Career Talk : How did I get here?
From SUST, Bangladesh to Northwestern University, Chicago , USA

Date (Bangladesh Time) : 5th Feb; Sunday, 9 am - 10 am
Venue: Department of Chemistry, Building B, SUST
Zoom ID :957 5281 6417
Passcode: 221238

Title of the talk : Electrochemical Technologies for Continuous and Real-Time Disease Monitoring
Chair: Professor Dr. Shameem Ara Begum, Head of Chemistry
Host: Amin Shakhawat, PhD
Moderator: Al-monsur Jiaul Haque, PhD

Dr. Jagotamoy Das
Assistant Professor
Northwestern University
Chicago , USA

Short Bio of Dr. Das

Dr. Jagotamoy Das is an Assistant Professor (Research) in the Department of Chemistry at the Northwestern University, Chicago,USA. Before, he had been working as a Senior Research Associate in the Department of Pharmaceutical Sciences at Leslie Dan Faculty of Pharmacy at the University of Toronto, Canada since 2012. He was also an Assistant Professor at the Shahjalal University of Science and Technology, Bangladesh.

Abstract

Development of wearable devices capable of non-invasive and real-time monitoring of relevant biomarkers is key to advancing precision, or personalized, medicine. The devices could provide users with crucial information regarding their health in real time, for example, the onset of stroke, myocardial infarction, or anaphylaxis.These sensing devices have many advantages, including rapid management of life-saving care and personalized treatment plans from healthcare physicians. For actual modernize this field, we need new devices that can continuously provide the user with information regarding their health in real time. The Apple Watch and FitBit are two examples of commercially available devices capable of continuous monitoring of health based on reading regarding their physical markers of health, such as heart rate, physical activity, sleep quality, etc. Although impressive, a major limitation of these devices is that they are unable to monitor biological markers. The next generation of technologies must be capable of monitoring disease biomarkers in non-invasive body fluids such as sweat, saliva, and tears and providing users with real-time physiological information. Recently, we have developed a versatile sensing strategy that is compatible with the analysis of proteins that are important physiological markers of stress, allergy, cardiovascular health, inflammation and cancer. The detection method is based on the motion of an inverted nano scale molecular pendulum that exhibits field-induced transport modulated by the presence of a bound analyte. We measure the sensor's electric field-mediated transport using the electron-transfer kinetics of an attached reporter molecule. Using time-resolved electrochemical measurements the presence of a biomarker bound to our sensor complex can be detected continuously in real time. We show that this sensing approach is compatible detection of analytes in blood, saliva,urine, tears, and sweat and that the sensors can collect data in situ in living animals

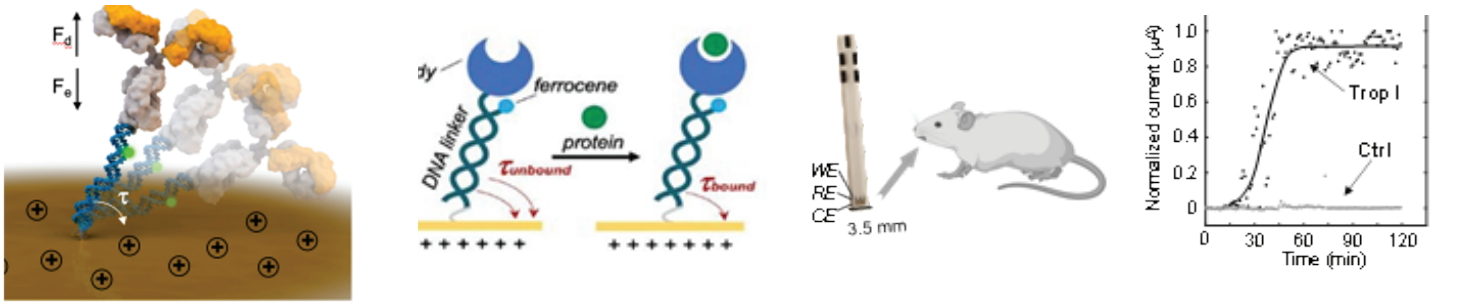

Figure 1. (Left) Modulation of molecular pendulum dynamics upon protein binding. (Middle) Schematic of the chip used for continuous in vivo monitoring of cardiac troponin I in mouse saliva. (Right) Analysis of protein biomarkers mouse saliva.

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