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TECHNOLOGY AVAILABLE FOR LICENSING

Nanoloom for Controlling Polymer Assembly

Patent Application #PCT/US2006/037681

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Details About the Invention:

The technology is a device and a method that recreates, or mimics, natural cell production of collagen. The invention comprises an array of nano- to micro-scale reactors designed to contain and control the arrival of unassembled fibril-forming collagen monomers which have not subsequently self-assembled into intermediate filaments or into fully formed collagen fibrils. In one aspect of the invention monomers are assembled through pores by knitting the fibers together. The invention also provides a means for controlling the residence time of forming fibrils in the reactor and drawing self-assembled fibrils from the reactors. To generate arrays of aligned collagen fibrils, arrays of reactors will be produced on a single nanoloom chip which can be used in conjunction with a mobile stage to print linear arrays of assembled collagen fibrils on a large scale. With this device and method, the inventors are able to produce aligned layers, which can be used to make scaffolding for tendons, ligaments, and the insertion points between bones and tendons. This method will allow the printing of collagen-based matrices in both 2- and 3-D with unprecedented control of the fibril spacing and has the capability of printing complex patterns on a large scale in a way not possible with current approaches.

Benefits of the Invention:

The invention covers the process of assembling collagen and other self assembling polymeric systems. Advantages of this invention include:

- Precisely controlled collagen fibril assembly
- Fuctionalization and/or modification of fibril assembly
- Ability to transition printing between different types of fibril assembly
- Collagen fibrils with sufficient order to have the load-bearing capacity of biological tissues

The Bottom Line:

Potential commercial applications include providing suitable scaffoldings for musculoskeletal tissue-engineered components (e.g.: ligaments, tendon, bone, cartilage and cornea). There is also potential to use constructs generated by the device for artificial and very strong leathers. Finally, this concept could be extended to a number of other polymeric systems which undergo self-assembly and thus could lead to the development of highly-aligned printed polymeric systems.

For More Information:

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