Micro-biosensor devices for Biochemical Analysis Applications

A Data Management Plan created using DMPTool

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Template: National Science Foundation (NSF)

Project abstract:

A biosensor is generally defined as an analytical device that converts the biological response into a quantifiable and measurable signal via a transducer. There is an urgent need in the diagnostics laboratories for accurate, inexpensive and fast response devices. In this dissertation, we introduce a novel Micro bio-sensor system that integrate microfluidics (polymer-based devices and paper-based devices) and bio-sensor system (optical sensor and electrochemical sensor) that provides great potential to be used as a powerful tool for point of care (POC) diagnostics and environmental monitoring.

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Copyright information:

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Roles and responsibilities

Ph.D. student Han Zhang will design, fabricate and evaluate the biosensor devices. the data from the proposed project will be generated and stored by Han Zhang

PI Prof. Anhong Zhou will be the project lead for all activities related to project management including management and preservation of the data after the graduation of the students.

Expected data

The data can be collected in many ways.

1. The Renishaw inVia Raman spectrometer connected to a Leica microscope will be used for the extracellular vesicles (EVs) Raman spectra collection. As to Softwares, Renishaw Wire 3.4 will be used for data collection and processing. the datasets will be export to text files for future plotting and analysis. Matlab R2018a will be used for Principal Component Analysis (PCA) for EVs classification. the size of the file should be less than 1GB

2. The image of the fabricated devices will be taken and saved as Tif files for future reference.

3. For the glucose colorimetric detection, the color intensity results will be captured by smartphone camera and commercially available scanner. the image will be saved as Tif files. The software, ImageJ will be used to convert RGB pixels to gray value for Calibration.

Period of data retention

All data generated will be archived on a minimum of two sets of hard drives, and will be maintained for a minimum of 7 years after termination or completion of this research project.

Data formats and dissemination

Data generated from the project will be published in summarized formats in journal articles, conferences and seminar presentations. In addition to publishing the data, full data sets from this work will be available through email request after publication. Upon request, PI-Prof Anhong Zhou will provide guest download access.

Data storage and preservation of access

All data generated will be archived on a minimum of two sets of hard drives one each in possession of the PI and Students. In addition, we will use an additional, offsite cloud-based backup of all data (Utah State supported RedBoomerang [redboomerang.com] or Carbonite [carbonite.com]) by working with IT Helpdesk at Utah State University.