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Synthesizing Multifunctional Benzimidazole-Based Self-Immolative Polymers

Maria Rueda

University of Windsor, ruedam@uwindsor.ca

Sarah Nasri

University of Windsor

Xiao Fei. Yu

University of Windsor

S. Maryamdokht Taimoory

Department of Chemistry and Biochemistry, University of Windsor

John F. Trant

Department of Chemistry and Biochemistry, University of Windsor

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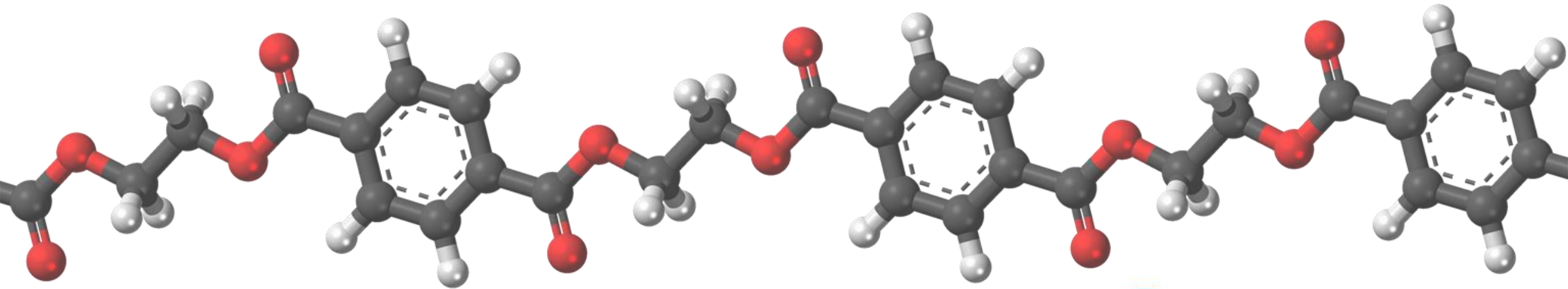
Rueda, Maria; Nasri, Sarah; Yu, Xiao Fei.; Taimoory, S. Maryamdokht; and Trant, John F., "Synthesizing Multifunctional Benzimidazole-Based Self-Immolative Polymers" (2022). *UWill Discover Conference*. 19. <https://scholar.uwindsor.ca/uwilldiscover/2022/2022Day3/19>

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Synthesizing Multifunctional Benzimidazole-Based Self-Immolative Polymers

Maria Rueda, Sarah Nasri, Xiao Yu, Dr. Seyeseh Maryamdokht (Nazanin) Taimoory, Dr. John F. Trant



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Drug specificity – *Why is it important?*





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For a drug to be effective => must be specific!





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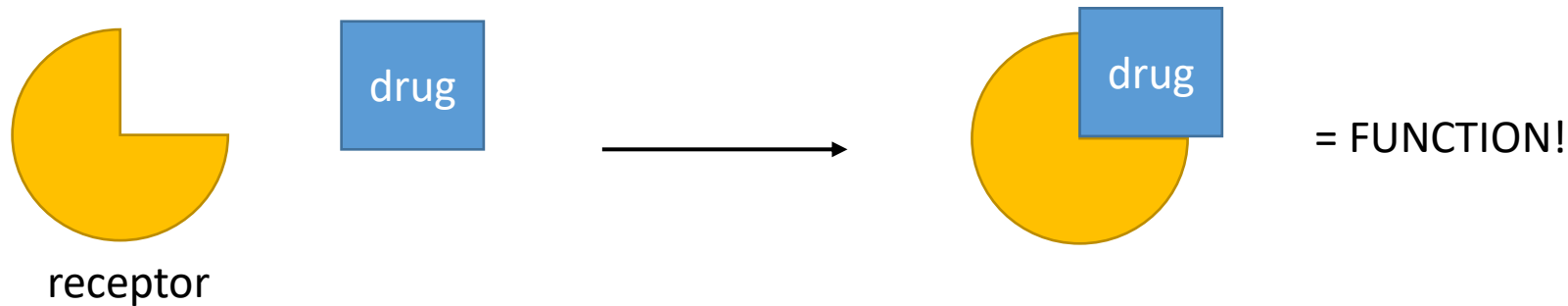


