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## Civil and Environmental Engineering
## Guest Lecture Series, Fall, 2015

**November 20, Friday, 2:00-3:00 PM**
**ECSB Auditorium (Engineering and Computational Sciences Building)**

# Algal Carbon Conversion –Lipid Extraction Technologies

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Microalgae offer several benefits over conventional bioenergy feedstocks for the production of low value biofuels. However, there are disadvantages associated with fuel production including high energy input requirements and lipids extraction and downstream separation. Microalgae also represent one of the most promising sources for the production of high-value lipids and pigments. The discussion will cover existing and developing technologies for lipid extraction and highlight the benefits of wet extraction directly from algal culture and the challenges encountered in technology development for this unconventional approach of lipids extraction.

Wet extraction of lipids, directly from algal culture without energy-intensive centrifugation or drying, is one of the processing pathways pursued for large scale processing of algal culture at National Research Council of Canada (NRC). The lecture will focus on the technology development of a single step wet shear approach for lipid extraction and separation of lipid from oleaginous culture without harvesting or de-watering processes. During the wet shear process, the cell walls are weakened and sheared by optimizing the amount of mechanical energy applied to break the cells and release the metabolites of interest while controlling cell fragmentation. Controlled and targeted application of mechanical and hydrodynamic shear has potential benefits, including reduced costs for extraction and separation of valuable metabolites, As a result, key design and engineering parameters that enhance extraction and reduce lipid separation costs for commercial scale production will be discussed.

***Curriculum Vitae***

Dr. Deepak M. Kirpalani is a Senior Research Scientist with the Energy, Mining and Environment (EME) Portfolio at the National Research Council of Canada (NRCC), where he holds the position of Team Leader for the Process Development and Separation Technology Team. . His research over the years has been devoted to new approaches for multiphase processing and has been applied to developing extraction and separation technologies for laboratory and industrial applications. Since 2001, he has conducted cross-disciplinary research for the development of novel processes using industrial acoustic and hydrodynamic cavitation systems. He has also developed complex multiphase numerical models to explain process and flow dynamics for a range of applications. Since 2010, he was invited to participate in the Algal Carbon Conversion (ACC) Program at NRCC and has applied multiphase cavitation and engineering fluid shear principles for wet extraction of lipids from algal culture directly without harvesting and de-watering.