VISIBLE LIGHT PHOTOACTIVE MATERIALS BASED ON MODIFIED NANOCRYSTALLINE TITANIUM DIOXIDE FOR DISINFECTION AND STERILIZATION

(TECHNOLOGY OFFER P-108)

The subject of the offer covers materials based on modified nanocrystalline titanium dioxide that can be applied for an efficient photocatalytic microorganisms inactivation or organic pollutants degradation under visible light irradiation.

Titanium dioxide based materials are commonly known as photocatalysts of environmental and biomedical relevance. Photoactive TiO_2 irradiated with ultraviolet light shows antiseptic, fungicidal, disinfecting and odour-neutralizing properties. It can be used for production of self-cleaning surfaces as well as disinfection, sterilization or odour-neutralizing agents.

The subject of this offer includes photocatalytic materials produced by a smart modification of nanocrystalline titanium dioxide. The new materials **absorb visible light** that initiates the photocatalytic processes. Under these conditions photodegradation of organic compounds and bacteria inactivation proceed very efficiently.

The main advantages of modified nanocrystalline titanium dioxide are:

- lack of the dark-toxicity of both the modified material and its components;
- visible light induced strong effect of phototoxicity towards microorganisms allowing elimination of expensive and harmful ultraviolet light sources;

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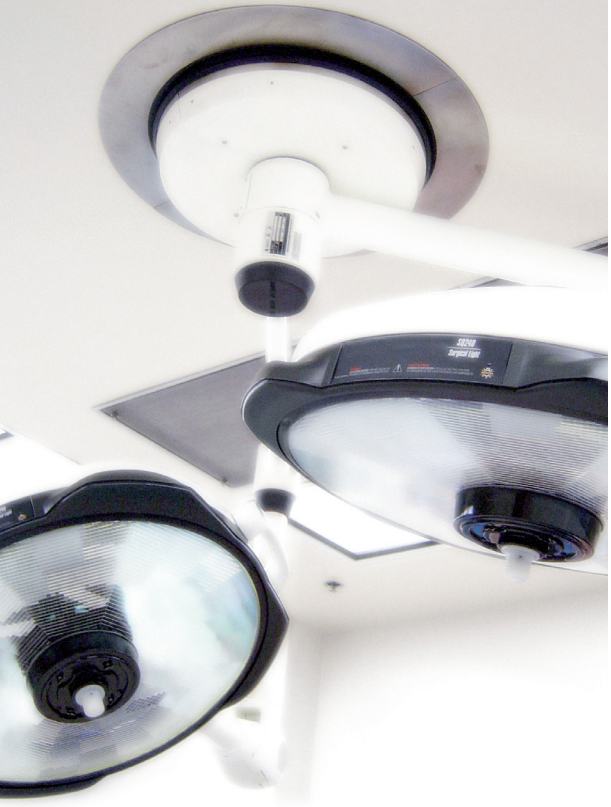

- formation of transparent colloidal solutions that can be easily applied for various surfaces impregnation and coating thus forming thin photocatalytic layers;
- stability in a wide range of pH, especially in the neutral conditions (pH=7), contrary to unmodified TiO2 stable in the form of transparent colloids only in acidic media;
- lack of any negative influence either on natural environment or human body;
- low production costs.

Materials based on the modified nanocrystalline titanium dioxide can be applied as:

- self-cleaning layers, particularly suitable for transparent surfaces;
- disinfection and sterilization agents, particularly suitable for surgical instruments and other glass or plastic components used in medical applications;
- agents for microorganisms photoinactivation;
- cleaning solutions for contact lenses.

Experimental tests of the **bovine serum albumin photodegradation** and ***Escherichia coli* photoinactivation** confirmed a high photocatalytic activity of the modified nanocrystalline titanium dioxide under visible light irradiation conditions.

Applications of the group of materials as well as the procedure of modified nanocrystalline titanium dioxide production are the subjects of **two patent applications.**

Further development of the invention is under progress at Faculty of Chemistry, Jagiellonian University. Currently the Centre for Innovation, Technology Transfer and University Development (CITTRU) is looking for entities intrested in the licence and commercial applications of the described materials.

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