

Composite materials for bone & tissue reconstruction

New materials with large magnetostrictive effects

Inventor

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STATE OF DEVELOPMENT

- Prototype

INTELLECTUAL PROPERTY

- US Patent 8,580,291

DESIRED PARTNERSHIP

- License

Problem

Materials used for bone transplants and as scaffolds for tissue restoration need particular features to work well. Current materials have shortcomings that complicate treatment. Dried silica gels are very attractive because of their nanometer-sized pores, but they lack larger pores that exist in natural bone. Composite materials may have larger pores, but the fibers are usually dense ceramics which are less biocompatible. There is a need for materials that combine the high surface area of dried gels with the larger pores of fibrous composites.

Solution

Researchers at the University of Pennsylvania have developed a fibrous composite of biocompatible silica gels and biodegradable polymers that preserves the nanometer-sized pores in the fibers, and the bone-like pores between the fibers. The fibers can be hollow to further increase the surface area, lower the density, and provide the open channels advantageous for transport and cellular activities. The polymers form bonding and linkage at the intersections of fibers to strengthen the composites. Such composites show good mechanical strength and readily induce bone-like growth. They can be easily applied to a surface for patches or coatings. They can also be easily formed into contoured objects that retain shapes during handling.

Advantages

- Increased porosity and surface area
- Controlled biodegradability
- Light weight, low-density materials
- Controlled mechanical properties

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