ACS Local Section
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Probing and Perturbing RNA Structure using Fluorescent Nucleic Acid Base Analogues

a talk by

Dr. Julia Widom

Assistant Professor of Chemistry, University of Oregon
Dept. of Chemistry and Biochemistry

Thursday December 9, 2021

Reed College Vollum Lounge
3203 SE Woodstock Blvd, Portland, OR 97202
map (use East Parking Lot; Vollum College Center is number 37 on map)

Dinner Reservations

Dinner reservation FIRM deadline: Thurs. Nov. 24 2021 **(TWO weeks notice now)**

Schedule: 6:00 pm social•6:45 pm buffet dinner •7:45 talk

COVID-19 Protocols

Thank you for working with us to help prevent transmission of COVID-19

- **Proof of COVID-19 vaccination** or **recent negative COVID-19 test** (<72 hrs) **required** at the door
- Face coverings must be worn indoors while not actively eating, drinking, or speaking at the podium
- Potential in-person attendees must self-monitor for common COVID-19 symptoms and elect to attend virtually if any symptoms are detected. Dinner fee will be refunded.
- These rules comply with Reed and Oregon Health Authority policies. For complete policies, please see:
  https://www.reed.edu/coronavirus/
  https://coronavirus.oregon.gov/

Virtual Attendance

Bio and Abstract next page

Bio: Julia Widom

Dr. Julia Widom is an Assistant Professor of Chemistry at the University of Oregon. She earned a B. A. in chemistry from Northwestern University and a Ph.D. in physical chemistry from the University of Oregon. After graduating from the U of O, Dr. Widom was a Postdoctoral research fellow at the University of Michigan. She joined the faculty at the U of O in 2018 where she employs biophysical techniques centered around ultrafast and single-molecule spectroscopy to study RNA structural characteristics.

Abstract: Probing and Perturbing RNA Structure using Fluorescent Nucleic Acid Base Analogues

RNA performs a diverse set of biological functions, acting in turn as a catalyst, an information carrier, a regulator of gene expression and more. Many of these roles require RNA to fold into specific structures and perturbations to this process can lead to disease. As a result, many techniques have been developed to study RNA folding, a number of which are based on fluorescence detection. Because RNA itself is almost completely nonfluorescent, fluorescence-based methods require artificial fluorophores to be inserted into the RNA being studied. I will present work that focuses on the class of fluorophores termed fluorescent base analogues (FBAs), which are chemically modified variants of the native bases G, A, T, C and U. Given the multitude of different interactions that contribute to RNA folding, small perturbations to geometry or hydrogen bonding can have significant functional consequences. I will first present work in which my lab used FBAs to intentionally perturb the folding of an RNA that regulates gene expression in bacteria. We substituted the adenine analogue 2-aminopurine at various sites in this “riboswitch” and utilized circular dichroism (CD) spectroscopy to investigate how substitution affected the structure of the RNA and its ability to bind to the ligand that it recognizes. I will then present work in which we are using fluorescence-detected circular dichroism (FDCD) spectroscopy to selectively probe the structures of different conformational subpopulations of FBA-labeled RNA. By fine-tuning our fluorophore-labeling strategy, we can utilize FDCD to selectively record spectra of either tightly-folded or loosely-folded conformational subpopulations. This approach enables us to circumvent the problem of ensemble averaging that limits the power of bulk spectroscopic methods such as CD.