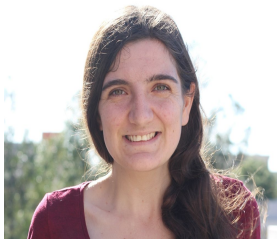


# Aggregation Induced Emission in Fluorescent, Helical Polymers

Victoria Rubio

Undergraduate Researcher, Chemistry Major  
Chemistry Department, UCSB

Lab Mentor:



Allison Abdilla

Faculty  
Advisors:



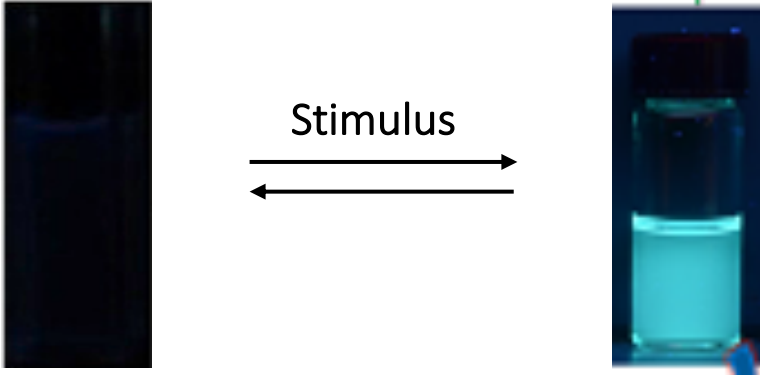
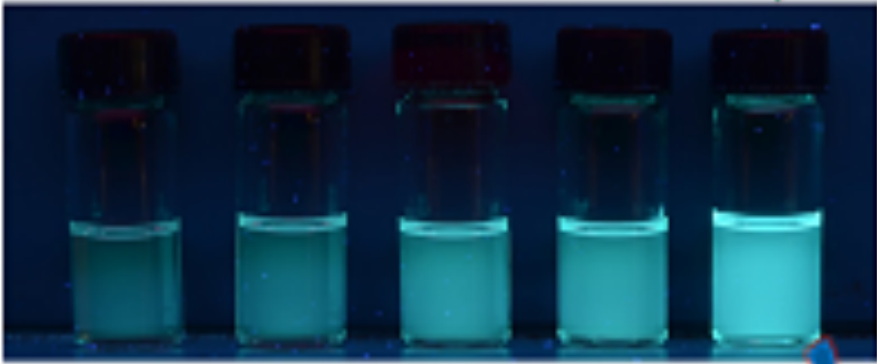
Craig Hawker



Javier Read de Alaniz

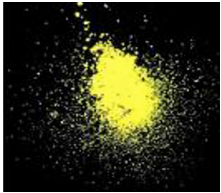


# Aggregation Induced Emission (AIE)

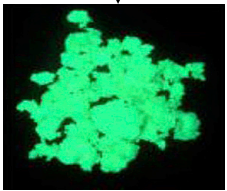


## Stimulus

Pressure



Grinding



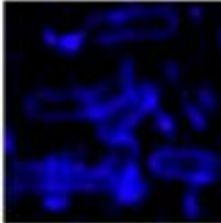
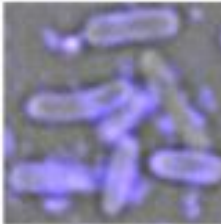
Heat



