CMET Seminar

UNIVERSITY OF DELAWARE

Dr. John Oakey

Assistant Professor

Dept. of Chemical & Petroleum Engineering

University of Wyoming

DATE:
Oct. 20, 2015
TIME:
2:00 pm
LOCATION:
366 CLB

John Oakey obtained his BS in Chemical Engineering at Penn State University and an MS and PhD in Chemical Engineering from the Colorado School of Mines. His PhD thesis work, with Professor David Marr, resulted in the development of optically-integrated colloid-based microfluidic devices and led to a startup company founded to commercialize this technology. He performed his post doctoral research with Mehmet Toner in the Center for Engineering in Medicine at the Massachusetts General Hospital and Harvard Medical School where he developed diagnostic and therapeutic applications for microfluidic devices. In 2010 he joined the University of Wyoming's Department of Chemical and Petroleum Engineering. His current research interests build upon themes of interfacial phenomena, multiphase flow and advanced materials fabrication to create platforms for both fundamental research and applied science. Applications for these platforms range from instruments for the high-throughput screening of cell-matrix interactions to the development of reactive transport models of multiphase flow. His work has been supported by a National Science Foundation, the American Chemical Society Petroleum Research Fund, the National Institutes of Health and the Department of Defense. In 2013 he received the NSF CAREER Award and in 2014 was named a Whitman Center Investigator at the Marine Biological Laboratory in Woods Hole, MA. He can be reached at joakey@uwyo.edu or +1 (307) 766-2518.

"Microfluidic Encapsulation for the Design of Intra- and Extracellular Niches"

Microfluidics encompasses the study of fluid flow and related transport phenomena at very small length scales. Our lab is interested in exploiting the unique behavior in microfluidic flows to develop tools and platform technologies for studying biological phenomena at the level of the single cell or even organelle. This talk will describe several fundamental microscale fluid phenomena that we are studying including multiphase emulsification and particle focusing. These techniques form the basis for encapsulation strategies that allow biologically relevant niches to be designed and constructed. In one example, we demonstrate the use of emulsification to create a surrogate cellular environment for the encapsulation of *Xeonopus Laevis* nuclei. The recapitulation and manipulation of an *in vivo* environment allowed fundamental aspects of the mitotic spindle to be directly observed and quantified. In a second example, we have also shown that whole cells can be deterministically encapsulated within microscale hydrogel environments, allowing for the hierarchical assembly of structured tissue scaffolds.