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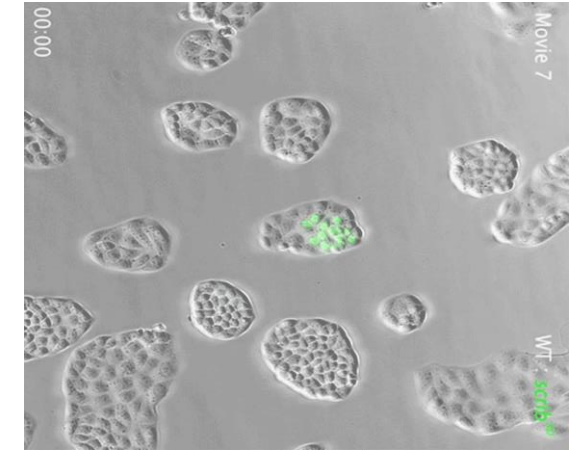
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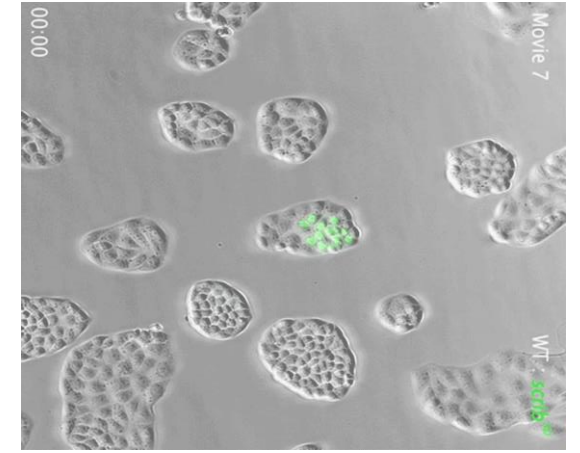
Drug Specificity & Cancer Cells





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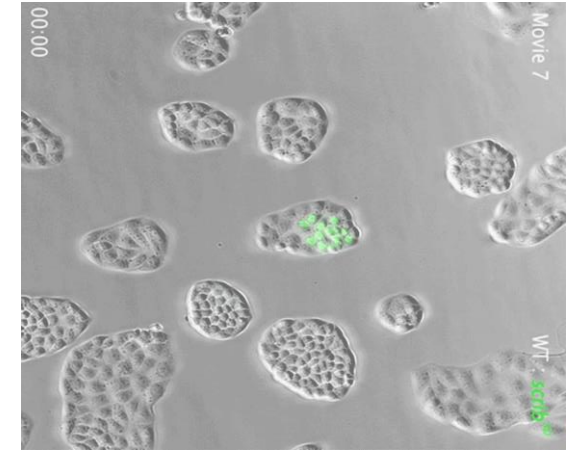
- Cancer cells replicate quickly.





Drug Specificity & Cancer Cells

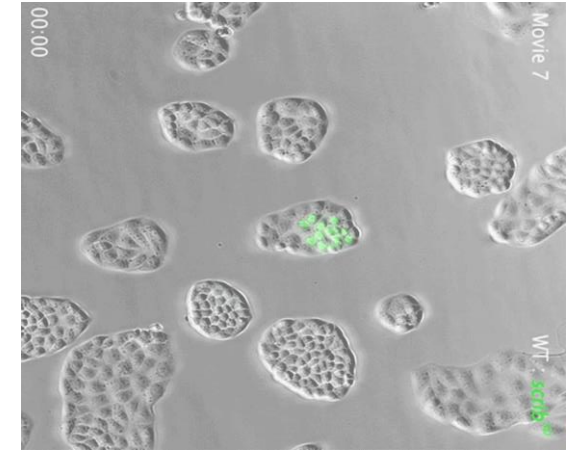
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Drug Specificity & Cancer Cells

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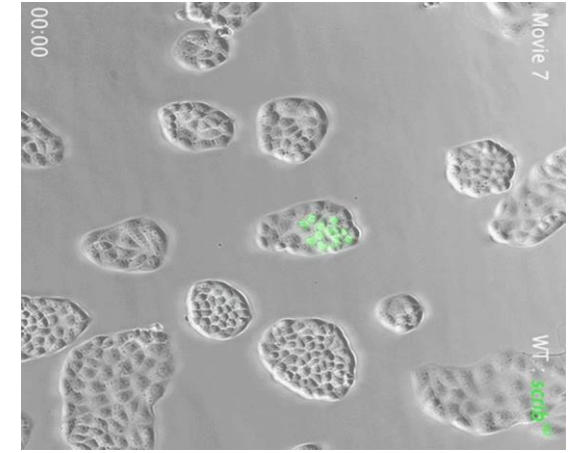
What can be done to improve the specificity of a drug?