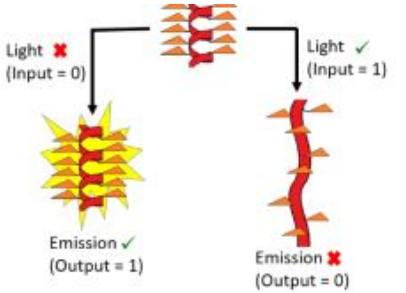
$\Delta$



## Applications



Bioimaging



'NOT' logic gate

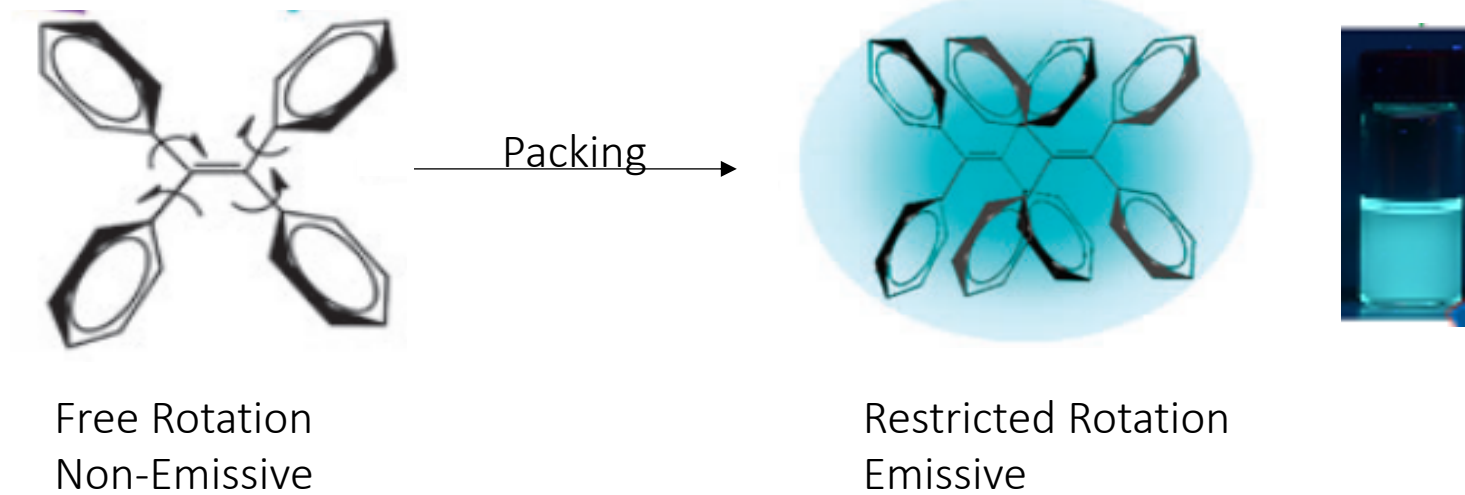
Input	Output
0	1
1	0

'YES' logic gate

Input	Output
0	0
1	1

Logic Gates

# Aggregation Induced Emission at the Molecular Level

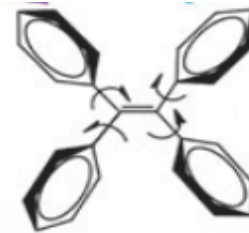


