IMPROVING THE ELECTRICAL RESISTIVITY OF BLAST-FURNACE COKE

[1]Koval V., [2]Miroshnichenko D., [2]Soloviov Y.
[1] State Enterprise "Ukrainian State Scientific Research Institute of Coal Chemistry (SE UKHIN)", Kharkiv
[2]National Technical University «Kharkiv Polytechnic Institute», Kharkiv

Abstract:

The study investigates the impact of adding petroleum coke to coal charges on the quality of blast furnace coke, specifically its electrical resistivity. Four charge variants with varying petroleum coke content were analyzed. Adding 5 % petroleum coke increased the orderliness of coke structure, nanostructures, and boosted gross coke output (by 1.3 – 1.4 %). However, it raised sulfur content (by 0.12 – 0.14 %) and decreased ash content (by 0.3 – 0.4 %), while slightly worsening mechanical properties, reactivity, structural strength, and electrical resistivity.

Methods:

Laboratory coking was conducted, followed by analysis of the coke's technological, mechanical, and electrical properties. Electrical measurements were taken using a press installation and specialized matrix to determine the specific electrical resistance of coke powder.

Results:

The best results were obtained using "K" grade coal (Svyato-Varvarynska Coking Plant). A reduction in its share in the charge led to a significant decline in coke quality. The study also highlighted the potential use of coke for the production of nanomaterials (fullerenes, nanotubes) and as micro-additives in construction materials.

Keywords:

Coal charges, petroleum coke, blast furnace coke, electrical resistivity, nanostructures, coke quality.

References:

1. Sakurovs R., Grigor M., Sokolova A., Mata Ya. Effect of high temperature on nanopores in coke. *Fuel*, 2023, vol. 334 (2), pp. 126821. https://doi.org/10.1016/j.fuel.2022.126821.

2. Zhu H., Zhan W., He Z. Pore structure evolution during the coke graphitization process in a blast furnace. *International Journal of Mineral Processing*, 2020, vol. 27, pp. 1226–1233.