

## **Section 01. Innovations in Engineering**

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### **Innovative Potential of Nanotechnologies in Manufacturing Building Materials**

In the last decade, there has sharply increased interest in research in the field of using nanotechnology in building materials, because the result of such studies can be the basis of putting into practice fundamentally new materials with unique physical, chemical and mechanical characteristics.

The main objective of modern research in the field is to obtain new improved characteristics of construction materials, as well as processes for more effective influence on these properties, such as: the improvement of indicators of material factors due to the structure formation at the atomic level, the possibility of changing the mineralogical composition, the production of composites with special properties, etc., using nanotechnology and nanomaterials. At the moment, the use of nanotechnology in construction is rather limited, as innovative ideas are mostly focused on surface effects, rather than on the formation of new structures of building materials. But nevertheless, the achievements of fundamental research in the field of nanotechnology are gradually finding their way into the construction industry.

Modification of building materials is carried out by provision of nanomodifiers. The following additives are used as nanomodifiers: carbon astralenes (C), carbon fullerenes (C), carbon nanotubes (C), silver (Ag), copper (Cu), titanium dioxide (TiO<sub>2</sub>), silicon dioxide (SiO<sub>2</sub>) from waste, dioxide Silicon (SiO<sub>2</sub>) synthesized, iron oxide III (Fe<sub>2</sub>O<sub>3</sub>), oxides of other metals, calcium oxide (CaO), polymeric nanoparticles, nanofilms, nanofibers. In the production of cement, much of the energy goes to the grinding of clinker (raw materials for cement production). A small addition of carbon nanomodifiers significantly reduces the grinding time. The future of building materials science is largely related to the use of nanotechnological approaches.

Taking into account the above, the research connected with the development of new and improvement of well-known nanotechnologies in the construction sphere acquires special significance. At this time, the developed innovative nanotechnology in the production of building materials, can objectively assess the appropriateness of using them to improve the functional properties of both building materials and products from them.