NEW MULTIFUNCTIONAL MATERIAL FOR CATALYSIS APPLICATIONS

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) is/are housed within the porous cavities of the structural matrix without maintaining any bond with the latter.

The **structural matrix** may consist of a material of a metallic, polymeric or 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 one is as a catalyst material or as a support for catalysts.

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

ADVANTAGES AND INNOVATIVE ASPECTS

MAIN ADVANTAGES OF THE TECHNOLOGY

The foamed material described has the following advantages:

- Since the structural matrix and the host phase(s) are not bonded, both fulfil their functionality independently.
- The matrix phase can be of a material that has good mechanical and thermal properties, so that it can withstand mechanical stresses derived from industrial catalytic use and adequately transport heat to or from the reactor.
- 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 than conventional foams used in catalytic applications.

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

- With suitable graphite or metallic matrices, materials with very high thermal conductivities are obtained, which allow the heat to be transported to or from the reactor.
- With high specific surface host phases (e.g. active carbons, zeolites, etc.) much higher specific surface values are achieved than conventional ones measured for foams (0.3 m2/g) or foams with nanoparticles on the porous surface (<1m2/g).
- The host phase(s) can be a catalyst material or support catalysts and its catalytic functionality is ensured by its configuration in the final material.
- Multi-catalytic materials can be designed by combining different host phases with the advantage that the catalytically active centres are physically differentiated.

INNOVATIVE ASPECTS

In the field of catalysis there is no material with the characteristics of the described material. The material has passed a patentability examination.

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 particularly useful **as a catalyst material or as a support material for catalysts.** The material allows catalytic active materials to be housed in the host phases and ensures that the passage of fluids through it. In addition, this material can be considered multi-catalytic when different host phases are combined, which allow the different catalytic centres to be physically separated.

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

- For the controlled release of chemicals or pharmaceuticals.
- For the adsorption of gases, liquids or dissolved solids.
- As an implant material.
- 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 electromagnetic radiation absorber material for conversion 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**, **especially manufacturers of catalysts, interested** in acquiring this technology for **commercial exploitation** through:

- Patent licensing agreements to assign 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.