

## Vita

Candidate's name: Ryan Currie Dean

Universities  
Attended: University of New Brunswick (2018)  
Bachelor of Science

University of New Brunswick (2021)  
Masters of Science

### Publications/Conference Presentations:

Brandon C. Fillmore, Jayden Price, Ryan Dean, Amy A. Brown, Andreas Decken, and Sara Eisler. Accessing the Ene-Imine Motif in 1H-Isoindole, Thienopyrrole, and Thienopyridine Building Blocks. ACS Omega 2020 5 (36), 22914-2295

Poster Presentation and the 102<sup>nd</sup> Canadian Chemistry Conference Exhibition, Quebec, QC, Ryan Dean, Brandon Fillmore, Sara Eisler (2019, June). Synthesis of  $\pi$  Conjugated Oligomers Using Isoindole Building Blocks.

# Synthesis of Novel Boron-Coordinated Fluorophores and the Synthesis Toward an Ene-Imine 1H-Isoindole Oligomer

UNIVERSITY OF NEW BRUNSWICK  
THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of  
Master of Science

by

**Ryan C. Dean**

in the Department of Chemistry

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

**Monday, August 23<sup>rd</sup>, 2021**  
**1:00 p.m.**

via MS TEAMS

Examining Committee

Dr. Sara Eisler	Supervisor
Dr. Barry Blight	Internal Examiner
Dr. David Keighley	Int-Ext Examiner
Dr. Gilles Villemure	Chair of Oral Examination

## Abstract

Nitrogen containing heterocycles are widely incorporated into small, conjugated molecules and extended  $\pi$ -systems that possess desirable properties for use in organic electronics (OE) and fluorescent dyes. Of particular interest is the ene-imine moiety, which is a critical component in porphyrin and boron-dipyrromethene (BODIPY) chromophores. BODIPYs are known for their intense fluorescence, small Stokes shifts, narrow optical bands, and large quantum yields. Despite the importance of the ene-imine motif, it is rarely observed outside of the aforementioned systems due to synthetic inaccessibility.

Recent work has led to the synthesis of a new class of ene-imine bearing BODIPY-like fluorophores, the lactam BODAZAs (Boron-DiAZA-methene). Lactam BODAZAs possess large Stokes shifts, broad optical bands, and retain fluorescence in the solid state, all of which are rare feats for BODIPYs. This thesis details the expansion of the lactam

BODAZA series using a generalized synthetic methodology and has resulted in the synthesis of two new lactam BODAZA fluorophores and the investigation of their optical properties.

Recent advances in the development of ene-imine molecular building blocks have allowed for an investigation into the linear extension of the moiety via oligomerization. By tethering 1H-isoindole building blocks together, a linear conjugation pathway of ene-imine fragments can be produced and facilitate an investigation into the effect of conjugation length on the optical and electronic properties of the moiety. The synthesis toward an extended ene-imine conjugated system is detailed in this thesis.