- Drug delivery



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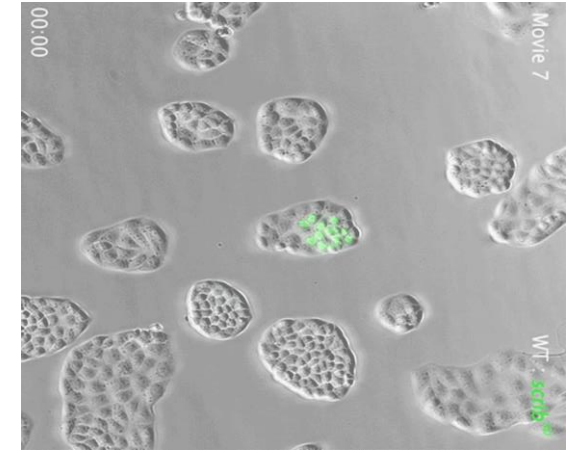
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How?



Drug Specificity & Cancer Cells

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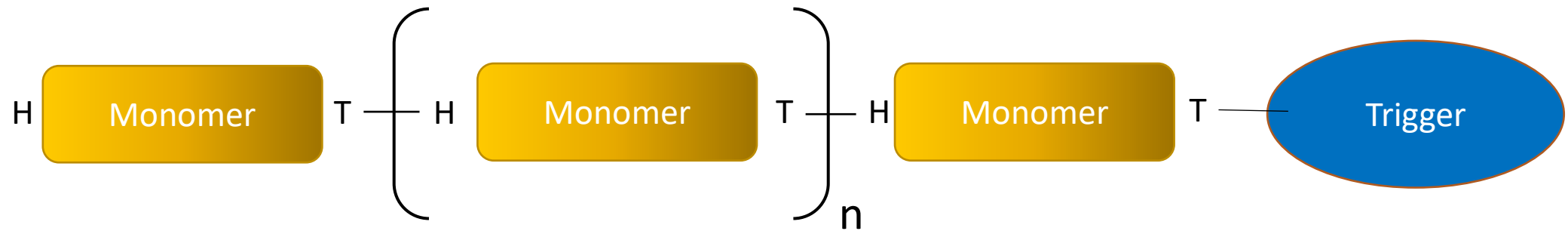


What can be done to improve the specificity of a drug?

