

UNIVERSITY OF CALIFORNIA, IRVINE

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

IS PROUD TO HOST A SEMINAR BY

“CONQUERING THERMALIZATION”



JUSTIN R. CARAM

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Thursday, February 20, 2024

2:00 PM - 3:20 PM

McDonnell Douglas Engineering Auditorium

Abstract: Thermalization is when a system evolves toward maximum entropy, exchanging energy and information with its bath. I am interested in how to slow thermalization in molecules and materials as a design strategy for improved photophysics. As my first example, I will describe how my group works to improve the quantum yield of near and shortwave infrared organic chromophores and quantum dots. We have found that while energy gap law(s) work against the design of bright infrared emissive systems, tuning vibronic coupling, increasing radiative rates through superradiance and developing defect resistant materials provide systematic paths to efficient photoemission. Thermalization is also relevant to the development of next generation quantum materials. I will discuss how my group is using lanthanides in solution to create “atom-like molecular sensors” which are insensitive to random fluctuations. In each case, chemical physics provides insights into how to conquer...for a short time...the second law of thermodynamics.

Bio: Justin Caram is an associate professor of Chemistry and Biochemistry at University of California, Los Angeles. His group uses photon-resolved spectroscopic methods to study and develop novel materials, with a particular focus on near and shortwave infrared photophysics.

Specialties

- Analytical
- Bioenergy and the Environment
- Biophysics
- Materials
- Nanoscience
- Physical

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