

SUMMER 2020 – SC EPSCOR / INBRE RET PROJECT DESCRIPTION FORM

Mentor's Name	Will Case
Institution	Converse College
Department	Biology, Chemistry & Physics
Mailing Address	580 E. Main St.
Telephone	854-596-9134
Email	will.case@converse.edu
Research Subject Area	Bioanalytical Chemistry

A. Briefly describe overall research program at your laboratory.

My research projects involve the detection of small biomolecules implicated in various diseases. Detection is achieved by utilizing electrochemical methods. We seek to quantify and detect molecules by developing biosensors that generate a measurable electrical signal after a specific reaction.

B. Briefly describe specific project(s) for your teacher:

Research into biosensor development continues to gain widespread interest due to its role in several clinical and industrial applications. Enzyme-based, electrochemical biosensors have become a prevalent subdivision of the field and offer a promising method for the signaling of molecules that often serve as biomarkers in disease detection. Specifically, “1st generation” methods are becoming viable strategies for the amperometric sensing of biomolecules. In this scheme, a molecule reacts with a specific oxidase enzyme to generate hydrogen peroxide (H_2O_2), and the peroxide is subsequently oxidized at an electrode. The signal generated at the electrode is therefore an indirect measure of the amount of molecule present (See Figure 1).

Investigations in my lab have studied the development of a 1st generation biosensor for the detection of galactose, xanthine and hypoxanthine, with potential applications in health care, environmental monitoring and food quality appraisal. Three manuscripts related to prior work have been published. Research planned for this upcoming summer will expand our current methodology to additional target molecules.

My research is ideal for those teachers interested in learning about interdisciplinary connections and ways to incorporate this type of learning into a classroom setting. The project enhances both knowledge and skill sets within chemistry and biology, and I would be excited to work with a teacher interested in further developing their knowledge within these fields. In 2016 and 2018 I worked with Mrs. Deborah Ezell, an environmental science teacher at Chesnee High School. Our collaboration resulted in a publication in *The Science Teacher* journal (December, 2017 issue). http://learningcenter.nsta.org/resource/?id=10.2505/4/tst17_084_09_20.

This opportunity is additionally meaningful given that I am a native of Spartanburg, SC and a graduate of Dorman High School. I feel fortunate to have had wonderful STEM training as a high school student, and would be honored to work with a teacher from the Upstate.

C. Will any other people (post docs, grad students, undergraduate students, colleagues, etc.) be involved directly with your teacher?

For summer 2020, it is anticipated that two undergraduate students will work with me in addition to a prospective teacher.

D. Will you require any advanced reading/preparation for the teacher? If yes, please briefly describe.

A prospective teacher would be assigned some relevant journal articles and textbook readings related to electrochemistry as needed.

Given the nature of our work, it is very helpful if the prospective teacher can commit to 5-6 weeks of consecutive research. There is the possibility that the 5-6 week research period could be spread out over the course of the summer, but it is not ideal.

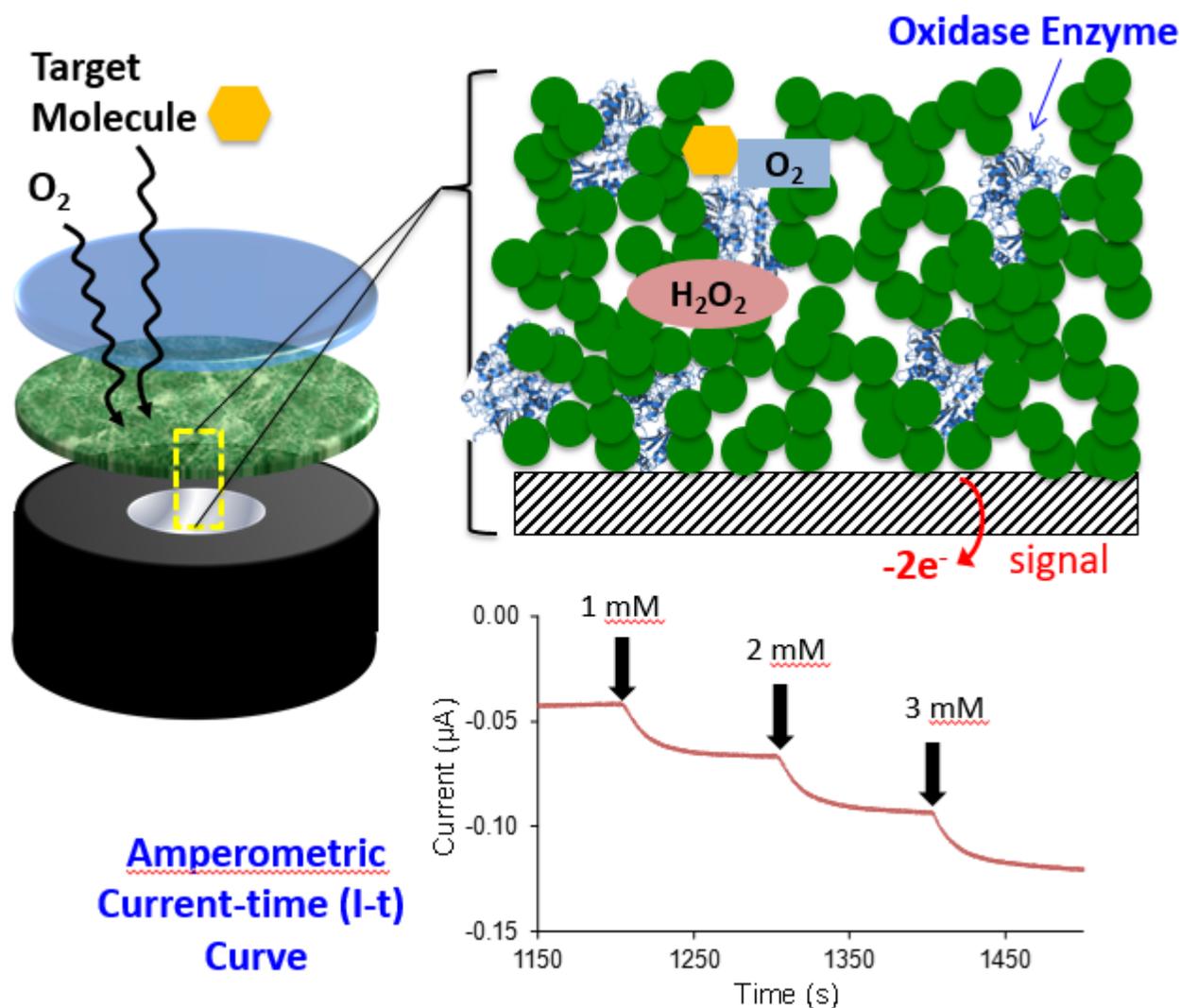


Figure 1: Schematic of “1st Generation” Biosensing