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The development of a multimarker, label-free electrochemical impedance based point-of-care technology

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With an increasing world population, rising healthcare costs, a greater demand on hospitals and clinicians, a growing need for low cost, rapid, point of care technologies (POCT) exist. The overall goal is to detect a disease and give the patient fast, accurate, and all-encompassing information regarding the state of the disease. Much akin to multi-variant space control systems modeling approaches, where future states may be predicted of cardiovascular disease or diabetes-related amputation yielding advanced warning so lifestyle or dietary changes can greatly reduce potential negative consequences. In our lab, biosensing and electrochemical principles are applied to the monitoring of cardiovascular disease, diabetes mellitus, stress and trauma, cancer detection, infectious disease detection, among others. The electrochemical technique being developed is a modified version of Electrochemical Impedance Spectroscopy (EIS). Specification for individual markers is provided with the use of molecular recognition elements such as enzymes and antibodies. This method of detection yields a sensitive and specific means of biomarker quantification in human media such as tears or blood. Future work includes exploration of different sensor configurations which will influence sensing capabilities, i.e. continuous sensing and implanted sensors.

Biography

Jeffrey T. La Belle earned his B.S. and M.S. in Electrical Engineering from Western New England University in Springfield Massachusetts and next attained a M.S. and Ph.D. from Arizona State University. He is currently an Assistant Professor at Arizona State University. His lab includes students from bioengineering, electrical engineering, mechanical engineering, chemical engineering, computer science engineering, as well as biology and chemistry programs. His research focus revolves around label-free, noninvasive sensing and point-of-care technologies. Other interests include commercialization of biomedical devices and products and methods of manufacturing the same as well as prototyping and blacksmithing.

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