRD analysis. Their structural parameters were determined, and the features of their microstructure were investigated, in result, their interrelations were revealed. The consistency of the conclusions obtained by the results of two independent methods makes it possible to consider X-ray structural analysis in combination with analytical electron microscopy as the necessary complementary tools for the evaluation of cokes with a view to their possible application in various technological processes.

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