Using AIE to Create Logic Gates

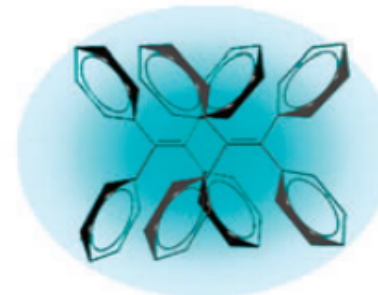
'NOT' logic gate	
Input	Output
0	1
1	0

'YES' logic gate	
Input	Output
0	0
1	1

Inputs

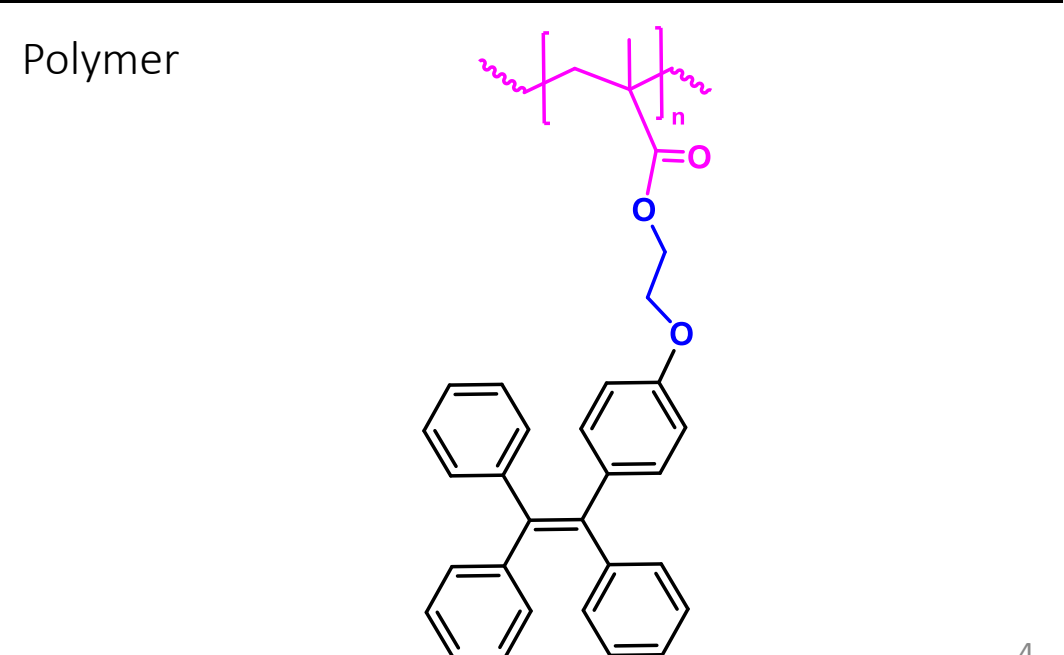
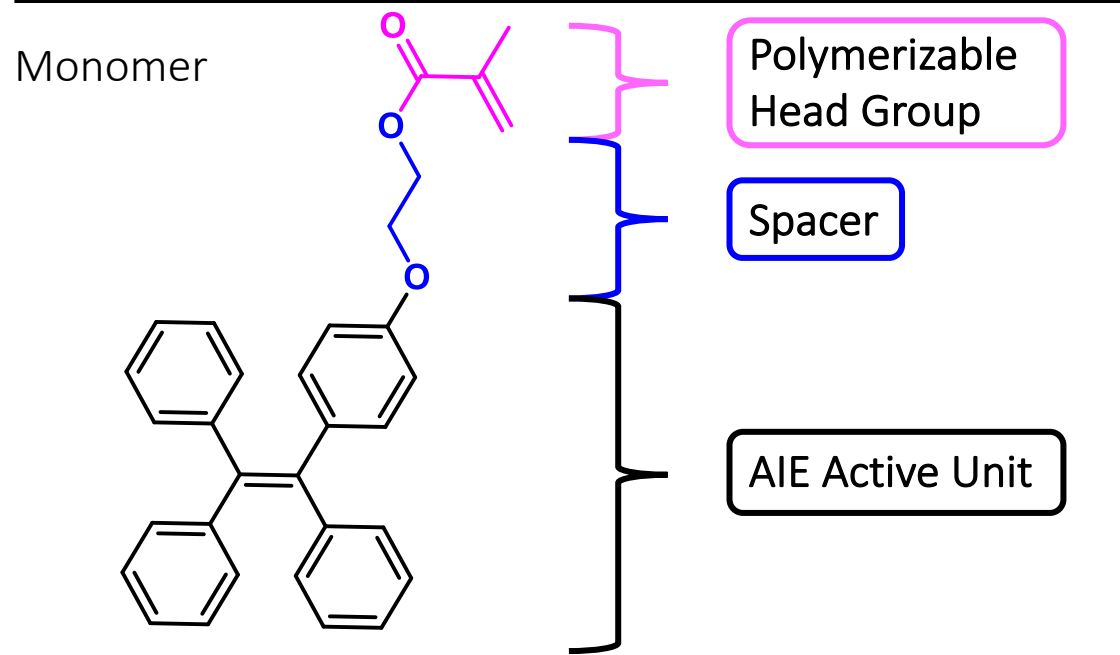
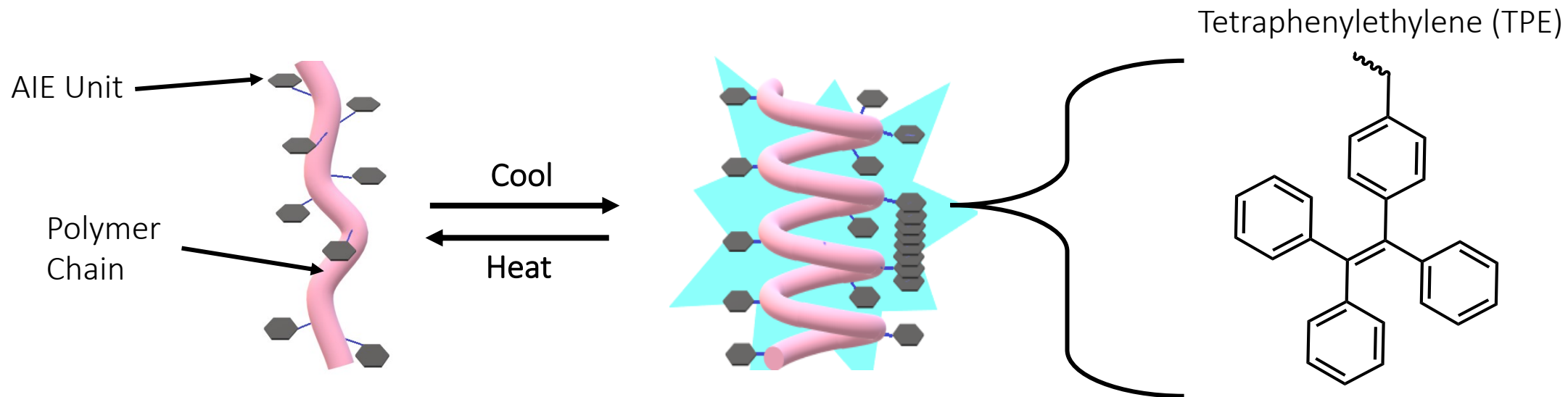


