

ABSTRACT

Development of Foamed Geopolymers with Nanocellulose Additives Derived from Industrial by-Products

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The main motivation for research was the development of new materials for application in the construction industry as eco-friendly isolation materials [1,2]. These materials should be coherent with the circular economy approach, especially based on industrial by-products. The article's aim is synthesis and investigation of foamed geopolymers for building applications. Firstly, the raw materials were characterized using the following tests: SEM, XRF and XRD. Secondly, the lightweight geopolymer was synthesized using coal shale from the Wieczorek coal mining and perhydroxide as a foaming agent. The additive, the crystalline nanocellulose, is in the amount of 0.5% by weight as applied for the part of the samples. Finally, the materials (reference material and composite with nanoadditive) were characterized, including density, mechanical and thermal properties, water absorption, and resistance to aggressive environments. Also, the microstructure of the obtained materials was investigated. However, the provided works show the possibility of synthesis of the foamed geopolymers from industrial by-products and application it for isolation putpose in construction industry. The obtained results also show the negative influence of nanocellulose on the properties of foamed material, including increasing density, decreasing mechanical properties and increasing the thermal coefficient.