NEW MULTIFUNCTIONAL MATERIAL FOR CONTROLLED-DRUG-RELEASE IMPLANTS

PATENTED TECHNOLOGY

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ABSTRACT

The "Advanced Materials" research group at the University of Alicante has developed a foamed material comprising three phases: a structural matrix, at least one host phase, and a fluid. This material is characterized by the fact that the structural matrix comprises a **plurality of interconnected porous cavities,** the host phase(s) is/are housed within at least one porous cavity of the structural matrix and the fluid is housed within the porous cavities. The host phase(s) can be housed within the porous cavities of the structural matrix without maintaining any union or maintaining discrete unions with the latter.

The structural matrix may consist of a material of a metallic, polymeric, ceramic nature or mixtures thereof. Meanwhile, **the host phase(s)** is/are a functional material, the **fluid** being a liquid or a gas.

These materials have many potential uses, among which ones is as an implant material, with the additional possibility of exerting a controlled release of drugs.

Companies interested in commercial exploitation of this material through a patent license agreement are sought.

ADVANTAGES AND INNOVATIVE ASPECTS

The foamed material described has the following advantages:

- If the structural matrix and the host phase(s) are not joined, both fulfil their functionality independently.
- The matrix phase can be of a material that has good mechanical properties, so that it can withstand mechanical stresses derived from implantology use.
- The host phase(s) can be a material with varied mechanical properties and with a high specific surface area (functional material), so that the material as a whole has a higher surface area and can serve as an adsorbent of chemical substances.

The competitive advantages of this material with respect to those used in traditional implantology are the following:

- Low density (great reduction in the weight of the prosthesis compared to mass titanium prostheses).
- Absence of toxic metal elements.
- Bioabsorbable material (the material of the matrix phase is pure magnesium, which can be slowly dissolved in the organism by means of its special surface treatment).
- Controlled local drug release (the host phase has the ability to adsorb drugs that can be slowly released locally into the body to prevent infection or perform hormonal treatments).

INNOVATIVE ASPECTS

In the field of implantology, there is no material with the characteristics of the described material.

MARKET APPLICATIONS

The present invention falls within the field of foamed materials and in particular refers to an interconnected pore foamed material containing within its porous cavities at least one host phase, which gives specific functionalities to the foamed material.

This material is especially useful **as an implant material**. The material acts as an implant allowing the growth of living tissue in its interior with the adsorbent host(s), in such a way that it retains at least one substance with pharmacological activity in a living organism, so that this substance is released in a controlled way by desorption from the host phase in the living organism.

In addition to this use, foamed material may also be used:

- For the controlled **release of chemicals or pharmaceuticals.**
- For the **adsorption of gases, liquids or dissolved solids.**
- As a **catalyst.**
- As a **filter for inorganic or biological substances.**
- As a **magnetic material.**
- As **impact absorbing material in passive safety** parts of land, air and sea transport vehicles.
- As an **electrode material**, particularly as an electrode for electrochemical conversion in chemical synthesis or decontamination processes of water and/or air.
- As an **absorber of electromagnetic radiation** for its transformation into heat or electrical energy.
- As **radar wave resonator material,** applied in radar invisibility technologies.
- As a **template material for crystalline growth** in the gap between the structural matrix and the host phase(s).

COLLABORATION SOUGHT

The research group is looking for companies in the field of implantology interested in acquiring this technology for commercial exploitation through:

- Patent licensing agreements to transfer the rights of use, manufacture or marketing of the technology to third parties.
- R&D project agreements (technical cooperation) for the development of new applications, adapting the technology to the specific needs of the company, etc.
- Subcontracting agreements for technical assistance, training, etc.