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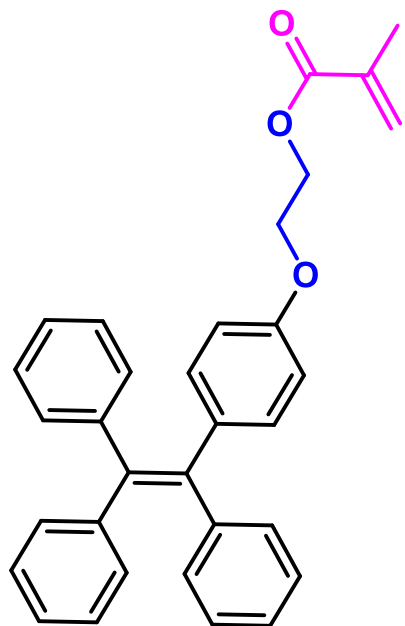
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# Using Synthetic Polymers to Designing Molecular AIE Switches



# Primary Research Goals: Understanding How to Create, Store, and Glow

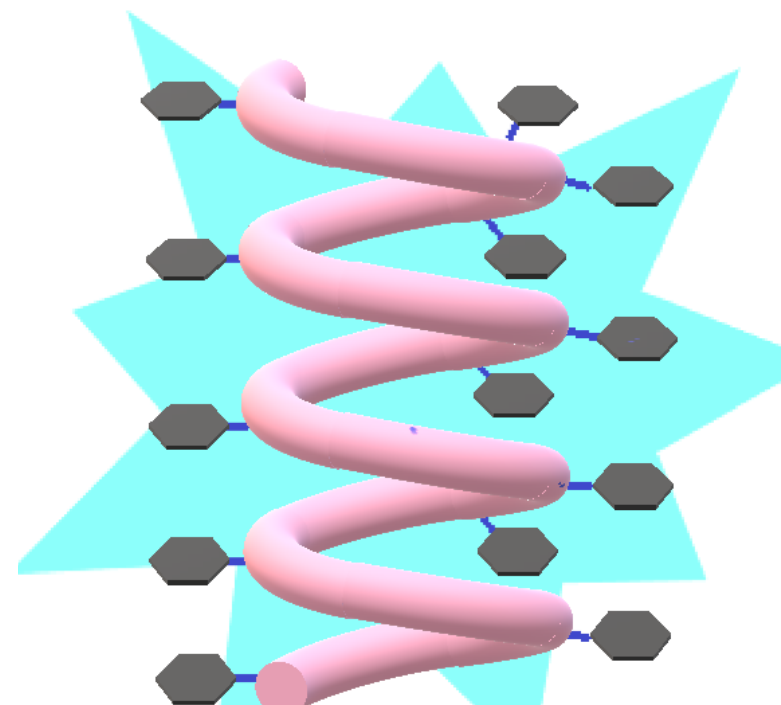
## Synthesizing Monomer Building Blocks



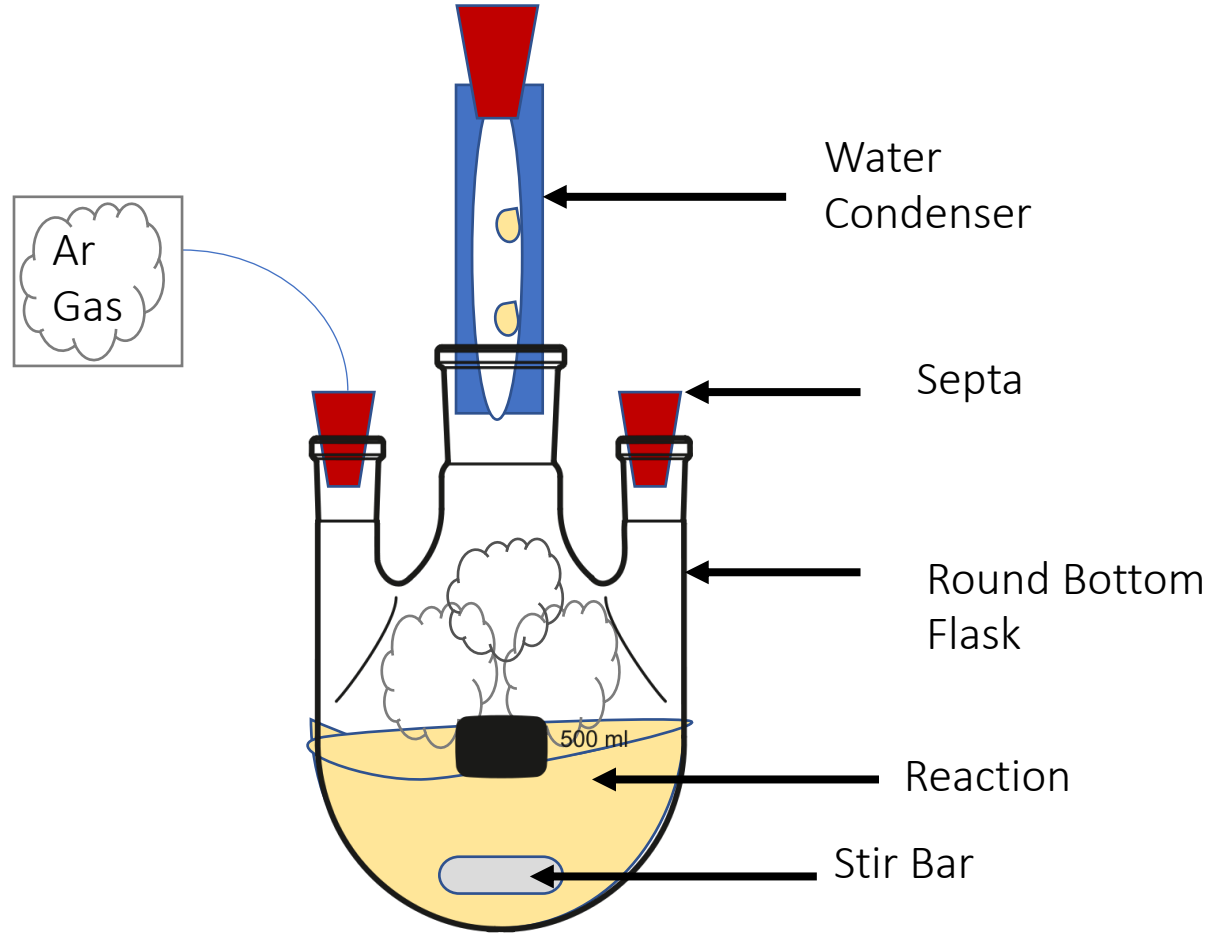
## Finding Optimal Storing Conditions



## AIE Properties of Polymer

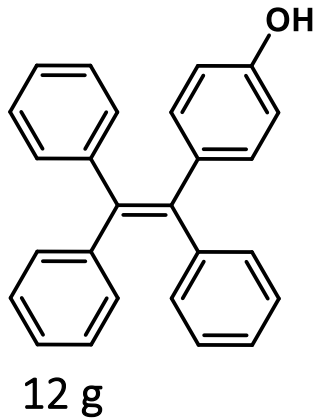


# General Reaction Set Up for Monomer Synthesis



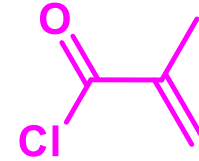
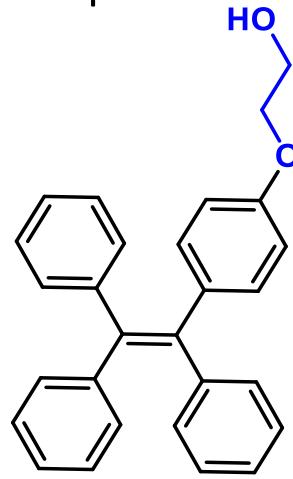
# Two-Step Synthesis of Fluorescent Building Block

