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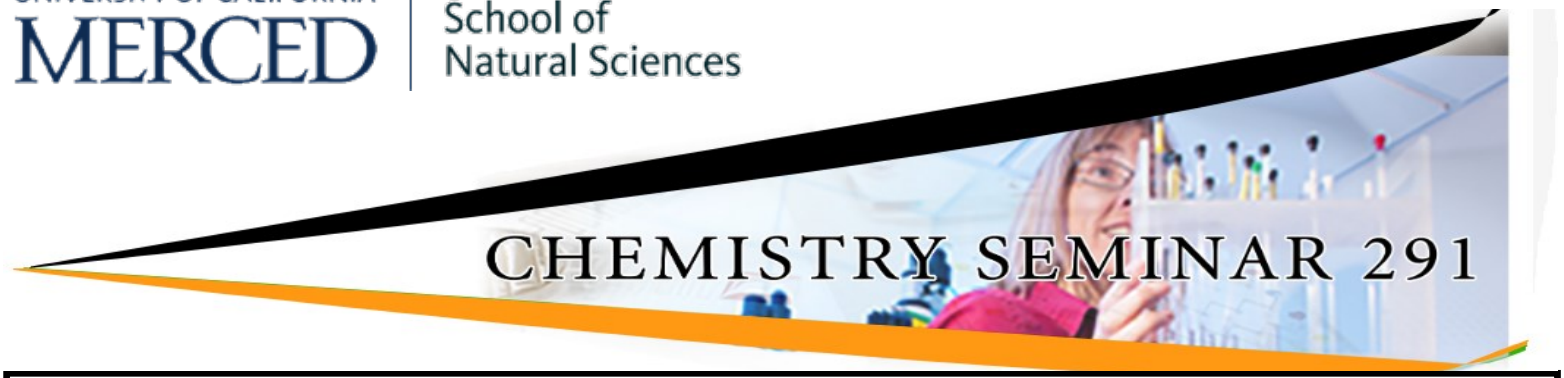

Scrambled Eggs and Ladders: Understanding Formation and Exciton Transport of Aqueous Inter-Conjugated Polyelectrolyte Complexes

Date: **10/14/2019** Time: **3:00 PM** Location: **COB1 267**	**Alexander Ayzner** Assistant Professor, Chemistry and Biochemistry UC Santa Cruz	For more information, contact : **Christine Isborn** **cisborn@ucmerced.edu**

Abstract

The ability to self-assemble artificial light-harvesting antennae in green solvents is highly attractive from a practical point of view. From a light-harvesting materials perspective, molecules that display highly mobile excited states (excitons), allowing for rapid sampling of the electronic landscape, are highly desirable. Conjugated polymers are such materials, as they display remarkable optoelectronic properties that emerge from the strong coupling between delocalized π-electrons. We have shown that complexation of oppositely charged conjugated polyelectrolytes (CPEs) in water can be used to construct exciton donor/acceptor networks, leading to efficient, ultrafast electronic energy transfer (EET) on a 250-fs timescale. We find that the exciton diffusion within the inter-CPE network is highly sensitive to the relative CPE stoichiometry. The extent of delocalization of polarizable π-electrons and the orientation of ionic sidechains relative to the conjugation plane dictate the kinetics and thermodynamics of complexation. We find that aqueous assembly changes from being endothermic to exothermic, which is unprecedented in the nonconjugated polyelectrolyte literature. We argue that the interaction between the water solvation shell and the polarizable aromatic backbone is key to understanding both the activation energy and the reaction enthalpy. Finally, due to the strong coupling between the CPE's ionic and electronic degrees of freedom, this macromolecular system displays very rich phase behavior. At intermediate and high ionic strength, we have for the first time recently demonstrated that CPEs are capable of forming salt-induced viscoelastic fluid phases. These highly dense complex coacervates are characterized by exciton diffusion dynamics that are sensitive to the simple ion type. Our results highlight the promise that inter-CPE complexes hold as soft, environmentally benign light-harvesting materials.