- Drug delivery
How? *Self-Immolative Polymers!*

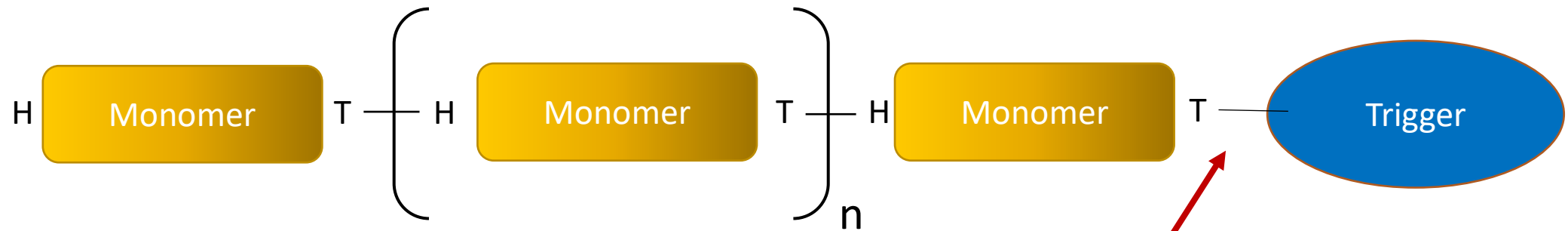


Self-Immolative Polymers



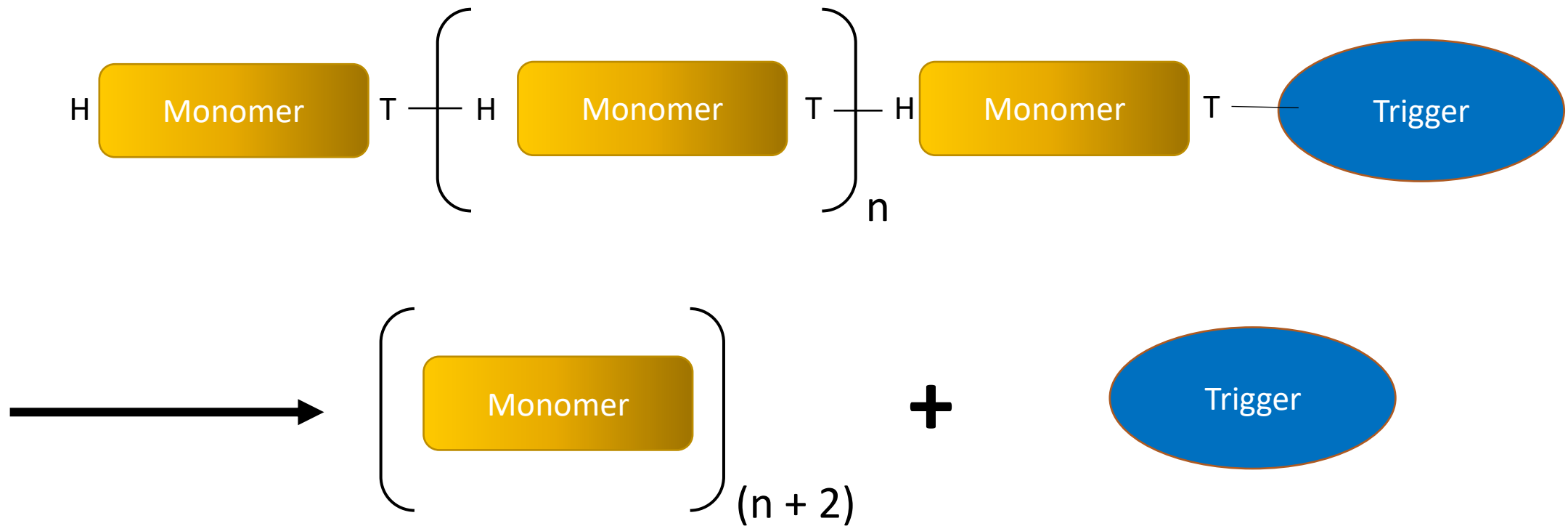
T = Tail; H = Head

Self-Immolative Polymers



Trigger Cleavage!

Self-Immolative Polymers





Why is this *relevant* to drug delivery?

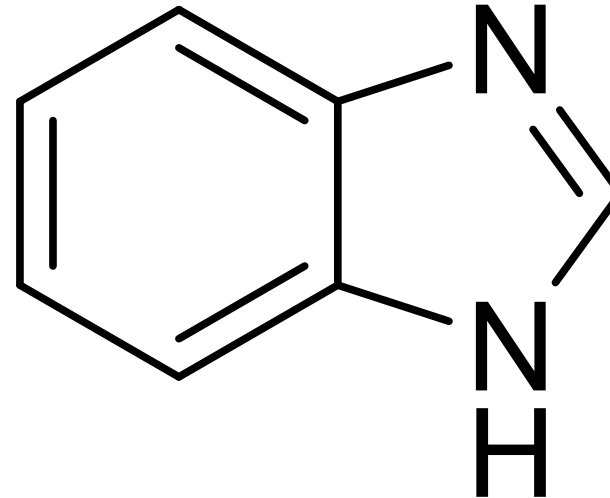
- Design drugs as *self-immolative polymers*.
- When travelling in body = polymer
- At target = cleaved => monomers

Result: Biocompatible drug delivery in the human body!

