Moldable, biodegradable, biocompatible and bioresorbable implant material

Material made up of a polymer matrix, a reinforcement of metal particles and a polymeric coating that presents medical applications as osteosynthesis material and tissue engineering for bone regeneration.

Description and essential characteristics

This technology focuses on the development of hybrid materials for implants based on moldable, biodegradable, biocompatible and bioresorbable polymers formed by a polymeric matrix which comprises reinforcing metal particles, such as magnesium.

The material has an amorphous or semicrystalline structure with a degradation profile modulated bv its volume fraction and particle size, and a multilayer coating of homogeneous and firmly bonded biodegradable polymer.

Each layer of the coating is loaded with different or equal active substances, and includes for example proteins, anti-inflammatory and antibacterial substances with low potential to cause antibiotic resistance.

The procedure for obtaining the implant material comprises the following steps:
a) drying of polymer
b) drying of reinforcement particles, eg. Magnesium,
c) processing the biodegradable polymer and reinforcement particles,
d) molding the product obtained in step (c)
e) coating.

Competitive advantages

This new type of material solves the complications associated with implants by incorporating drugs through biodegradable coatings on the implant surface allowing:

- The sequential release of active substances,
- The local treatment of complications, that occur immediately after surgery, associated with microorganisms infections; this treatment is more effective than systemic antibiotic treatment,
- The generation of coatings at room temperature and the potential incorporation of different polymer layers, that are held together to each other and also to the substrate, promoting once again the sequential release of active substance.

In vitro studies results show that:

- Compressive strength of the composite materials is within the strength values of cortical bone (100-130 MPa).
- The incorporation of Mg to the polymer matrix improves the viability of human mesenchymal cells while the matrix itself controls the degradation of Mg particles contained in it.
- The presence of the coating delays the onset of the composite degradation.
- Materials made up of the amorphous form of the polymer and Mg, have a high antibacterial action and reduce the viability of bacteria included in the biofilm, providing it with added value for its use as osteosynthesis material.

Type of collaboration sought

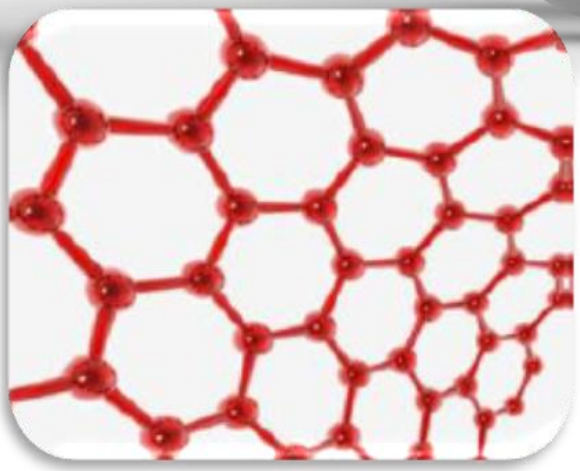
Cooperation is sought with any Party interested in partnering, licensing or investing in the technology, whether it is an investor to fund the project, a partner interested in getting involved in any of the various phases until its placement on the market, a licensee, etc. Organisations potentially interested in this technology are those devoted to the manufacture, commercialisation and/or distribution of implants and medical devices; as well as universities, hospitals, research centres and all types of institutions engaged in the research of biomaterials for implants manufacturing.

Current stage of development

In vitro studies have been carried out with different combinations of polymer and metal and different reaction conditions.

Current state of intellectual property

Spanish Patent P201530683, applied for in May 2015.



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Technology Offer from the Foundation for Biomedical Research of La Paz University Hospital