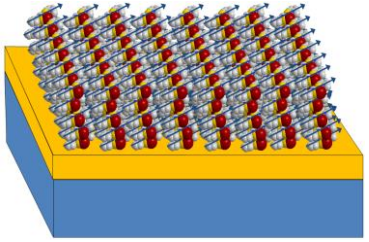
Special Seminar
Thursday May 11, 2017
MRL 2053
12:00 – 1:00 pm

Quantum optics meets physical chemistry: Molecules in cavities

Prof. Joel Yuen-Zhou, Department of Chemistry and Biochemistry UCSD

ABSTRACT:
Organic molecules interact strongly with confined electromagnetic fields in plasmonic arrays or optical microcavities owing to their bright transition dipole moments. This interaction gives rise to molecular polaritons, hybrid light-matter quasiparticles. Molecular polaritonics opens new room-temperature opportunities for the nontrivial control of energy transport in the nano and mesoscales, Bose-Einstein condensation, and modification of physico-chemical properties of molecular assemblies. In this talk, I'll showcase some of these opportunities that we have been exploring in the past few years within the context of physical chemistry. First, I'll show that topologically nontrivial phases can be realized in excitonic and polaritonic systems of organic dye molecules that support Frenkel excitations [1,2]. Next, I will discuss some intriguing optical properties of plexcitons (surface plasmon-exciton polaritons) associated with van Hove singularities [3]. Finally, I will end my talk with an outlook on how kinetics and thermodynamics of chemical reactions can be controlled via strong coupling to cavity modes [4].

BIO:
Prof. Joel Yuen-Zhou received a B.S. in Chemistry and a B.S. in Math from MIT in 2007, where he did undergraduate research under the late Prof. Robert J. Silbey. In 2012, he graduated with a Ph.D. in Chemical Physics under the supervision of Prof. Alan Aspuru-Guzik at Harvard University. He was the Robert J. Silbey Postdoctoral Fellow in the Center for Excitonics at MIT in 2012-2015. Since July 2015, he is an Assistant Professor in the Department of Chemistry and Biochemistry at the University of California, San Diego. He recently received the National Science Foundation CAREER award. His research group is interested in the weak, strong, and ultrastrong coupling of light and molecular matter to design and probe new materials and phenomena at the interface of chemical physics, materials science, and nanophotonics.



Food will be provided

[1] J. Yuen-Zhou, S. Saikin, N. Yao, and A. Aspuru-Guzik, Nature Mater. 13, 1026 (2014).
[2] J. Yuen-Zhou, S. K. Saikin, T. Zhu, M. Onbalsi, C. Ross, V. Bulovic, and M. Baldo, Plexcitons: Nat. Commun., 11783 (2016).
[3] J. Yuen-Zhou, S. Saikin, V., in preparation.
[4] L. Martínez-Martínez, R. Ribeiro, J. Campos-Angulo, F. Herrera, J. Yuen-Zhou,, in preparation.