Reaction 1: Spacer

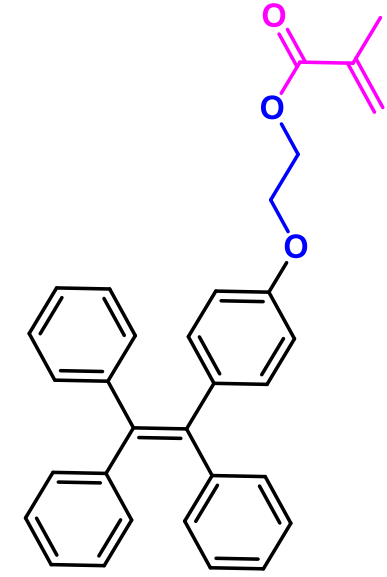


Base  
100°C, 16h

Reaction 2: Polymerizable Head Group

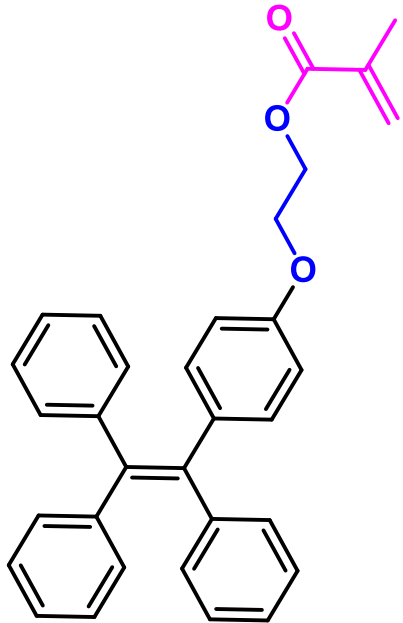


Base  
Room Temp, 12h

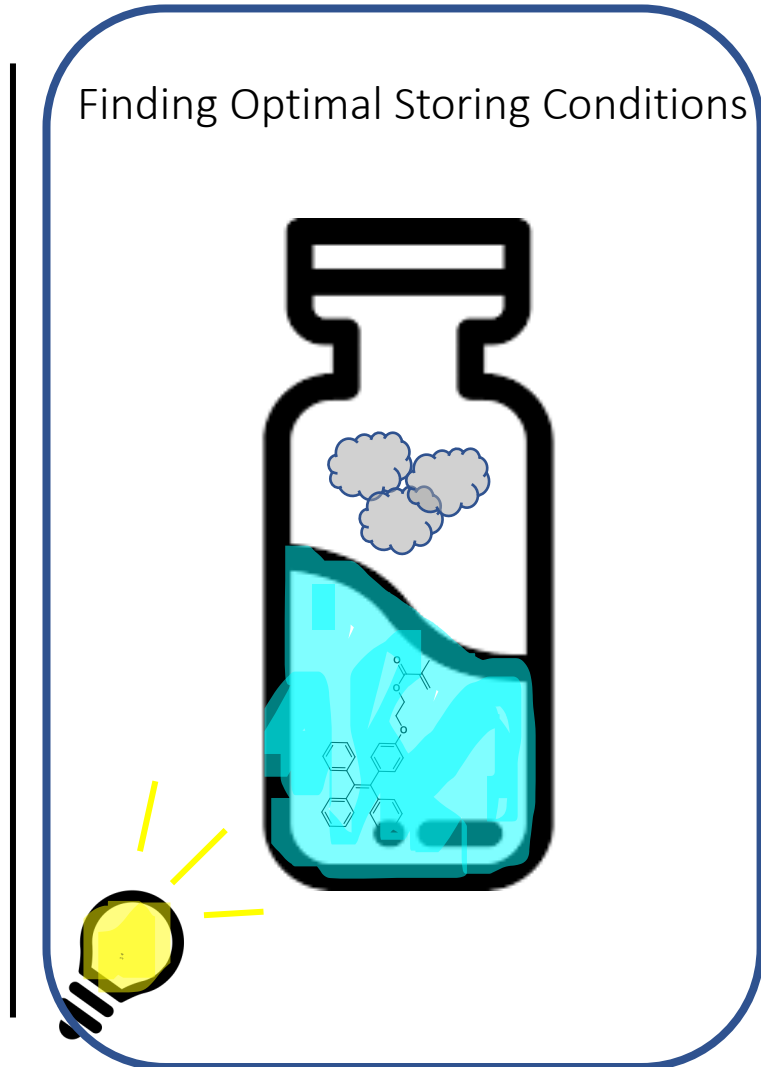


# Primary Research Goals

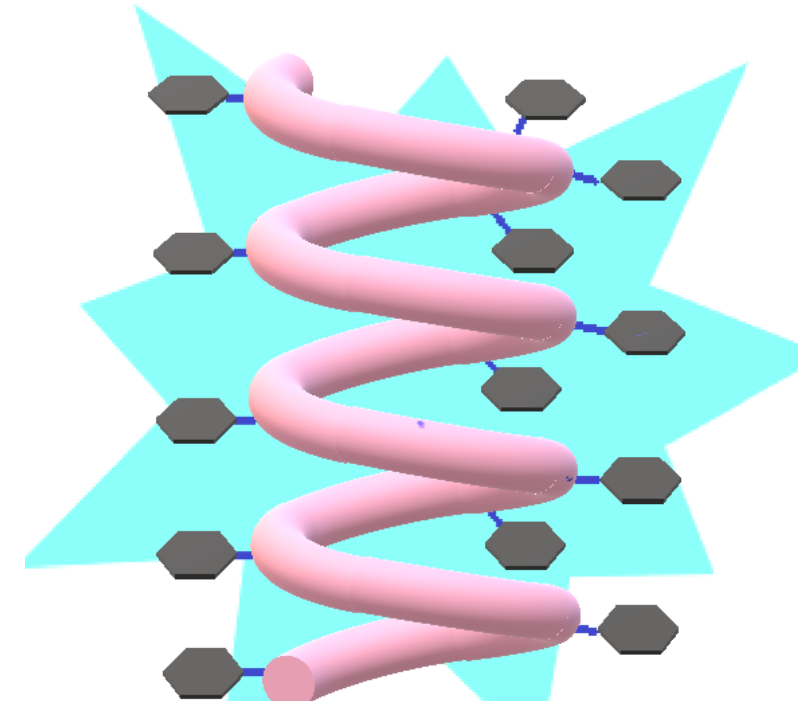
