

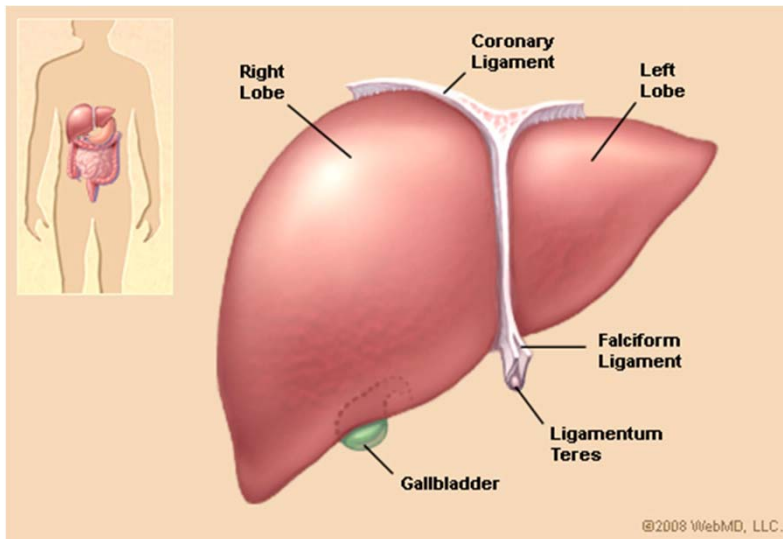
Origami and Assembly Based Human Tissue Engineering

Carol Livermore

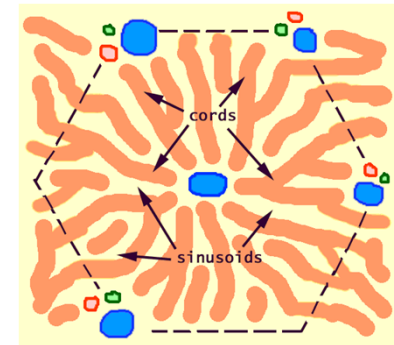
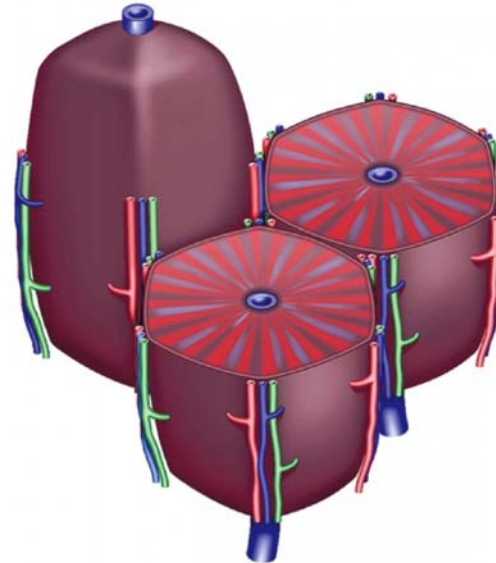
**Department of Mechanical and Industrial Engineering,
Northeastern University**

