Department of Chemical Engineering
Distinguished Seminar Speaker

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Host: Ming Su
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Tissue Engineering of Functional Systems of Preclinical Drug Discovery

Friday, 9/11/2015
315 BK
4:00p – 5:00p

Refreshments will be served

ABSTRACT The cost of drug discovery and subsequent regulatory approval for each new candidate now exceeds $2B and often requires 10-15 years of development time. The pharmaceutical industry would benefit greatly from better pre-clinical screening technologies to reduce the attrition rates during clinical trials as well as to begin to pre-select specific genetic sub-populations for optimal drug efficacy with limited distribution. In addition, with the banning of animals for toxicology testing in many industries, systems to replace animals with human mimics is essential for product development and safety testing. A promising technology to help reduce the cost and time of this process are body-on-a-chip or human-on-a-chip systems either at the single organ level or more advanced systems where multiple organ mimics are integrated to allow organ to organ communication and interaction. Our focus is on the establishment of functional in vitro systems to address this deficit where we seek to build subsystems to model motor control, myelination and cognitive function, as well as cardiac and liver models as well as combinations thereof. The idea is to integrate microsystems fabrication technology and surface modifications with protein and cellular components, with the aim of initiating and maintaining self-assembly and growth into biologically, mechanically and electronically interactive functional multi-component systems. The ability to control the surface composition of an in vitro system, as well as controlling other variables, such as growth media and cell preparation, all play important roles in creating a defined system for hybrid device fabrication and in vitro evaluation of surface modifications and their effect on cellular materials. Our advances in culturing adult rat, mouse and human mammalian spinal cord, hippocampal neurons, muscle and cardiac cells in a defined serum-free medium, suggest outstanding potential for multi-organ systems.

BIOGRAPHY Dr. Hickman is the Founding Director of the NanoScience Technology Center and a Professor of Nanoscience Technology, Chemistry, Biomolecular Science, Material Science and Electrical Engineering at UCF. Previously, he held the position of the Hunter Endowed Chair in the BioE Department at Clemson. Dr. Hickman has a PhD from MIT in Chemistry, as well as BS and MS from Penn State in Chemistry. For 25 years, he has studied the interaction of biological species with modified surfaces. He established one of the first bioelectronics labs in the country that focused on cell-based sensors and their integration with electronic devices. He has worked at NSF and DARPA in the area of biological computation. He is also the founder and current Chief Scientist of a biotech company, Hesperos. He has 112 publications and 18 book chapters, in addition to 26 patents. He has presented over 150 invited presentations with more than 185 total presentations. Dr. Hickman is a Fellow of AIMBE and AVS. He was a founding member of the Biomaterial Interfaces Technical Group for the AVS, and Chair from 1995-2000. He received the NSF Director's Award for Collaborative Integration for contributions to integrating biology and information technology research in 2002. He received the SAIC Publication Award in 1993, 1994 and 1995; the Berman Award from the NRL in 1993 and 1995; the SAIC Technology Achievement Award in 1995 and the MIT Gold Award for community service in 1989.