Composite polymer materials doped with carbon nanotubes for use in regenerative medicine

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Today, the problem of using polymer materials in the field of restorative medicine is particularly relevant, since these materials offer a wide range of advantages and opportunities for creating innovative medical products. However, the need for import substitution in this area is becoming increasingly acute, as dependence on imports of polymer materials may be undesirable due to supply-side risks and price instability. To solve this problem, it is important to continue research and development in the field of creating new competitive polymer materials at the local level. Nano-additives can significantly improve the mechanical, thermal and physical properties of polymers, making them more durable, resistant to high temperatures and chemical influences. Such polymer nanocomposite materials can be used to create various medical devices and implants, such as bone implants, dentures, vascular stents and others. Thus, the use of nano-additives will improve the quality of domestic polymer materials, which can reduce dependence on imports of similar products. By improving the properties and reducing the cost of production, the claimed polymer materials with nano-additives can be more competitive in the market both domestically and abroad. Thus, the use of nano-additives in polymer materials will be an important step for import substitution and the development of domestic industry.

Polymer materials based on polymethylmethacrylate, polypropylene and polyvinyl alcohol are used in surgery, dentistry, ophthalmology and other fields of medicine as biocompatible materials. Known for their extraordinary properties, CNTs can revolutionize these areas of medicine. Their high strength, rigidity, lightness and corrosion resistance make them an attractive material for use in strengthening polymer matrices used in the manufacture of dentures, crowns, bridges and other dental structures.

We have studied the features of the structure and properties of a polymer nanocomposite doped with CNTs using modern methods of quantum chemistry, and also developed a basis for the methodology of doping polymer materials of various types (powdered and granular) CNTs.

The development of polymer technologies opens up new horizons for prosthetics. Polymers not only improve the physical properties of prostheses, but also increase the level of comfort for patients, which makes prostheses more functional and convenient in everyday life. Innovative materials such as polyurethane, silicone, and carbon composites make prosthetics lightweight, durable, and biocompatible. As a result, patients receive products that become not just technical devices, but real assistants in an active and fulfilling life.