

# Nanocomposites and nanomaterials

## Nanocomposite coatings with CNTs strengthening component

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Due to their unique strength characteristics carbon nanotubes (CNTs) are widely used in the development of new composite materials with special properties. In the overwhelming majority of cases, synthesized by any of the known methods CNTs are added as one of the components to compounds of various types and uses. Further, machine parts, for example, and other finished products are formed and manufactured from such mixtures.

However, a separate method to create composites is the formation of special coatings on the surfaces of substrates. On these substrates, the CNTs of the desired morphology and density are grown at first, and then they are filled with material with the necessary physico-mechanical and chemical properties [1]. In this paper, we present the results of studying of CNTs structures synthesis on SiO<sub>2</sub> substrates with the subsequent filling of the grown layer with a thin layer of copper. CNTs were synthesized at the industrial modernized facility "Bulat". Ni-nanoparticles obtained by vacuum annealing of nickel thin films were used as catalytic centers.

After synthesis, a layer of copper was deposited onto CNTs layer by thermal evaporation from an alundum crucible. The typical view of grown CNTs and tubes with a layer of deposited copper is shown in Fig.1. It can be seen that the CNTs diameter with Cu layer deposited on them increased almost tenfold. The copper coating on the tubes is uniform over diameter of the tubes, and that indicates the long diffusion lengths of copper atoms on the deposited nanostructures. Copper freely penetrated between the tubes to the substrate surface, creating a continuous composite coating of a conductive hardened copper film on the SiO<sub>2</sub> surface.

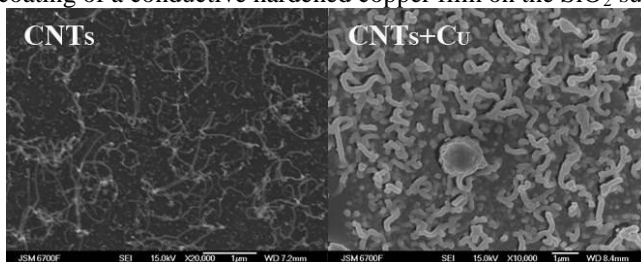


Fig.1 The typical view of CNTs and CNTs with Cu layer

1. Svavilny M.Ye., Panarin V.Ye. Khominych A.I. *Sposib otrymannya kompozycijnogo pokryttya z nanostrukturnym vuglecevim zmichnyuvachem. Patent of Ukraine №103869. Published: 25.11.2013*