Synthesizing Monomer Building Blocks



Finding Optimal Storing Conditions

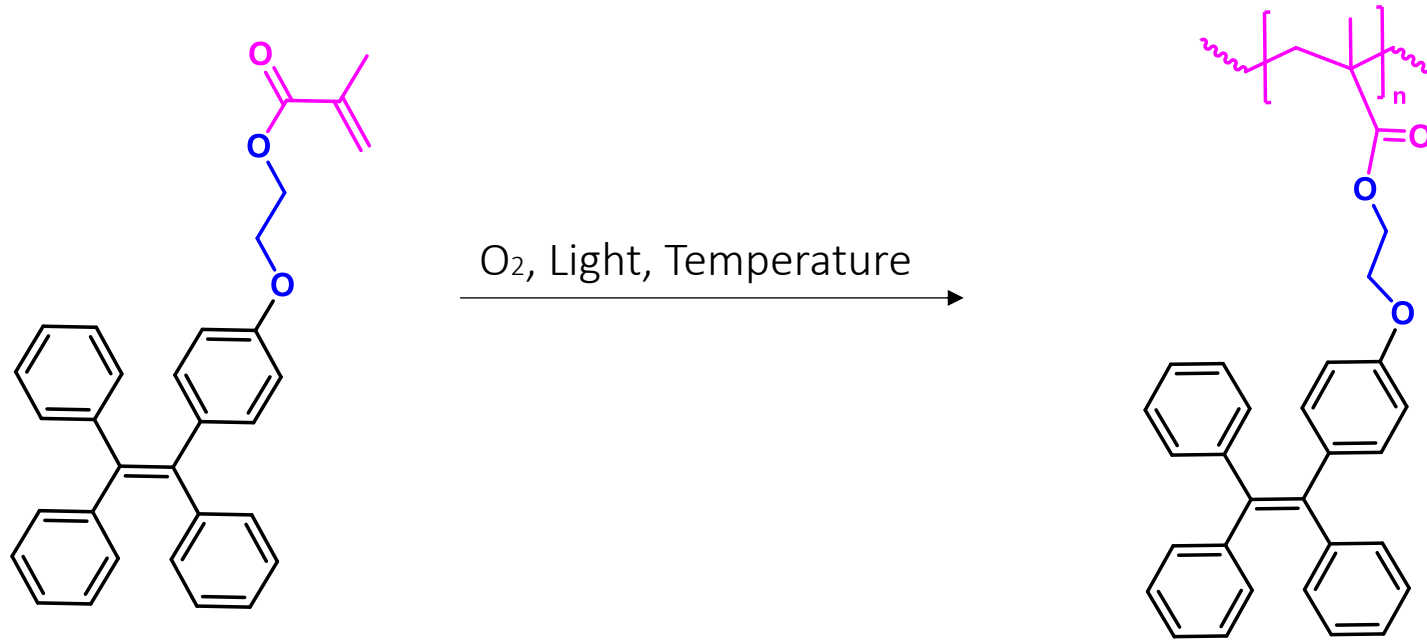


AIE Properties of Polymer



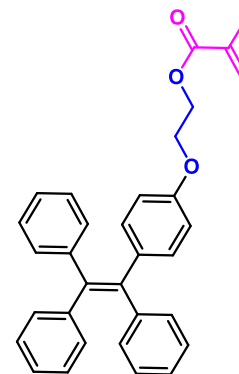
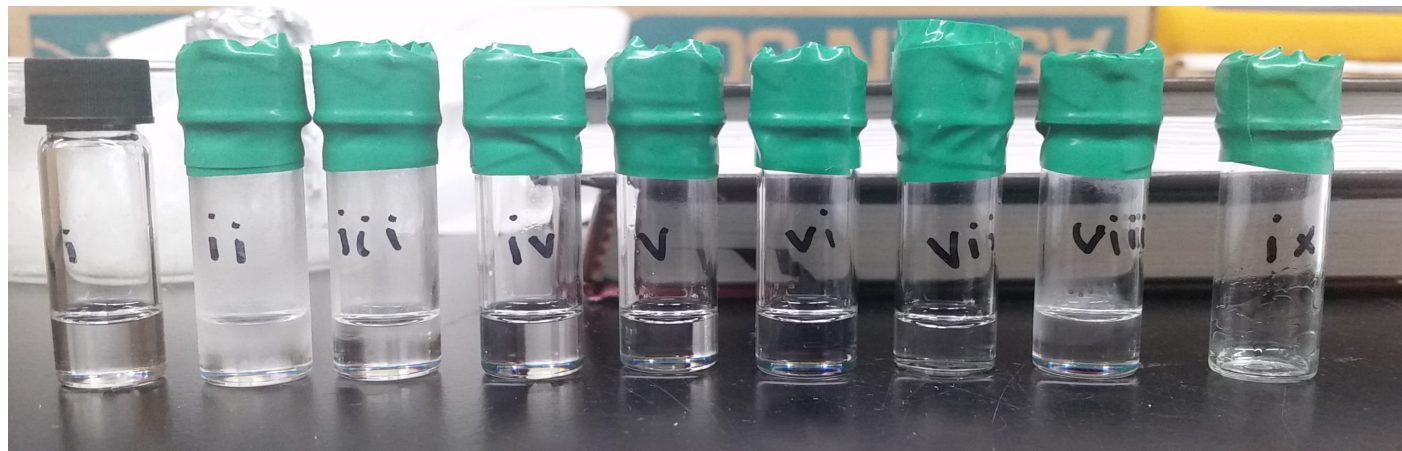


