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**Seminar: “*The Northern Integrated Biorefinery: Optimizing Heterotrophic Algal Growth”***

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November 30 – 1.30 pm – WB215

Integrated biorefineries, capable of economically producing affordable biofuels, bioproducts and biopower, will vary depending upon their geographical location. In Canada, living on the northern edge of the temperate zone, biorefineries will be configured to reflect the constraints of low seasonal temperatures and photosynthetically active radiation. Current elements of the traditional biorefinery include bioethanol, biogas and green power (electricity). The integrated biorefinery will also closely integrate livestock and agriculture. Algal biofuels and bioproducts are an important option to diversify and improve the profitability of the integrated biorefinery. In the Canadian context, our northern latitude limits the phototrophic growth of algae on sunlight. Our research has focused on algae’s ability to use sugars for energy rather than sunlight. To this end we have developed tools and methods to optimize algal growth on a variety of carbon sources, including both hexose and pentose sugars, and other carbon sources such as low-grade glycerol. Optimal growth is based on detailed knowledge of algal physiology coupled with adaptive model based control strategies. Our experiences with optimizing the green microalga *Auxenochlorella protothecoides* and the red microalga *Galdieria sulphuraria* will be described.

**Biography:**

Dr. William McCaffrey is a professor at the University of Alberta, in Edmonton, where he has developed a large expertise in the reaction engineering of both conventional and renewable energy systems. His main research interests are in the intersection of process understanding, in the forms of both chemistry and cellular physiology, and reaction engineering of highly complex systems. Using spectroscopic, optical, thermal, catalytic, and biochemical methods his group examines both fundamental and applied problems related to chemical and biochemical systems.