October 16, 2013

Goal: Engineer human tissue with quality, quantity, and throughput



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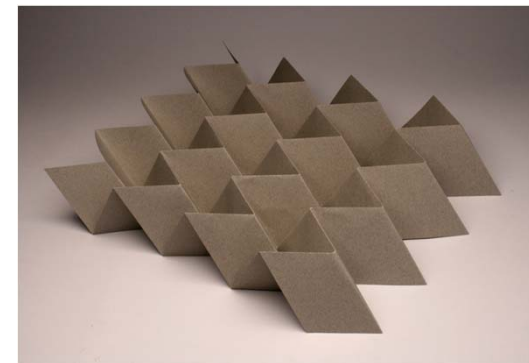
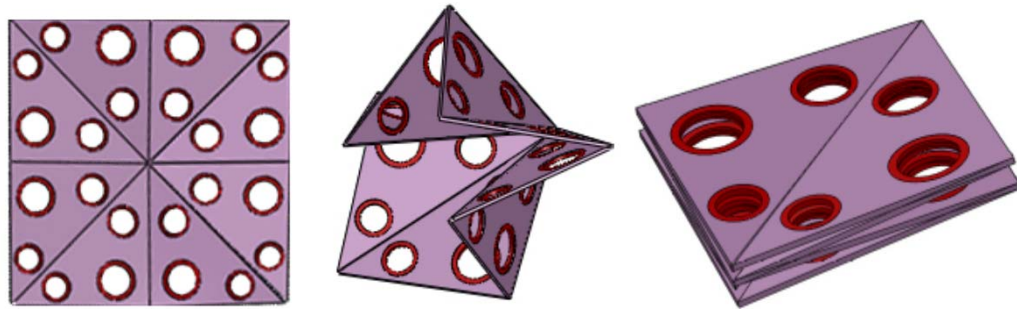
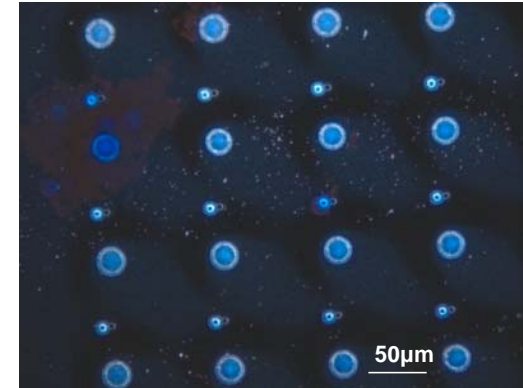
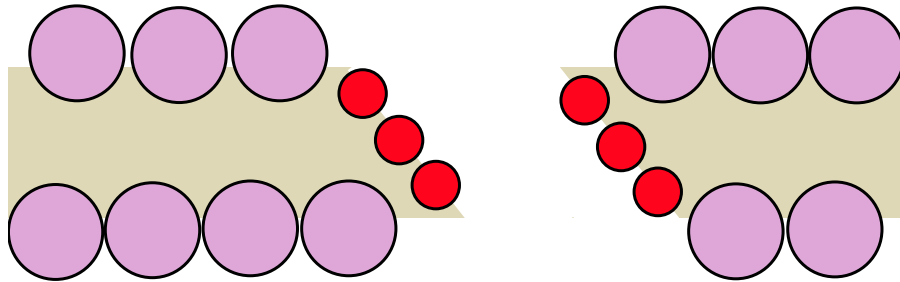


Human tissue and organ function is enabled by structure at the milli and micro scales. Can microtechnologies enable the creation of tissues with the right structure and function, rapidly and in large quantities?



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Our approach: 2D directed assembly and origami folding

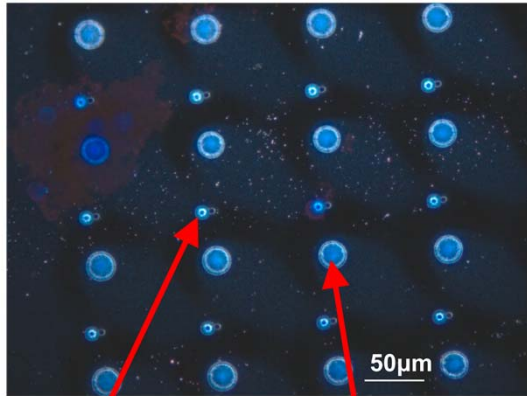


Robert Lang, Lang Origami



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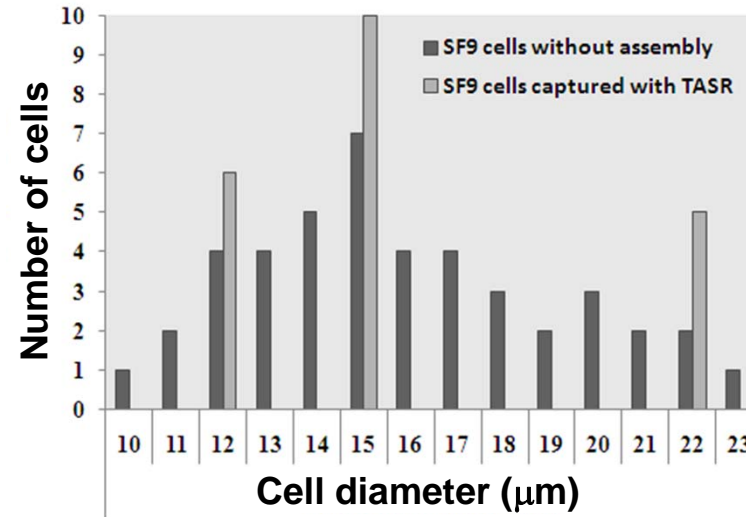
Passively directed self assembly orders cells in 2D



