ACS Local Section
New York
Long Island Subsection

Adventures in Photochemistry

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Thursday, October 16th, 2025, 6:30 PM
St. John's University, DAC Ballroom (4th floor)
and online (Zoom)

Registration required
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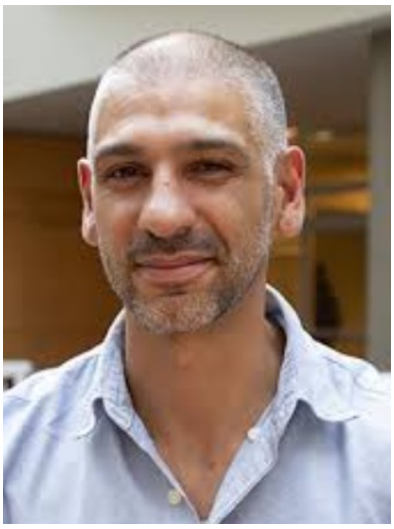
to register.



Abstract: The optimization of excited state processes in molecular systems is a fundamental science problem critical to the realization of emerging sustainable energy technologies such as artificial photosynthesis, solar cells, and solid-state lighting. The last several decades have seen tremendous progress in this area driven by advances in the design and synthesis of excitonic materials that exhibit strong absorption, efficient light emission, and tunable electrochemical potentials. Still, there are fundamental limits to the strength of light-matter interactions in conventional molecular chromophores that have hindered their adoption in next-generation device technologies, including their absorption and emission rates, as well as dynamical processes, such as the carrier delocalization and diffusion. As such, a grand challenge for light-responsive molecular materials involves the development of strategies to increase the size of achievable cross-sections, expand the size of their electronic wavefunctions, and access novel spin states with long lifetimes.

I will discuss strategies to address these challenges by combining molecular light harvesting systems with dielectric photonic devices. The goal of these studies is to simultaneously optimize these materials' macroscopic light-matter interactions and their carrier dynamics to improve the efficiency of processes for solar energy capture, including heterogenous photocatalysis, spin conversion, and exciton harvesting processes. I will discuss our efforts in the development of resonant photocatalytic metasurfaces, open cavity systems that permit selective excitation on strongly coupled organic exciton polaritons, and nonlinear polariton condensates. Key to these efforts is the development of high-speed ultrafast and nonlinear metrology tools that allow us to rapidly evaluate new materials and device concepts with unprecedented sensitivity.

Presented by the Long Island Subsection of the American Chemical Society