Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Exciton transfer in self-assembled conjugated polyelectrolyte complexes ALEXANDER AYZNER, WILLIAM HOLLINGSWORTH, CARMEN SEGURA, JONATHAN BALDERRAMA, NATHANIEL LOPEZ, PAMELA SCHLEISSNER, University of California, Santa Cruz — Conjugated polyelectrolytes (CPEs) combine the remarkable properties of conjugated polymers and polyions, leading to the strong coupling between electronic structure and the solution ionosphere. With the aim of creating soft, artificial light-harvesting antennae, we have for the first time formed ionically assembled CPE complexes capable of electronic energy transfer in both aqueous solution and the solid state. We find that complex formation is an activated process, which leads to emergent excitonic states on the energy acceptor CPE. These states are characterized by substantial wavefunction delocalization along the polymer backbone, leading to an enhancement in the fluorescence quantum yield by roughly two orders of magnitude, as well as the possibility of coherent transfer. We also show that the chemical nature of excess ions and the solution ionic strength can have a drastic effect on cooperative complex assembly and the corresponding energy transfer dynamics. This indicates a possible path towards sensitive control of the light-harvesting efficiency using the electrostatic environment surrounding the CPE complex.

Alexander Ayzner
University of California, Santa Cruz

Date submitted: 13 Oct 2016 Electronic form version 1.4