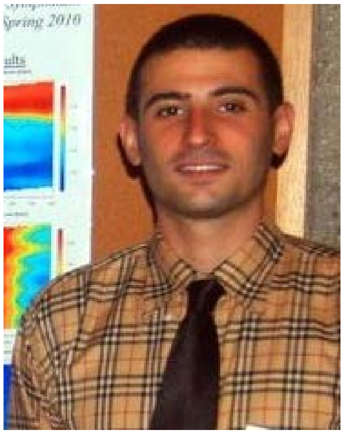

Michael is originally from Long Island, NY and completed his B.S. in biology from the University of Massachusetts-Amherst in May of 2010. He came to Purdue in January of 2011 to purse his M.S. in the ABE department. He has thoroughly enjoyed his work with ion-selective electrodes and finding new ways to improve their efficiency. Living in the Midwest these past couple of years has been an exciting and memorable experience for him. After completing his M.S. degree, Michael has aspirations of attending medical school to become a doctor.

Agricultural & Biological ENGINEERING

Defense

Speaker: Michael Zeitchek

Title: All Solid-State Ion-Selective Electrodes for Real-Time Measurement of Relevant Physiological Phenomena

Major Professor(s): D. Marshall Porterfield

Date: Friday, February 01, 2013

Time: 9:00 am

Location: BIRCK 2001

Abstract:

Effectively and accurately measuring physiological phenomena in a real-time manner with high fidelity is important for understanding analyte and ion movement on the molecular level. A popular method for interrogating a target analyte is employing the use of ion-selective electrodes (ISE). Although ISE possess many favorable properties, several limitations exist. Among these are longevity of the sensor and an inability to easily miniaturize. With the advent of polymer based ion-selective membranes (ISM) in conjunction with using highly electroactive conducting polymers; these have come together to form all solid-state ion-selective electrodes (ASSISE). ASSISE are marked by efficient ion to electron transduction as well as having a mechanically rigid ISM that adheres well to the sensor's surface. Coupled with advances in materials science and batch microfabrication processes, miniaturization of ASSISE has become increasingly feasible and cost-effective. The work here focuses on an ASSISE called the multi-analyte biochip (MAB) and its use for monitoring photosynthetic activity in the singe-cell green algal *Chlorella vulgaris*. Although the MAB was used to monitor photosynthesis in this work, its versatility allows it to be applied to a wide variety of biomedical, agricultural and environmental research based applications.

Application:

The work presented here using the MAB can be a potential analytic tool used across a variety of disciplines. It's small size; robustness and reliability make it an excellent addition to the field of biosensing. A major advantage of the MAB is that it does not require the use of any highly skilled personnel. Therefore, making it an attractive tool for spaceflight research and long duration unmanned nano-satellite missions.