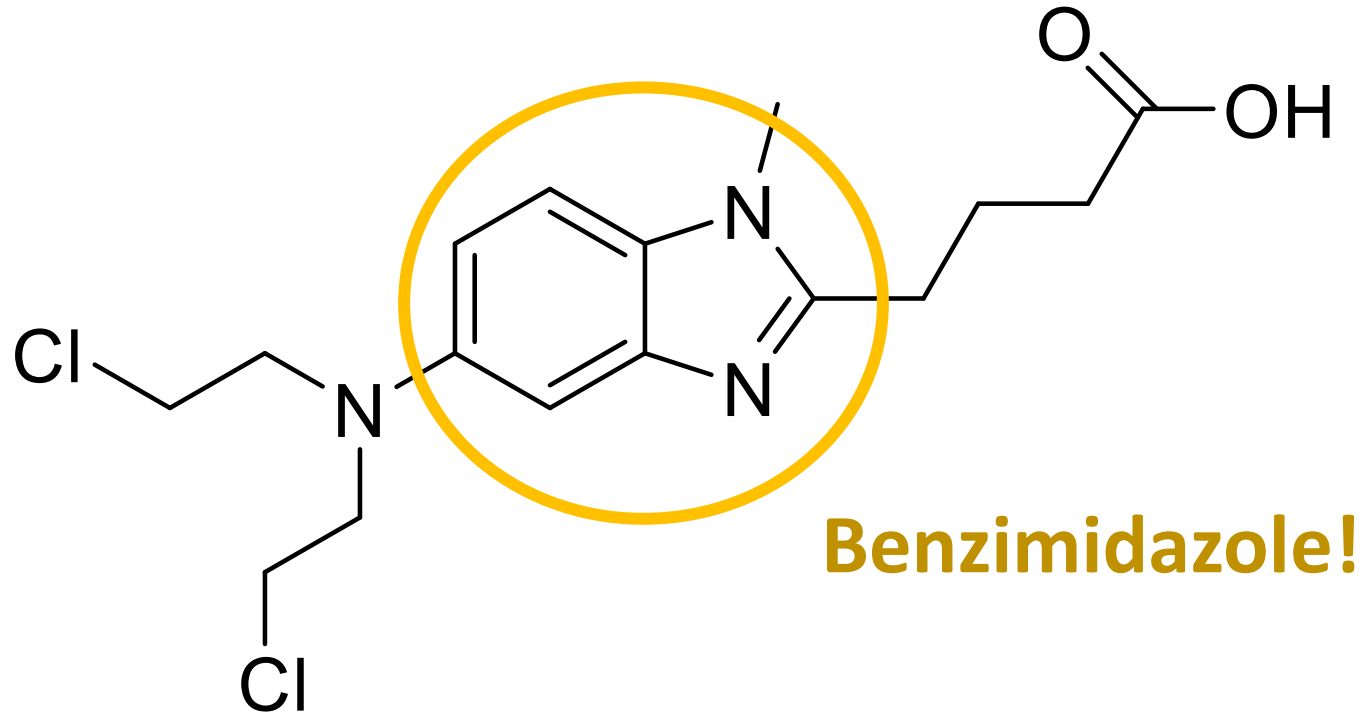


Benzimidazole

- pH sensitivity
- Electron accepting abilities
- Highly selective!

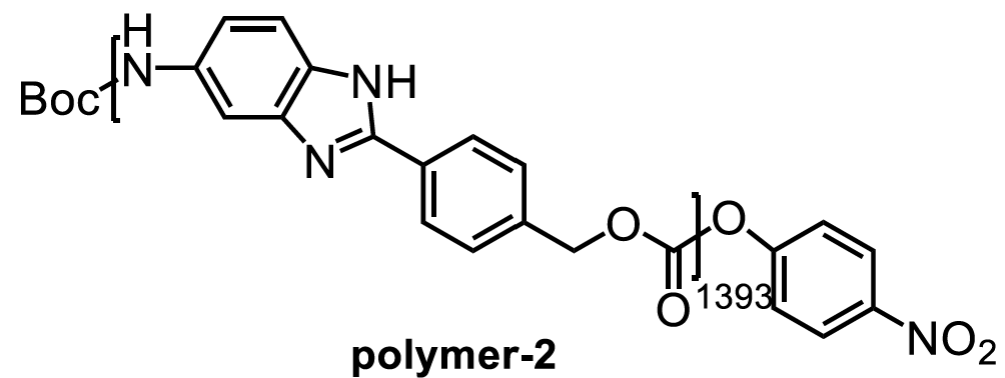
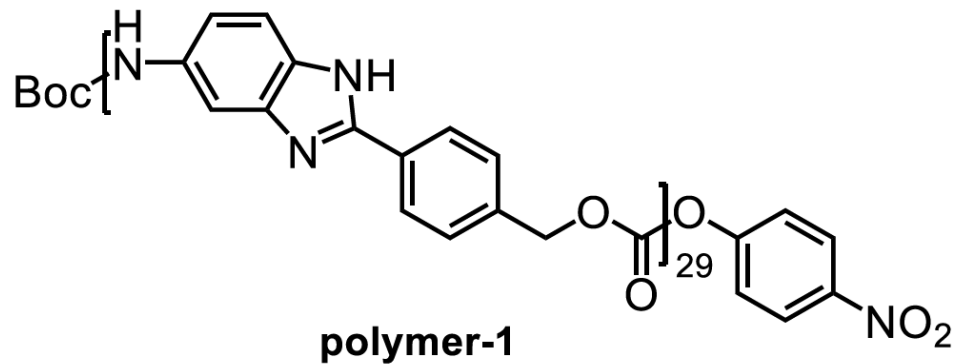


