Pneumatically Actuated Soft Micro Mold for Hydrogel Particle Generation

Overview
This technology uses a soft robotics micromold (SRM) and pneumatic actuation to create hydrogels with a controllable 2D or 3D structure. This technology can create microparticles with a wide variety of shapes and sizes out of fragile hydrogels like collagen I. Creating various hydrogel shapes predictably is important for developing scaffolds for tissue engineering, drug delivery, micro locomotive, and other applications.

Technology
For this technology, the hydrogel is cured in a SRM integrated pneumatic channel. Then, air is pushed through the channel, deforming the mold. PBS can then diffuse through the mold to release the hydrogel. Using this method for particle generation, the produced hydrogel retains the same shape as the mold. Shapes of these hydrogels are highly customizable. This technology can create microparticles between 100 μm and 1000 μm with a thickness of 75 μm to 600 μm and shapes including square, cross shape (2D structure), bullet, and roller-slide (3D structure).

Advantages
- Capability to produce collagen microparticles without damage to structure.
- Highly reproducible generation of customizable 2D or 3D shapes.
- Generation of microparticles with dimensions between 100 μm to 1,000 μm.
- Very low variability between microparticles size and shape.
- Applicable to a variety of biopolymers Easy extraction of microparticles from mold.

Applications
- Tissue engineering.
- Drug delivery.
- Micro locomotive.

Stage of Development
Prototype completed.

Patent Status
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Publications


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Research Interests
- Bio-Nano machining
- Micro and nano fluidics
- Bio-Nano hybrid devices for medical applications

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