Vita

Candidate's name: Connor Daniel Flynn

Universities Attended:

University of New Brunswick (2019)
Bachelor of Science

University of New Brunswick (2020)
Masters of Science

Publications/Conference Presentations:

McWilliams S, Flynn C, et al. Nanostructured Cu2O Synthesized via Bipolar Electrochemistry. *Nanomaterials*. 2019.

Flynn C, Ignaszak A. Lyme Disease Biosensors: A Potential Solution to a Diagnostic Dilemma. *Biosensors*. Biosensors. 2020.

Zupančič U, Rainbow J, Flynn C, Aidoo-Brown J, Estrela P, Moschou. Strategies for Multiplexed Electrochemical Sensor Development. *Modern Techniques in Biosensors* (Springer Book Chapter, releasing 2021). 2020.

Towards the Direct Electrochemical Detection of Lyme Disease. Canadian Chemistry Conference & Exhibition 2019. Quebec City.

Development of Electrochemical Biosensors for the Direct Detection of Infectious Disease

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Connor D. Flynn

in the Department of Chemistry

U.N.B., Fredericton, N.B.

Thursday, December 3rd, 2020
1:30 p.m.

Via MS TEAMS

Examining Committee

Dr. Anna Ignaszak	Supervisor
Dr. Adam Dyker	Internal Examiner
Dr. Shawn MacLellan	Int-Ext Examiner
Dr. David Burns	Chair of Oral Examination

Abstract

Infectious disease detection is an extremely important field, as clinicians and scientists around the world continue to seek improved diagnostics. Electrochemical biosensors represent an emerging class of diagnostic techniques that are rapid, inexpensive, and easily scalable. By combining the intricate interactions of biological molecules with the sensitive techniques of electrochemistry, these biosensors hold great promise in the future of infectious disease sensing. The current thesis explores the development of two such devices, for Lyme disease and hepatitis B, by describing their design, assembly, and effectiveness. The Lyme sensor exploits a known protein-protein interaction between bacterial and human cells to produce a biomimetic sensor capable of binding individual bacteria. This biosensor proves effective at capturing the Lyme bacteria and producing a significant electrochemical response. Likewise, the hepatitis B sensor employs highly specialized surface chemistry to detect hepatitis-specific antigens. Through the development of these sensors, we hope to provide insight into potential devices that can combat these dangerous diseases.