Bendamustine – An Anti-Cancer Drug



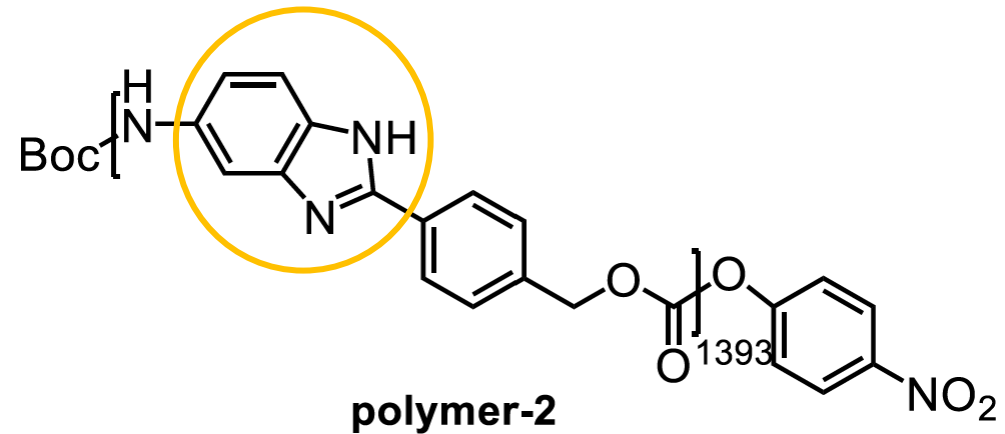
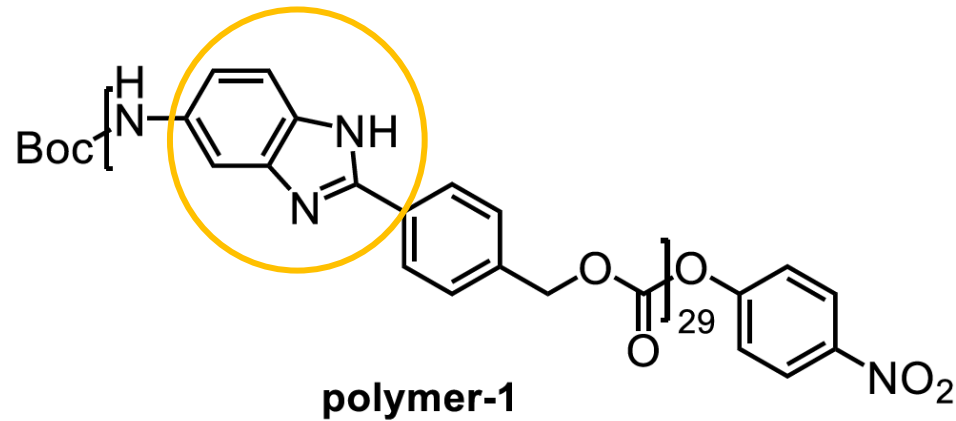
My target compound:

A self-immolative polymer that has benzimidazole-like structures and properties.

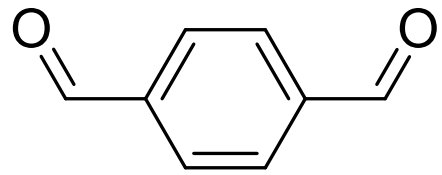


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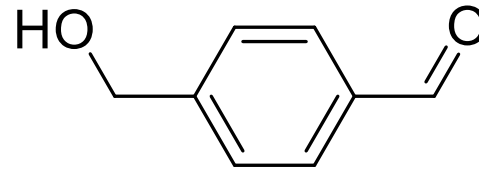
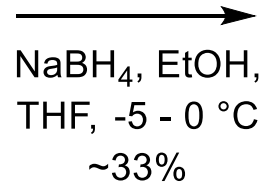
A self-immolative polymer that has benzimidazole-like structures and properties.



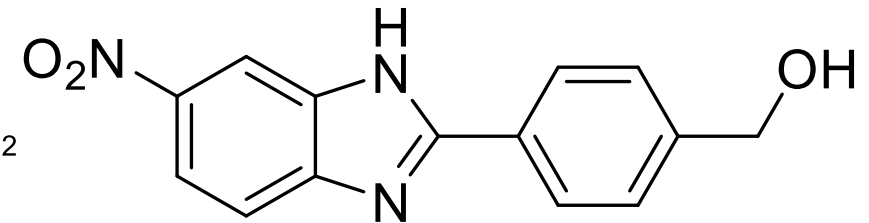
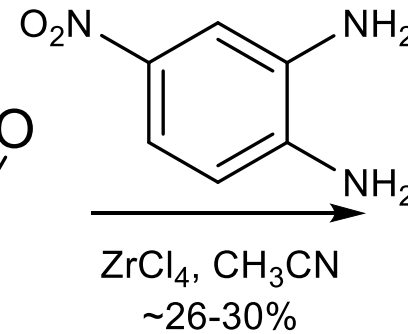
Where it started...



