

Chlorophyll is Cool

Amy Deatherage

OCN 318

March 2025

Project Idea!

make a device that measures chlorophyll levels in situ

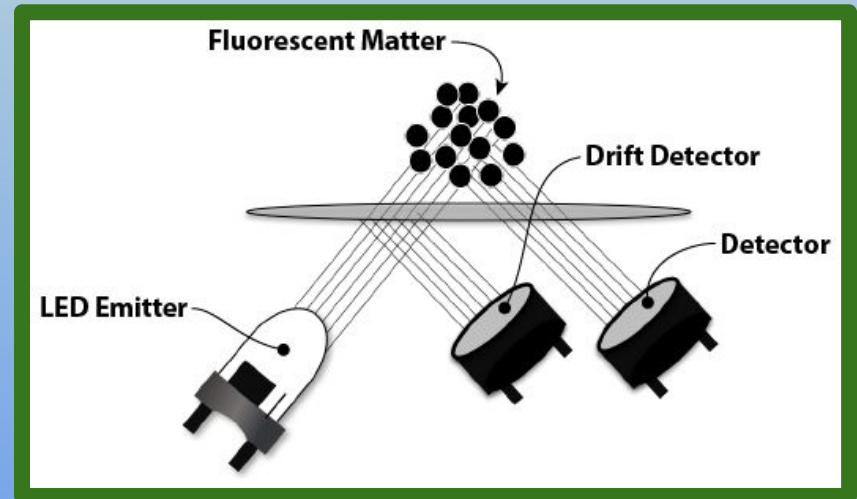
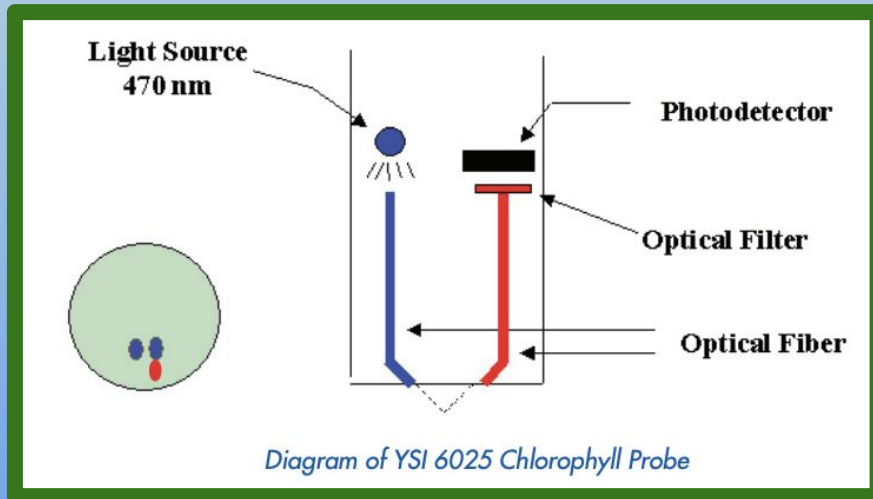
- part of my thesis involves collecting data on chlorophyll levels at my project site, Ka'alawai Point
- run the YSI and my device side-by-side while I'm doing fieldwork for my thesis
 - ~1 hour of data
- compare YSI chlorophyll data to data from my device



Ka'alawai Point

Fluorometer: What is It and How Does It Work

- key characteristic: chlorophyll fluoresces!
- **fluorometer**: a device that measures how much light is emitted by a substance after it's exposed to light of a specific wavelength



How- How Do I make a Fluorometer? Great Question.

Stuff I'll need:

- **LED** with a peak wavelength of ~470 nm (blue)
 - this particular wavelength excites chlorophyll, fluorescing a light with wavelength ~650-700 nm (reddish orangish??)
- **photodiode**
 - detect the ~650-700 nm light being fluoresced by the chlorophyll
- **670 nm optical filter** to screen out LED light (YSI) or **second photodiode** to detect LED light (In-Situ)
 - basically a way to account for backscattered light from the LED
- **waterproofing material**
 - so my device doesn't literally die in the ocean lmao
- **data logger**

Concerns (besides literally not knowing what i'm doing)

- **biofouling prevention**
 - algae build up on the filter/screen
- **calibration**
 - making sure the numbers number
 - I have no idea how I'd do this
- **water pump?**
 - I saw a bunch of sources that recommend a pump, but the YSI doesn't use a pump and I wanna be cool like them :(

Budget

- 470 nm LED: \$0.70
- photodiode: \$0.63
- 670 nm optical filter: \$18 or \$142, depending on how sketchy of a seller we buy from
- pump: \$3.00 (not sure exactly what pump I should be looking for though, highkey doubt this one would work in the ocean lmao)
- waterproofing material (ie. pvc, plastic stuff, ???): **\$not-that-much**
- data logger: **already at the lab :D**

Citations

YSI “The Basics of Chlorophyll Measurement”:

https://www.ysi.com/File%20Library/Documents/Technical%20Notes/T606-The-Basics-of-Chlorophyll-Measurement.pdf?srsltid=AfmBOorNF0_kNnyyqVPcn7OjbCoOis2hTHg0lrp_74qKWGF_-E9MfKsH

In-Situ “How do fluorometers work?”:

<https://in-situ.com/en/faq/aqua-troll-help/aqua-troll-600-faqs/how-do-fluorometers-work>

Some Helpful Forum I Stumbled Upon:

<https://www.edaboard.com/threads/choosing-the-right-photo-diode.228787/>

Knight Optical Interference Filter Information Sheet:

<https://knightoptical.com/wp-content/uploads/2020/02/Info-sheet-interference-filter-terminology.pdf>

Thanks Besties :)

whatever questions you have I probably
have too, but feel free to ask