

Centre of Excellence NANODIAM

Technical University of Łódź, Mechanical Faculty,
Institute of Material Sciences and Engineering

**New Technologies for Medical Applications:
Studying and Production of Carbon Surfaces Allowing for Controllable Bioactivity**

The research interest of the Centre focuses on study and production of new materials with intentionally modified surfaces, exhibiting variety of properties designed for controllable bioactivity. The expected area of present and future applications of our achievements is directly combined with orthopedic surgery, artificial organs implantation and Rother biomedical implementations including New tools for surgery and for diagnostic tests. Our main interest concerns of crystalline karbon synthesis at the surface of several materials widely used in medicine, i.e. medical steel, titanium and other metals, including their alloys, and also polymers. Synthesized by RFACVD (Radio Frequency Plasma Activated Chemical Vapor Deposition) and MW/RF CVD method (Microwave/Radio Frequency Chemical Vapor Deposition) crystalline karbon exhibits diamond structure with crystals of nanometer size.

Diamond is a carbon allotrope, which is in our body as well. That is why patent do not reject implant as a foreign body. Manufactured diamond layer does not only change mechanical properties of implants but additionally raises their durability, corrosion resistance and protects against the allergy to metals, the ions of which are presence in materials, they are made from. Moreover conducted examinations showed one more very important property of nanodiamonds - their bioactivity. This feature was discovered and confirmed by scientists from NANODIAM consortium.

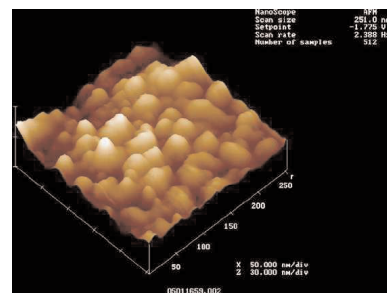
Currently we try to modify the nanodiamond surface structure with a

goal to reach the highest bio-, hemo- and thrombo-compatibility, which are continuously monitored in our lab. For monitoring of the biomedical usefulness of our new materials we employ several unique techniques like: SPR-biosensor technology, fluorescence imaging and scanning elektron microscopy.

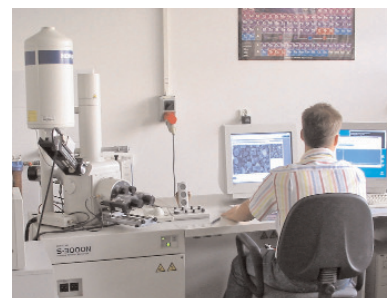
Scientists of the Centre publish annually about thirty papers in refereed journals and deliver more than fifty communications during domestic and international scientific meetings. They are active members of: Word Biomedical Academy - Paris, Tissue Engineering Society - Londin, American Society for Metals International, Federation of European Materiale Society, The Mediterranean League Against Thromboembolic Diseases, Polish Vacuum Society, Polish Biomaterial Society, Academy of Engineering in Poland, Materials Science Society, Polish Society of Clinical Chemistry, Committee for Thromboembolism and Haemostasis of Polish Academy of Sciences, The Committee for Cooperation of Biological and Chemical Sciences of Polish Academy of Sciences, Polish Society of Histochemistry and Cytochemistry and Polish Society of Biochemistry. They are in close cooperation with several European, Canadian and American universities and industrial units. Members of the Centre were repeatedly awarded for their scientific and engineering achievements. The permanent research staff of the Centre consists of 77 scientific workers and research - technical specialists, it is 10 professors (incl. 4 full professors, 6 TUL professors) and 36 doctors. At present

there are also 21 PhD students and, on average, 20 postgraduate students gaining their Master degree in the Centre

There is a possibility for foreign and domestic students to take part or to take the whole of their studies in the Centre - both on MSc and PhD levels. The Industry and Technology Park Belchatów Kleszczów gives students of our Institute an opportunity to serve apprenticeship, to receive training and to do the research work using high-quality equipment



The smallest diamonds in the world by Atomic Force Microscope



CoE NANODIAM is equipped with high-quality apparatus



The Centre of Excellence NANODIAM is based in building of the Technical University of Łódź, Mechanical Faculty, Institute of Material Sciences and Engineering

NANODIAM - New Technologies for Medical Applications: Studying and Production of Carbon Surfaces Allowing for Controllable Bioactivity

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