**Expanding the Toolbox to Modulate the Electronic Functions of Light-Harvesting Nanomaterials and Functionalized Electrodes**

Jean-Hubert Olivier

University of Miami

Department of Chemistry

1301 Memorial Drive

Coral Gables, FL 33146

Jh.olivier@miami.edu

<https://www.um-olivierlab.com/>

As a product of the dynamic equilibrium between solubilized building blocks and self-assembled structures, supramolecular architectures are fragile compositions where minor changes in temperature, solvent dielectric, and building-block concentration can trigger the dismantlement of generated superstructures and concomitant loss of their emergent properties. Developing molecular strategies to rigidify non-covalent assemblies opens exciting opportunities to “dial-in” structure-function properties that remain elusive by current supramolecular methodologies. This seminar will introduce design principles to reticulate 1-dimensional supramolecular polymers in solution and on Silicon electrodes, demonstrating how this novel approach can be leveraged to modulate the semiconducting properties and light-harvesting capabilities of structurally and electronically well-defined nanoscale objects. For instance, exploiting transient absorption spectroscopy and spectroelectrochemistry, we will discuss the properties of the excited state products formed following photoexcitation and correlate them to the structural properties of the molecular tethers with which π-conjugated aggregates are stapled. Furthermore, we will present novel design principles to regulate excitonic coupling as a function of chosen tethering strategy and new avenues to capture out-of-equilibrium self-assembled intermediates to form semiconducting monolayers on silicon electrodes. These studies demonstrate that the ability to modulate the electronic structures of nanoscale objects, used in conjunction with facile hierarchical organization, offers exceptional promises for the development of a new class of (opto)electronic materials.

Bio

Jean-Hubert is originally from Strasbourg (France) and attended the University of Strasbourg where he obtained his M.Sc. in Organic and Supramolecular Chemistry. During his Ph.D. work at the University of Strasbourg, he developed new classes of luminescent liquid crystals and studied light-matter interactions in hierarchical materials. He then moved to Duke University in 2011 as a postdoctoral associate to focus on the engineering of polymer-wrapped carbon nanotube compositions for solar energy capture and conversion. Since he joined the Department of Chemistry at the University of Miami in 2016, he is developing molecular tools to create new classes of structure-function optimized organic materials using supramolecular tools. In addition to elucidating fundamental electronic processes in these emerging materials, his research program targets applications in solar energy capture and conversion, mechanical energy harvesting, tactile sensors, and organic electronics.

