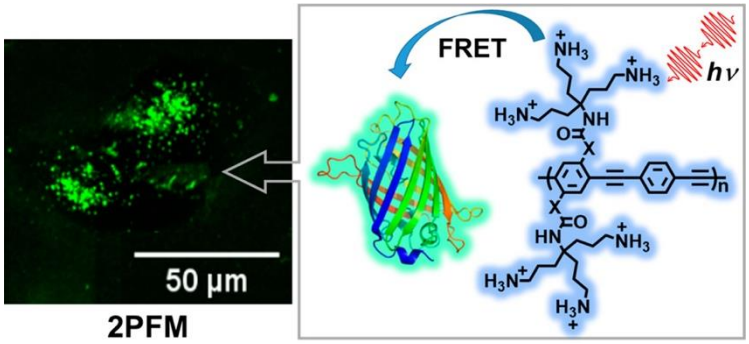
Prof. Kirk S. Schanze

University of Texas at San Antonio, San Antonio, TX, USA 78023

Conjugated Polyelectrolytes in Biosensing and Disinfection

Date: December 12 2022, 15.00 h Hamburg Time (Zoom)

Abstract: Conjugated polyelectrolytes (CPEs) featuring poly(phenylene ethynylene) and poly(thiophene) backbones substituted with ionic solubilizing groups are water soluble. These materials display a variety of interesting properties, including self-assembly into nanoscale aggregates, ability to process into nanostructured layer-by-layer films and optical/stimuli responsive behaviour in the presence of ions, surfactants and biomacromolecules. We have explored the use of cationic CPEs as fluorescent sensors for polyphosphates (pyrophosphate, ATP and ADP). In addition, cationic CPEs exhibit profound light-activated biocidal activity vs. a broad spectrum of bioagents, including bacteria, virus particles and spores. The talk will give a high-level overview work in this area, including recent work concerning the interaction of cationic CPEs with mammalian and bacterial cells.



[1] Jiang, H.; Taranekar, P.; Reynolds, J. R.; Schanze, K. S. "Conjugated Polyelectrolytes: Synthesis, Photophysics, and Applications", *Angew. Chem.* **2009**, *48*, 4300-4316, DOI: 10.1002/anie.200805456.

[2] Parthasarathy, A.; Pappas, E. H.; Hill, E. H.; Huang, Y.; Whitten, D. G.; Schanze, K. S. "Conjugated Polyelectrolytes with Imidazolium Solubilizing Groups. Properties and Application to Photodynamic Inactivation of Bacteria", *ACS Appl. Mater. Interfaces* **2015**, *7*, 28027-28034, DOI: 10.1021/acsami.5b02771.

[3] Li, Z.; Acharya, R.; Wang, S. S.; Schanze, K. S., "Photophysics and Phosphate Fluorescence Sensing by poly(Phenylene Ethynylene) Conjugated Polyelectrolytes with Branched Ammonium Side Groups", *J. Mat. Chem. C* **2018**, *6*, 3722-3730, DOI: 10.1039/c7tc05081j.

[4] Huang, Y.; Li, Z.; Risinger, A. L.; Enslow, B. T.; Zeman, C. J., IV; Jiang, G.; Yang, Y.; Schanze, K. S. "Fluorescence Spectral Shape Analysis for Nucleotide Identification" *Proc. Nat. Acad. Sci. USA* **2019**, *116*, 15386-15391, DOI: 10.1073/pnas.1820713116.

[5] Jagadesan, P.; Yu, Z.; Barboza-Ramos, I.; Herman Lara, H.; Vazquez-Munoz, R.; Lopez-Ribot, J. L.; Schanze, K. S. "Light-Activated Antifungal Properties of Imidazolium-Functionalized Cationic Conjugated Polymers" *Chem. Mater.* **2020**, *32*, 6186-6196, 10.1021/acs.chemmater.0c02076.