

DESCRIPTION FOR THE GENERAL PUBLIC

Elaboration of new innovative nanomaterials with controlled level of interaction with living organisms depends on many factors and requires complex interdisciplinary research.

Titanium-copper materials in the form of nanocrystalline thin films are characterized by high biological activity, yet are very durable and resistant to hazardous conditions. The main advantage is a high degree of surface development which determines their bioactivity.

Our group has developed an innovative magnetron sputtering method used in deposition of the Ti-Cu thin-film coatings with controlled content and distribution of copper. This method allows precise and discrete distribution of copper and titanium in assembly of the innovative biomaterials.

In the project we aim to study nanocrystalline thin-films coating based on titanium and copper by comprehensive analysis of phenomena determining a bactericidal level and limited cytotoxicity effect. We will investigate dynamics of the ion migration process to the environment from coatings with various copper content and distribution.

Our interdisciplinary research leads to the development of a new type of safe, bioactive nanomaterial of unique features, covering antibacterial and antifungal properties, with limited cytotoxicity to the human cells.

There is a wide range of applications of such nanocrystalline surfaces. High demands of the increased hygiene regime in the health care institutions are often limited by compelling toxicological safety with minimal use of antimicrobial chemicals. As a solution, innovative Ti-Cu thin-films will help to overcome an infestation of bacterial and fungal pathogens, especially multidrug resistant, in the environments requiring top-class sanitization.