Recycling of Steam Slag in Composite Materials to Strengthen Railway Subgrades

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Keywords: ash and slag waste; composite materials; cryostructuring; organic-inorganic materials; locomotive slag; stabilizing additive; structuring; strengthening the subgrade; recycling.

Abstract: The paper substantiates the possibility of obtaining composite materials with improved functional properties for strengthening the subgrade, containing locomotive slag stabilized by an additive based on a gel-forming polymer. The mechanism of structure formation of the resulting organic-inorganic materials, consisting of macromolecules of high-molecular substances and inorganic inclusions subjected to cryogenic treatment, is shown. The structure of the sample is distinguished by the heterogeneity of the pore space, which is characterized by the presence of fine-porous and large-porous regions, which determines its thermophysical properties. It was revealed that the compressive strength of samples subjected to three cycles of cryogenic treatment and subsequent air drying was 3.5 MPa, thermal conductivity – 0.17 W/(m·K). It has been established that the resulting composite material is waterproof and frost-resistant, which makes it possible to recommend it for strengthening the subgrade in difficult climatic and engineering-geological conditions.