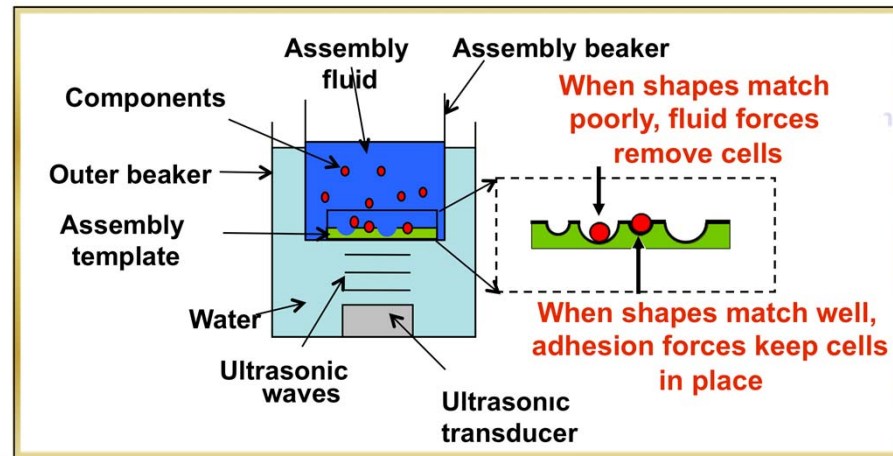
12 µm diameter insect cell in matching hole

22 µm diameter insect cell in matching hole

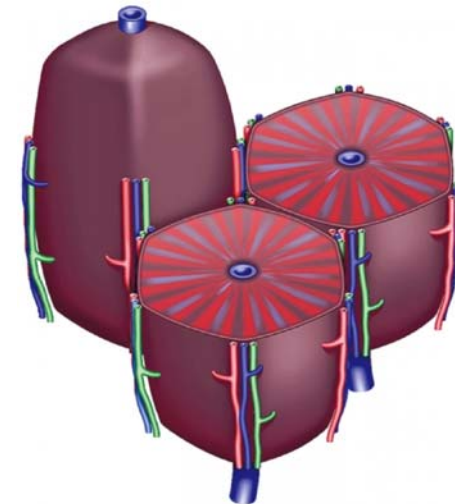
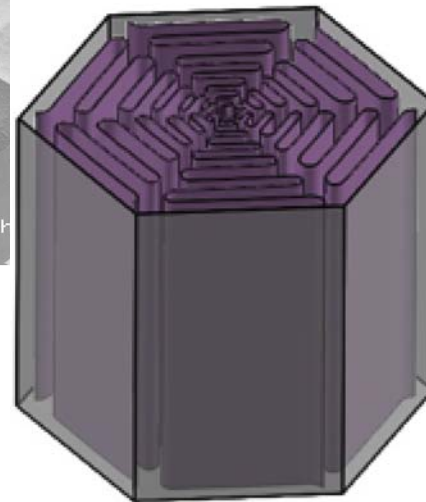
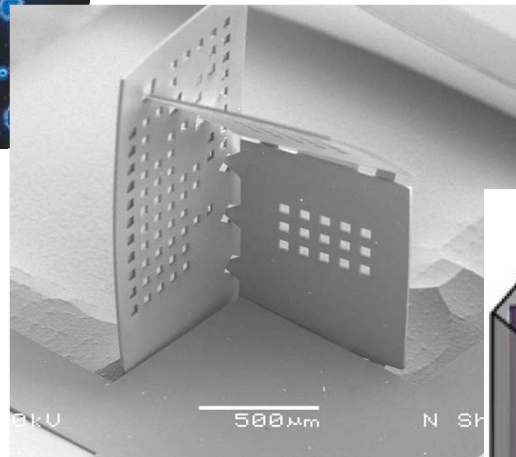
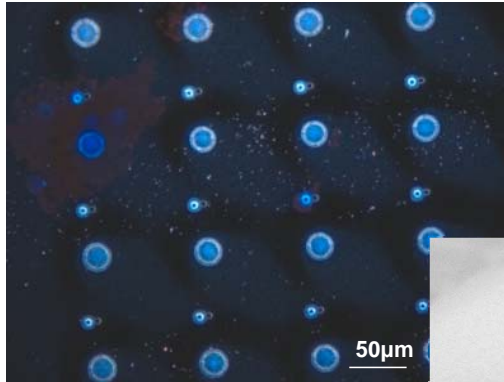
Lab on a Chip, 11, 2204-2211, 2011.



Broad cell size distribution, but only cells of desired sizes are assembled



Present research: combining cell assembly with origami folding to create modular tissues



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