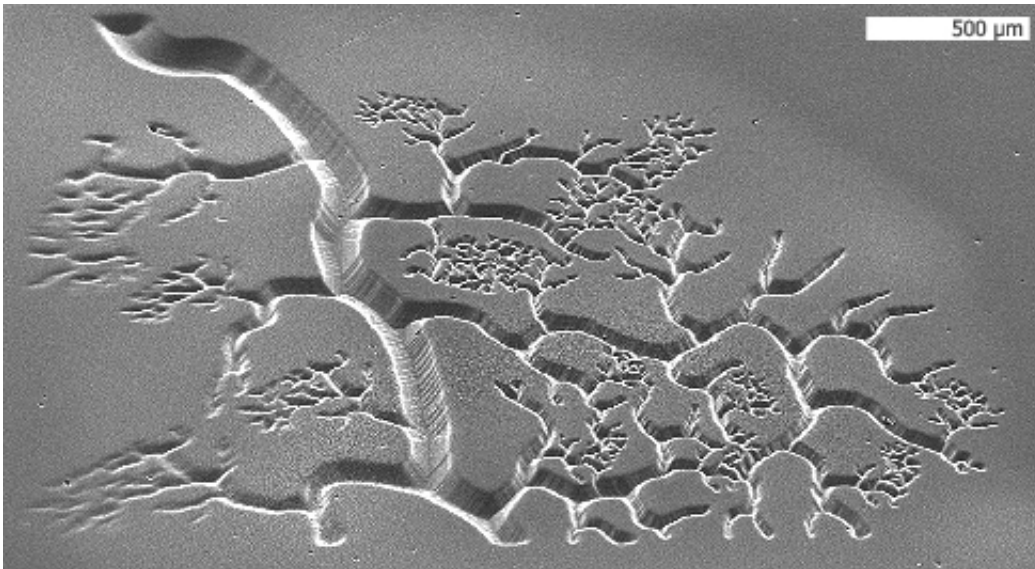


Nanoengineers can print 3D microstructures in mere seconds

September 13 2012



NanoEngineering Professor Shaochen Chen has demonstrated the capability of printing three-dimensional blood vessels in mere seconds out of soft, biocompatible hydrogels. Being able to print blood vessels is essential to achieving the promise of regenerative medicine because it is how the body distributes oxygen and nutrients. Credit: Image Credit: Biomedical Nanotechnology Laboratory, Chen Research Group, UC San Diego Jacobs School of Engineering.

(Phys.org)—Nanoengineers at the University of California, San Diego have developed a novel technology that can fabricate, in mere seconds, microscale three dimensional (3D) structures out of soft, biocompatible hydrogels. Near term, the technology could lead to better systems for

growing and studying cells, including stem cells, in the laboratory. Long-term, the goal is to be able to print biological tissues for regenerative medicine. For example, in the future, doctors may repair the damage caused by heart attack by replacing it with tissue that rolled off of a printer.

Reported in the journal *Advanced Materials*, the biofabrication technology, called dynamic optical projection stereolithography (DOPsL), was developed in the laboratory of NanoEngineering Professor Shaochen Chen. Current fabrication techniques, such as photolithography and micro-contact printing, are limited to generating simple geometries or 2D patterns. Stereolithography is best known for its ability to print large objects such as tools and car parts. The difference, says Chen, is in the micro- and nanoscale resolution required to print tissues that mimic nature's fine-grained details, including blood vessels, which are essential for distributing nutrients and oxygen throughout the body. Without the ability to print vasculature, an engineered liver or kidney, for example, is useless in regenerative medicine. With DOPsL, Chen's team was able to achieve more complex geometries common in nature such as flowers, spirals and hemispheres. Other current 3D fabrication techniques, such as two-photon photopolymerization, can take hours to fabricate a 3D part.

The biofabrication technique uses a computer projection system and precisely controlled micromirrors to shine light on a selected area of a solution containing photo-sensitive biopolymers and cells. This photo-induced solidification process forms one layer of solid structure at a time, but in a continuous fashion. The technology is part of a new biofabrication technology that Chen is developing under a four-year, \$1.5 million grant from the National Institutes of Health (R01EB012597). The term "additive manufacturing" refers to the way [3D structures](#) are built layering very thin materials.

Provided by University of California - San Diego

Citation: Nanoengineers can print 3D microstructures in mere seconds (2012, September 13)
retrieved 20 March 2024 from <https://phys.org/news/2012-09-nanoengineers-3d-microstructures-mere-seconds.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.