# The Nuisance of Autopolymerization



- Uncontrolled Chain Lengths
- Unable to form Helices
- Monomer can no longer undergo controlled polymerization methods

# Ideal Storage Choice for TPE Monomer



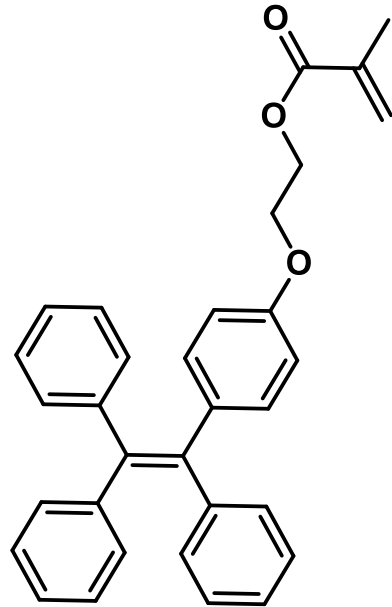
Ideal Storage Choice

	i	ii	iii	iv	ix	v/vi/vii/viii
Gas	O <sub>2</sub>	Ar	Ar	Ar	Ar	Ar
Temperature	-20°C	25°C	-20°C	-20°C	-20°C	-20°C
Solvent	Toluene	Toluene	THF	Toluene	Toluene	Toluene
Light	Dark	Dark	Dark	Light	Dark	Dark
Concentration	30mg/mL	30mg/mL	30mg/mL	30mg/mL	Solid	30mg/mL
Autopolymerization	0%	0%	0%	0%	0%	0%

