Introduction

Eutrophication is one of many environmental issues facing Wisconsin and eutrophication develops because of the excess of nutrients that get into bodies of water from agricultural runoff. To try and mediate this problem constant monitoring of the phosphate levels needs to be done, but to do this takes time and can be very expensive. So, the purpose of this project is to have a way of determining how much phosphate is in each sample without having to go to the lab and analyze them. The goal of this project is to produce a phosphorus sensor using an already preexisting method to detect certain nutrients in agricultural runoff. To accomplish, technology platform developed for detection of inorganic compounds will be modified to be used for the detection of phosphorus in water.

Methods

3D Design Process

To successfully recreate the device a 3D design was created using Solidworks. There are 2 different phases to designing the setup to run experiments.

The first phase was setting up a bench top design using cardboard to recreate the experiments to be ran with the actual 3D parts.

The second phase was to create the 3D parts and have them printed then run experiments using different concentrations of phosphorus.

Results

3D Printed Parts:

Figure 1. Main Stage used for device. The main stage of the design is used so that all the slides, lenses, and the LED sources can be set in one place without having to move any components.

Figure 2. One of the sliders used to hold the lens. The slides of this design are used to change the angles in which the lenses are pointed and make running multiple experiments easier.

Figure 3. Final assembly with both sliders on the main stage. The final assembly shows how both lenses can slide across the main stage without having to move many components.

Figure 3. Slide Cover

Figure 5. Excitation and Emission filter

The design setup consists of using an excitation filter lens and an emission filter lens to shine a light on to a sample then use different concentrations of phosphorus to determine if the sensor can differentiate between them.

Conclusions

Future Work

The next steps in this project are to set up the entire assembly with the 3D printed parts along with the LEDs and Lens.

For further information

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Literature cited
