

KEYWORDS: pneumatics objects, structural rigidification, shape morphing, deformable material, 3D

BACKGROUND

In many fields, it is important to have structures with a compact, space-saving contracted configuration at rest. There are pneumatic objects that bend, lengthen, contract or twist in one direction when pressurized. However, they are almost always one-dimensional actuators and the shapes obtained are very limited. Experimental "shape morphing" results have been obtained using the swelling of hydrogels and elastomers with a solvent, but they are difficult to handle and their deformation is slow. To date, there is no easily activatable and deformable material that changes shape rapidly in the industry. Manufactured objects often lack the adaptability to meet several functions.

DESCRIPTION

The invention consists of an architecture composite material comprising interconnected cavities. When these are subjected to positive or suction pressure such, the primary structure, made of an extensible material such as elastomer, deforms into a shape programmed by the geometry of the network of cavities. A folded internal structure made of a quasi-inextensible material may also be deployed by the deformation of the primary structure, giving rise to a structural rigidification of the material by tensegrity. This new material can be applied to three-dimensional or quasi-2D objects and the actuation speed is of the order of a few Hertz.

COMPETITIVE ADVANTAGE

- Material whose internal structure codes for a precise shape
- Optimized material manufacturing cost
- Easy to use
- Reversible and deforms quickly at will
- Adapted to rapid prototyping techniques to accurately model internal channel structure
- Customizable shapes according to your needs



PRINCIPAL MARKETS

- Sport/Rehabilitation
- Woodworking
- Architecture
- Biomedical device
- Aircraft furniture industry



FIELDS OF APPLICATION

- Adjustable support and movement assistance
- Biocompatible elastomer
- Manufacture of art furniture
- Adaptable structures for industry



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