Established Slovak scientific and research institute has developed new innovative solution for surface treatment of biomedical titanium and Ti-alloys in electrolytes based on deep eutectic solvents and is looking for a licensee/investor/buyer

Summary

Profile type	Company's country	POD reference
Technology offer	**Slovakia**	**TOSK20230801022**
Profile status	**Type of partnership**	**Targeted countries**
PUBLISHED	**Commercial agreement with technical assistance** **Investment agreement**	**• World**
Contact Person	**Term of validity**	**Last update**
Rita ELSTE - TOMSONE	**1 Aug 2023** **31 Jul 2024**	**1 Aug 2023**

General Information

Short summary

A team of inventors from an established Slovak scientific and research institute has developed a new innovative solution for surface treatment of biomedical titanium and Ti-alloys in electrolytes based on deep eutectic solvents.
The present innovative solution proposes the possibility to create bio-inspired, corrosion-protected, non-contaminated Ti-surfaces with a high range of roughness.
The preferred cooperation type are commercial agreement or investment agreement.

Full description

A team of inventors from an established Slovak scientific and research institutes has managed succeeded in substantially eliminating the above shortcomings by the proposed innovative solution using deep eutectic solvents based on choline chloride (vitamin B4) and proton donors (such as ethylene glycol, carbamide or glycerol) for the efficient electrochemical surface treatment of Ti and Ti-alloys. Deep eutectic solvents, as a new type of room temperature ionic liquids, exhibit many attractive properties (they are inexpensive, easy to prepare, and readily biodegradable) that are not harmful to the environment compared to many other types of electrolytes, and provide flexible options for surface patterning of titanium biomedical products.

The present proposed solution has proved to be a promising medium for electrochemical application, electrodeposition and electropolishing of various metals and alloys. Due to the unique combination of properties of deep eutectic solvents enabling electrochemical treatment of Ti and Ti-based alloys without passivation even at room temperatures, their significant advantage over traditional high-temperature electrochemical surface treatment technologies in acidic and non-acidic electrolytes can be pointed out.
The research activity gradually demonstrated the unique capabilities of a new technique of electrochemical surface treatment of biomedical Ti and Ti-based alloys in a new generation ecological solvent (deep eutectic mixture Ethaline) modified by the addition of ethyl alcohol. At the same time, it allows modelling the surface properties of Ti biomedical products in a wide range according to the individual needs of special use. The aim is to improve the technological properties of the electrolytic polishing process and the quality of the resulting surfaces of titanium and its alloys.
The institutions are looking for a partner to cooperate with via commercial agreement or investment agreement.

Advantages and innovations

- the possibility of electrochemical modification of surfaces in deep eutectic solvents allowing to modify Ti and Ti-alloy surfaces at room temperatures in environmentally friendly media without additional toxic substances, thus avoiding passivation and contamination,
- the possibility to perform surface modification treatments for prostheses and implants of complex shapes in order to improve their physical, mechanical and corrosion properties and biocompatibility,
- the possibility to achieve a high range of desired surface topographies,
- the possibility to obtain nanostructured surfaces for drug delivery,
- the possibility to simplify the process of using electrolyte biodegradation.

Technical specification or expertise sought

Stage of development

Available for demonstration

Sustainable Development goals

- **Goal 9: Industry, Innovation and Infrastructure**
- **Goal 17: Partnerships to achieve the Goal**

IPR Status

IPR applied but not yet granted

Partner Sought

Expected role of the partner

A new innovative solution for the surface treatment of biomedical titanium and Ti-alloys in electrolytes based on deep eutectic solvents and the modification of the deep eutectic solvent Ethaline can be used in various areas.
For example, in the field of aviation, specifically for rocket technology and naval shipbuilding, where surface cleanliness, physical-mechanical properties and corrosion resistance play an important role. The presented

innovative surface treatment solution can also be used on Ti-based materials for galvanochemistry and for photocatalytic applications. At the same time, it is possible to use a new solution to modify the surface of biomedical products based on Ti and Ti-alloy (especially implants and prostheses).
The institute is looking for a partner to cooperate with via commercial agreement (a partner for licensing of this technology is sought) or investment agreement (an investor to further develop this technology is sought or a partner to sell this technology to is sought).

Type of partnership

Commercial agreement with technical assistance

Investment agreement

Type and size of the partner

- **SME 50 - 249**
- **Big company**

Dissemination

Technology keywords

- **02002015 - Surface treatment (painting, galvano, polishing, CVD, ..)**
- **02007002 - Building materials**

Market keywords

- **09007002 - Manufacture of construction materials, components and systems**
- **08001015 - Other speciality materials**
- **009007002 - Manufacture of building materials**

Targeted countries

- **World**

Sector groups involved