

Investigation of methods of forming biocompatible coatings on metallic surfaces

Description for the general public

Metals are a group of materials applied in many kinds of medical devices. From tooth and orthopedic implants to stents having very complex shapes and miniature electrodes for pacemakers - due to their tremendous properties metals seem to be irreplaceable in biomedical uses. Hardness, durability or electrical conductivity are qualities that will make metallic parts always present in implantable devices.

Apart from unquestionable advantages, use of metallic materials in contact with living tissues brings also some serious faults. Metallic parts, especially those intended for long years of use, happen to corrode, emit harmful substances, cause allergies and can cause serious health issues to patients. For this reason research groups from all over the world are looking for methods of separation of metal parts of devices working in human bodies from direct contact with tissue. Various modifications of surfaces of metals are being tried out, such as coating with polymers, substances that release medicines or even living cells in order to increase safety of metals spending years in patients' bodies, in other words to increase their biocompatibility.

The aim of presented project is to investigate methods of modification of metals' surface by means of coating them with graphene oxide. A coating made of this interesting substance can introduce an advantageous change by isolating metal materials from contact with blood or other tissues, ensuring electrical conductivity, what is in many cases crucial and eliminates possibility of use of other, non-conducting compounds

During the project we will be studying methods of graphene oxide synthesis in order to obtain most preferable forms of it that could be used for coating metals. We will investigate methods of making coatings on mostly applied medical metals: stainless steel and gold. Obtained coatings will be thoroughly tested in terms of such characteristics as thickness, homogeneity or roughness of the coating. Finally, influence of prepared coatings on living organisms will be checked so that we will find out whether such coatings are biocompatible.

Results of presented project may in the future lead to creation of novel materials for construction of implantable medical devices. It would decrease complications caused by implanted materials, prolong time of usage of applied devices and, above all, improve comfort an life of patients.