

## A NOVEL APPROACH TO CREATE STRONG AND CONDUCTIVE CONSTRUCTION MATERIALS

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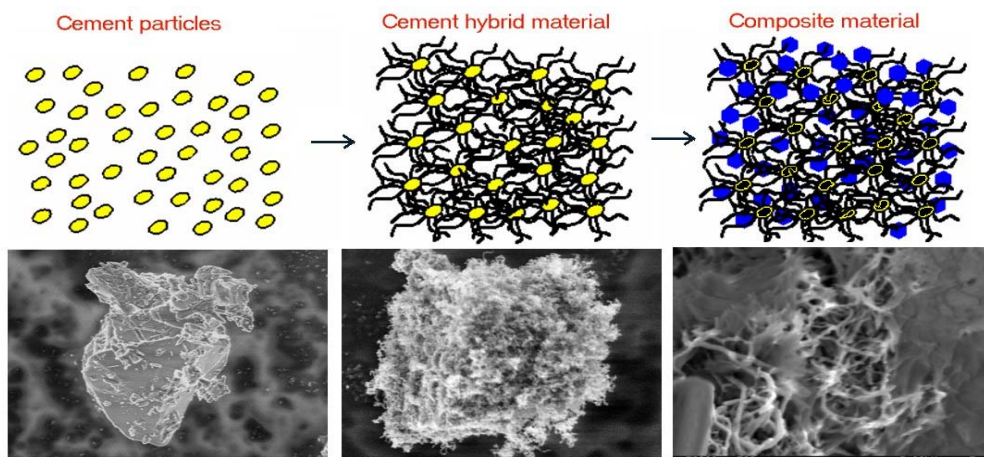
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Carbon nanotubes (CNTs) and carbon nanofibers (CNFs) are known to possess exceptional tensile strength, elastic modulus and electrical and thermal conductivity. They are promising candidates for the next-generation high-performance structural and multi-functional composite materials. However, one of the largest obstacles to creating strong, electrically or thermally conductive CNT/CNF composites is the difficulty of getting a good dispersion of the carbon nanomaterials in a matrix. Typically, time-consuming steps of purification and functionalization of the carbon nanomaterial are required. We propose a new approach to grow CNTs/CNFs directly on the surface of matrix particles.

As the matrix we selected cement, the most important construction material. We synthesized in a simple one-step process a novel cement hybrid material (CHM), wherein CNTs and CNFs are attached to the cement particles. The CHM has been proven to increase 2 times the compressive strength and 40 times the electrical conductivity of the hardened paste, i.e. concrete without sand <sup>[1]</sup>.



**Figure** Schematic representation of general concept of the incorporation of CNTs/CNFs into composite material by their direct growth on the surface of matrix particles.

[1] A. G Nasibulin *et al.* A novel cement-based hybrid material. 2009 *New J. Phys.* **11**, 023013.