

Nanocomposites and nanomaterials

Nanotubes as additives modifiers cementitious compositions

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Study investigates the possibility of using nanomaterials tubular shape as additives modifying the structure of cement composites. Authors [1] shows the positive experience of nanomaterials to improve the traditional characteristics of cement and concrete, as well as giving them a fundamentally new properties. However, increasing the strength of the composites is still low (30%), that can not justify the use of additives such a high cost for building construction. Therefore, the development of technology introduction of nano-objects in the cement matrix to maximize their potential as modifiers nanostructures artificial stone is relevant .

As nanomaterials used untreated multiwall carbon nanotubes (CNT) Ukrainian production [2]. They were formulated into the cement as an integrated component of the plasticizer melamine-formaldehyde type. The contents of the tubes in the plasticizer was changed from 0.5 to 1,5%. Stability CNT dispersions plasticizer was sufficiently high regardless of the number nanotubes. Wherein the plasticizer is activated of the modified, as evidenced by an increase in line intensity infrared spectrograms.

Study of physico-mechanical properties of cement showed that the compressive strength of the samples with CNT increased by 40 % and flexural strength - by 20%. The use of cement with addition of blast-furnace slag improves the activity nanomodifier. Thus, compressive strength increasing more than doubled , and the flexural - by 40%.

These results can be explained by increasing the number and dispersion of low-main hydrosilicates of calcium C-S-H, which are formed of randomly arranged fiber needle-like phase. They become mikro reinforcement artificial stone in all directions and increase its deformation properties. Composites obtained prospectively used as protective coatings waterproofing and crack resistance of concrete structures.

1. *Birgisson B., Mukhopadhyay A., Geary G., Khan M., Sobolev K.* Nanotechnology in concrete materials:a Synopsis// Transportation Research Circular E-C170 -2012- 33 p.

2. *Revo S.L., Sementsov Yu I., Lozovii F.V., Ivanenko E.A., Druga L.* Structure and resistance of the Al-C nano-composite material // Heat treatment and surface engineering. – 2008. – 8, N 2. – P. 3-17.