

MULTIFUNCTIONAL ELASTOMERIC BIO-COMPOSITE IMPLANT MATERIALS FOR BONE REGENERATION

ABOUT THE SOLUTION:

Biocompatible, three-component, elastomeric, polymer-ceramic biocomposite implant materials for bone tissue regeneration based on poly(glycerol adipate), unmodified and L-lysine functionalized bioglass particles and bioactive peptides, exhibit osteoconductive, proregenerative, antimicrobial and anti-inflammatory properties. These biocomposites have great potential for bone tissue regenerative.

The innovation of the patented materials is based on: (i) the presence of bioglass covalently functionalised with L-lysine, (ii) the elastomeric nature of the composites and (iii) the proven pro-regenerative, antimicrobial and anti-inflammatory properties. The biological activity of the biomaterial is ensured, among other things, by peptides with a specific amino acid sequence. L-lysine, on the other hand, promotes osteoblast adhesion and proliferation and increases the osteogenic potential of bone stem cells. The inconvenience of the implants currently available on the market is the lack of a comprehensive action.

SCOPE OF COOPERATION:

- Licensing,
- Sale of property rights,
- Partnership in further research and commercialisation,
- Spin-off.

IP PROTECTION:

The inventions are the subject of patent applications:

P.442877,
P.442876,

P.442875,
EPO: EP23174684.3

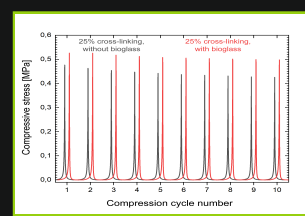
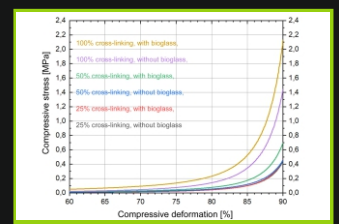
AUTHORS:

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TECHNOLOGY READINESS LEVEL: TRL 4; according to the TRL classification for medical devices

Implantable material concept validated in use, materials tested *in vivo* on a small animal model [rabbit] with the approval of the National Ethical Committee for Animal



peptide release kinetics. They will significantly speed up the regeneration process and eliminate a number of post-operative complications in surgery, particularly in microsurgery. As elastomeric materials, biocomposites are characterised by elasticity and deformation reversibility, and can be easily adapted to the dimensions of the bone defect.

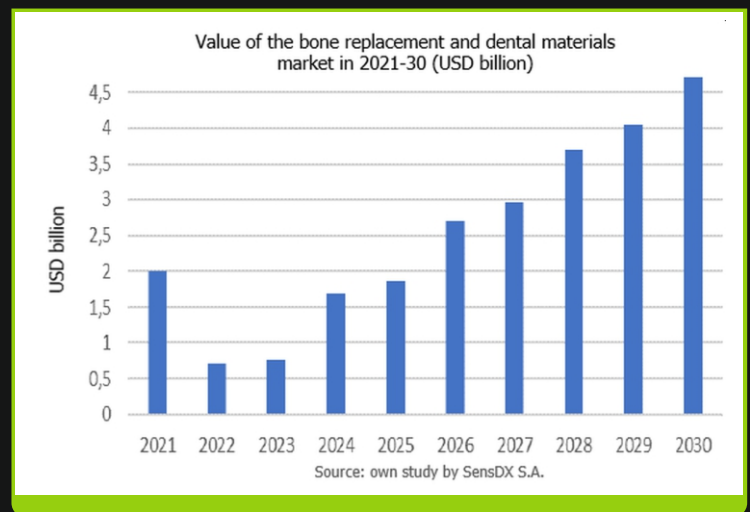


The developed biomaterials do not cause mechanical stress at the implantation site. The materials are formulated as porous and solid biocomposites and can have a varied layered structure. It is possible to obtain a biomaterial consisting of layers of different porosity. The suitability of the biomaterials has been verified in *in vitro* and *in vivo* studies on a small animal model (rabbit).

MARKET:

A commercialisation strategy is created for the developed materials with market analysis, providing an implementation plan, business model, marketing strategy, financial plan and intellectual property valuation.

The materials fit into: the market for biomaterials, the market for bio-glass and, above all, the market for bone grafting and dental materials. The market for these materials was in 2022 worth approx. USD 700 billion, and projected to grow at a CAGR of 9.5 per cent until 2030 to reach up to USD 4.7 billion. The materials segment for bone tissue regeneration is expected to show the highest growth of 10.6% over the forecast period.



APPLICATIONS:

Multifunctional composite materials with properties such as osteoconductive, antimicrobial and pro-regenerative can be used, among others, in orthopaedic and traumatological procedures as a filling material for bone defects resulting from bone tissue degeneration (osteoporosis), cancerous resections or defects resulting from complex bone damage following accidents, e.g. traffic accidents. The suitability of the material has been verified *in vivo* in a rabbit model.

The target market group for the products will be companies producing and marketing implant materials for orthopaedics and traumatology. Due to their pro-regenerative effect, osteoconductive ability, antibacterial properties and biological activity, they represent a major advantage over existing biomaterials in the medical device market.



The material was developed as part of the project 'Multifunctional composite material with antimicrobial and pro-regenerative properties for the reconstruction of bone tissue' with the acronym **GlassPoPep** National funded by the **Centre for Research and Development (grant no TECHMATSTRATEG2/406384/7/NCBR/2019)**.

We look forward
to working with you!

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