1,4-Benzene
dicarboxaldehyde

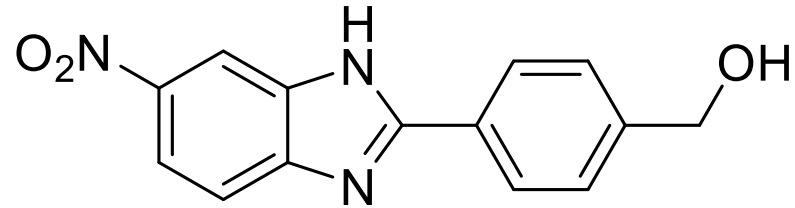


Compound 0

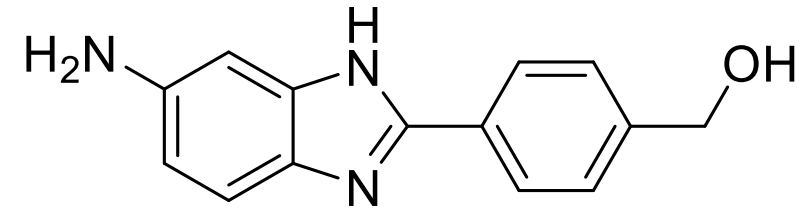
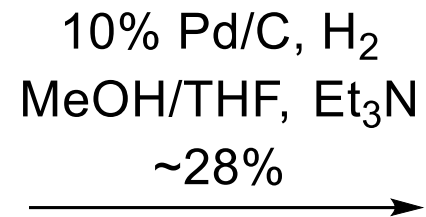


Compound 1

A troubling step...

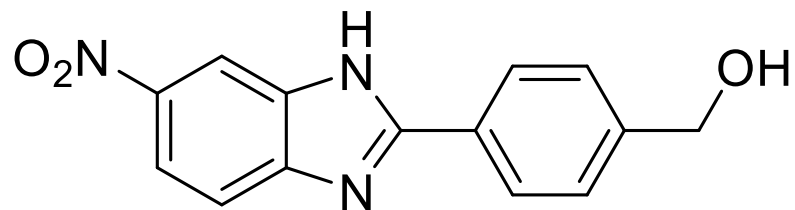


Compound 1



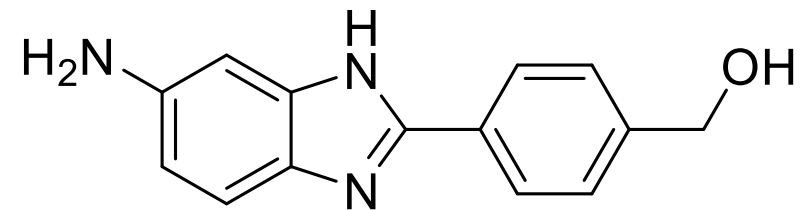
Compound 2

A troubling step...