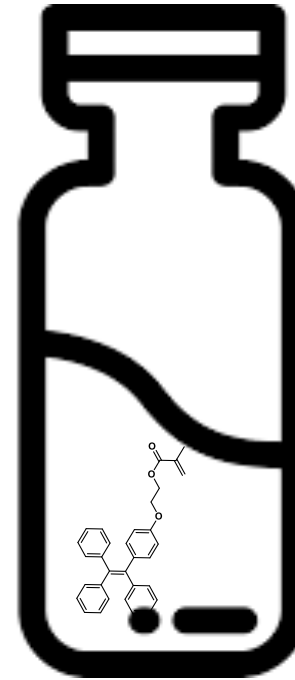
# Project Achievements of Summer 2019

## Synthesizing TPE-EtMA Building Blocks

1. Reaction
2. Purification
3. Characterization



## Finding Optimal Storing Conditions



### Storage Conditions

Ar

-20°C

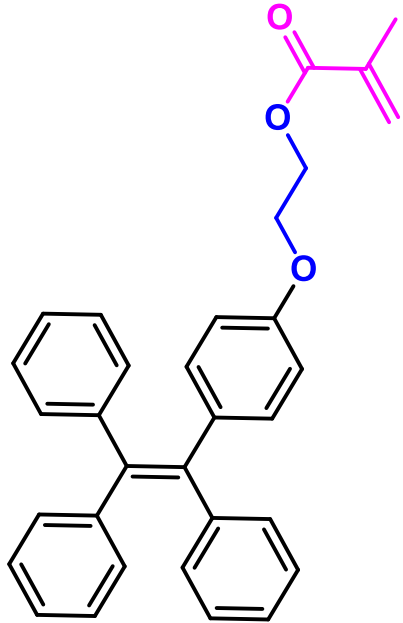
Toluene

Dark

30mg/mL

# Primary Research Goals

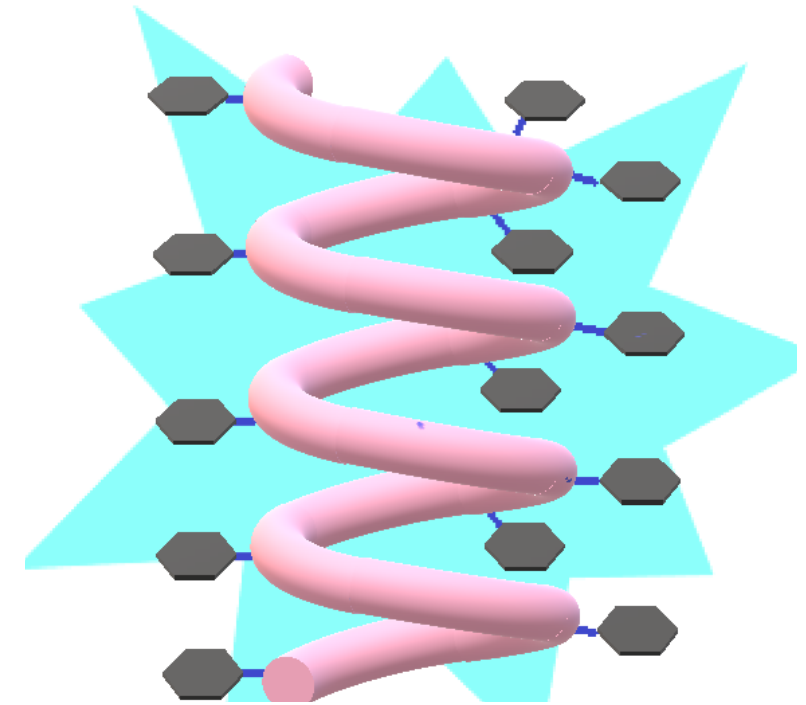
Synthesizing Monomer Building Blocks



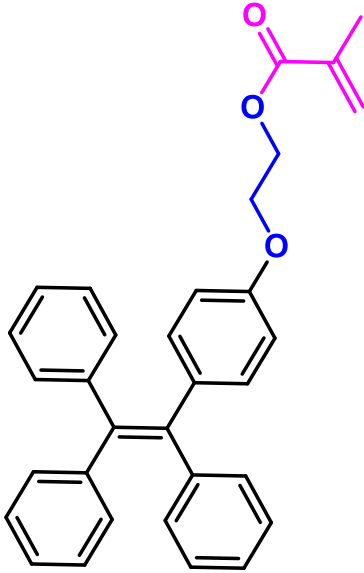
Finding Optimal Storing Conditions



AIE Properties of Polymer



# Ongoing Work

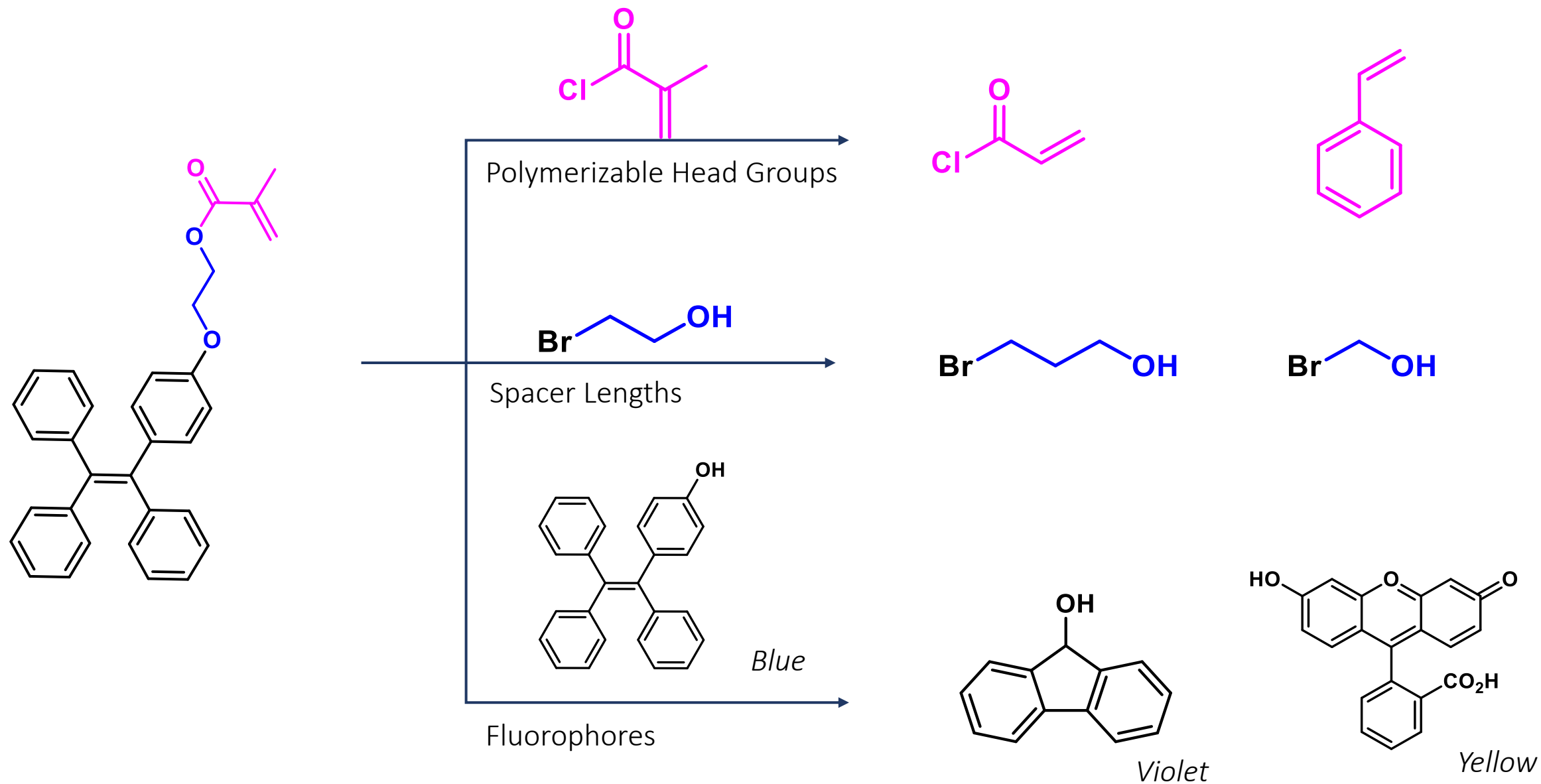


Polymerize



- Wavelength?
- Absorption?
- Stimuli?

# Future Plans: Exploring Variations of Fluorescent Building Blocks



# Acknowledgements

## *Faculty Advisors:*

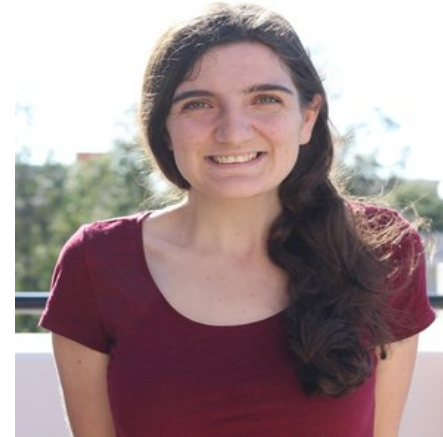


Craig J. Hawker



Javier Read de Alaniz

## *Mentor:*



Allison Abdilla



Read de Alaniz Group Photo

## **Special Thanks:**

Samantha Davis  
Timnit Kefela  
Simone Stewart  
CSEP Scholars  
Hawker + Read de Alaniz Groups