

16th Global Diabetes Conference & Medicare Expo

March 22-23, 2017 Rome, Italy

Novel detection methods and novel analytes

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Diabetes is one of the largest epidemics in the world affecting over 422 million people worldwide, with quickly increasing prevalence. In order to help combat the ever growing amount of patients, many new technologies are being suggested to help monitor and treat the disease. In the Labelle Group, we are currently developing electrochemical sensors for noninvasive glucose sensing. Our design ranges from tear glucose sensors to measure blood glucose noninvasively, to a multi-marker sensor that adds more depth for self-monitoring glycemic devices. These markers such as glucose, HbA1c, insulin, and many others are simultaneously monitored on a single disposable strip sensor. Specifically, we suggest using third generation biosensing integrated with electrochemical impedance spectroscopy (EIS), which is a novel detection platform capable of multi-marker detection through the application of voltage at varying frequencies. Utilizing real and imaginary impedance as separate entities, a calibration curve can be derived with high sensitivity and specificity at the chosen characteristic frequency. The ability to detect multiple analytes simultaneously is due to the ability to deconvolute the output impedance signals at these varying frequencies. The process is performed through immobilizing various molecular recognition elements onto a single working electrode followed by scanning a range of frequencies 1.18 Hz up to 100 KHz, and selecting characteristic peaks. Currently, this has been used to characterize many diabetes related biomarkers such as glucose, insulin, lactate, glucagon, IGF-1, as well as multi-marker LDL/HDL co-immobilization. This type of system would greatly affect the quality of life, and more specifically the control of glycemic levels.

Biography

David Probst has done his Engineering from Arizona State University, USA. He has done his MS and BS in Electrical Engineering from the Western New England University. He is currently an Assistant Professor in the School of Biological Health and Systems Engineering, and at the Biodesign Institute of Arizona State University. He is currently working with Dr. Labelle at the Arizona State University, USA. He has worked with various markers such as glucose, glucagon and insulin. At present, he is working on the multi-marker design and publication.

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