

UNIVERSITY OF RHODE ISLAND
Department of Chemistry Ph.D. Seminar

2:00 PM, Friday, April 14, 2023
Beaupre Room 105

Justin Pantano
University of Rhode Island
Department of Chemistry

***From Sea to Land: Leveraging
Organic Chemistry to Alleviate
Local Environmental Issues***

HOST
Daniel Thomas
Department of Chemistry
401-874-5834

From Sea to Land: Leveraging Organic Chemistry to Alleviate Local Environmental Issues

There are a number of environmental issues that are proving to have strong effects on local populations. Chief among them is the growing concentration of contaminants in seawater, of which there are limited ways to detect in a consumer-friendly way. Contaminants such as nitrite and phosphate have strong adverse effects on aquatic life, including algal blooms and observed hypoxia in fish. The main work presented herein discusses two ways to leverage organic chemistry in our efforts to develop new materials to use as potential sensors for phosphate and nitrite, using a polymer-based system and an N-heterocyclic carbene (NHC) system, respectively. A novel monomer was developed for the polymer system, and subsequent experiments show promise in being able to incorporate this as a solution-based phosphate sensor. The NHC system, conversely, was designed as a solid-state sensing system, where the goal was to leverage the stability of the carbon-gold bond to achieve the desired substrate before use as a selective nitrite sensor. Solution-based experiments show promise in the sensing ability for this system.

Another environmental issue that has recently become notable is the ongoing parasite problems that honeybee hives face. In particular, *Varroa destructor* is proving to harbor substantial long-term health effects on hives due to increased resistance of common synthetic pesticides. Organic acids have long been used as effective pesticides. Oxalic acid is one of the most commonly used organic acids, though its mechanism of action has been up for debate. We probed the degradation of oxalic acid via thermogravimetric analyses to help determine how vaporization affects its ability as a pesticide, and we hope to determine the proper mechanism of action in addition to determining a proper dosage amount to maximize effectiveness.