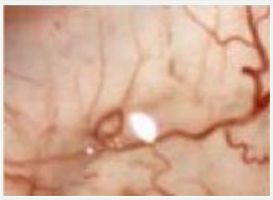
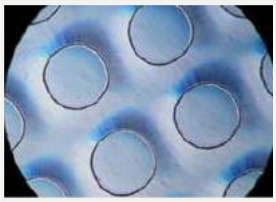
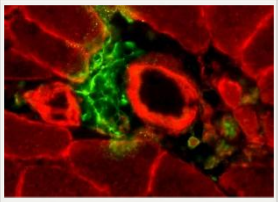
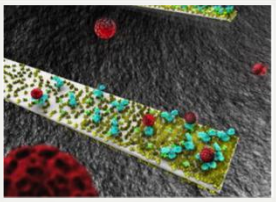
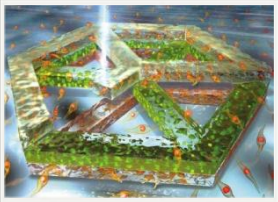
BioNanotechnology Seminar Series

Spring 2012

Direct Write Assembly of 3D Microperiodic Hydrogel Scaffolds For Stem Cell Culture and Tissue Engineering

Lucas Osterbur, CMMB IGERT Trainee

Lucas is a PhD student in the Department of Materials Science and Engineering at the University of Illinois at Urbana-Champaign

Date: **Tuesday, February 21, 2012**

Time: **12:30 – 1:00 p.m. CST (10:30 – 11:00 a.m. PST)**

Location: **1000 MNTL at Illinois (SSM 150 at UC Merced)**

Abstract:

Stem cells have demonstrated remarkable potential for tissue engineering and regenerative medicine through their ability for self-renewal and controlled differentiation. However, the development of optimal three dimensional (3D) scaffolds that overcome the limitations of 2D cell culture remains an elusive challenge in stem cell research. Here, we demonstrate the use of direct-write assembly to create tailored hydrogel scaffolds composed of 3D microperiodic architectures for applications with two types of stem cells, human embryonic stem cells (hESCs) and mesenchymal stem cells (mSCs). Photo-polymerizable poly(hyaluronic acid) (pHA) is synthesized as an ink for scaffold fabrication due to its demonstrated biocompatibility, biodegradability, and tailorable functionality. hESCs are cultured on 3D pHA scaffolds as an alternative to traditional culture methods based on 2D substrates with mouse embryonic fibroblast (MEF) feeder layers. Initial results demonstrate the potential of pHA scaffolds as chemically defined, biomimetic systems for proliferation of hESCs in an undifferentiated state. 3D pHA scaffolds are also under development for repair of articular defects using porcine, adipose-derived mSCs. Cartilage developed from mSCs *in vitro* on these 3D scaffolds exhibits a morphology that is distinct from that observed on 2D polystyrene controls. Animal protocols are under review for implantation of 3D pHA scaffolds seeded with mSCs.

Seminar Presented by:

Center for Cellular Mechanics
University of Illinois at Urbana-Champaign

IGERT Integrative Graduate Education and Research Traineeship
Cellular and Molecular Mechanics and BioNanotechnology

M-CNTC NCI Alliance for Nanotechnology in Cancer
Midwest Cancer Nanotechnology Training Center

CNST University of Illinois Center for Nanoscale Science and Technology