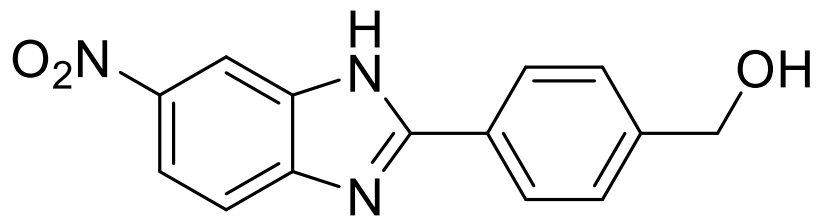


Compound 1

10% Pd/C, H₂
MeOH/THF, Et₃N
~28%



Compound 2

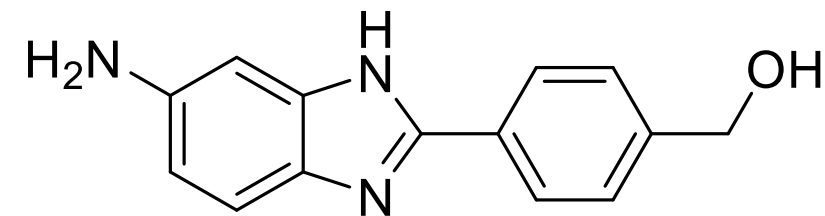


Compound 1

SnCl₂, EtOH

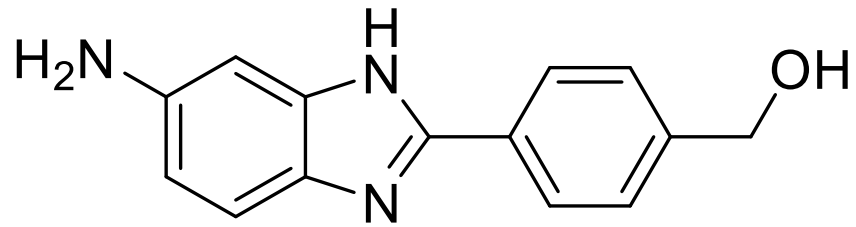


undergoing
purification

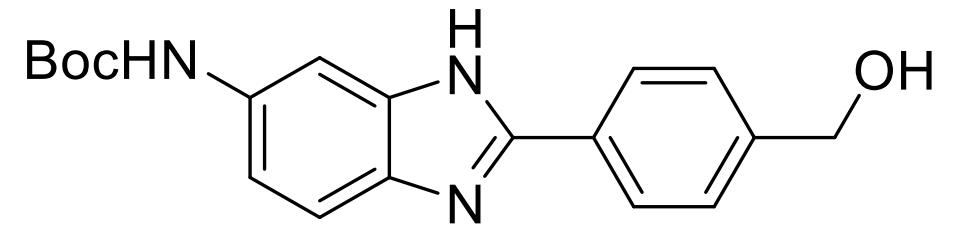
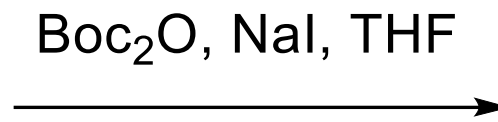


Compound 2

How far I have gotten...

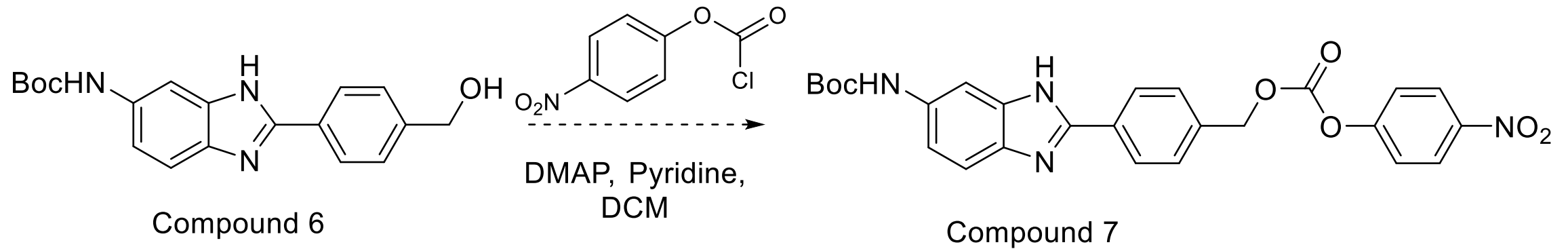


Compound 2

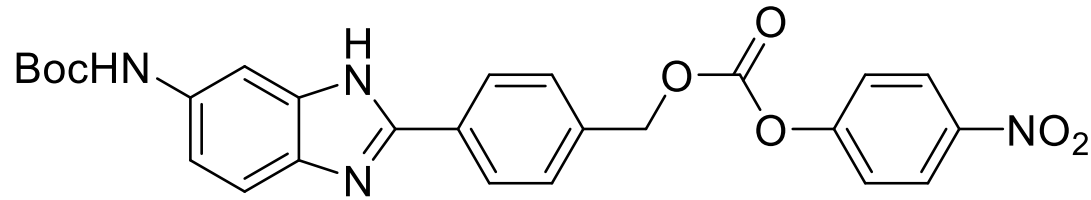


Compound 6

Next Steps...



Next Steps...



Compound 7

TFA:DCM = 1:0.5
DIPEA (2.5 eq), DMF
0.1 eq 7

Polymer-1!
(30-mer)

Characterization

TFA:DCM = 1:0.5
DIPEA (2.5 eq), DMF
0.01 eq 7

Polymer-2!
(1000-mer)

Characterization



Thank you for listening! 😊

