

Amgen Seminar Series in Chemical Engineering
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Functional Biomaterials via Supramolecular Assembly of Biomolecule Fusions

By

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Research in the Hudalla lab creates functional materials for therapeutic or diagnostic applications via “self-assembly”, the spontaneous organization of molecules into supramolecular structures. In general, we first develop synthetic peptides that self-assemble into a desired nano-scale architecture, and then use these peptides as “fusion tags” to organize biologically active molecules into functional materials. One aspect of my research program focuses on creating biomaterials that can recognize carbohydrate-binding proteins, or “lectins”, via self-assembly of synthetic glycopeptides. This talk will present examples of biomaterials that can inhibit lectin bioactivity via non-covalent capture within lectin-rich environments, or harness lectin bioactivity via controlled release into lectin-poor environments. Another aspect of my research program focuses on creating peptides that cannot self-assemble due to electrostatic repulsion, yet co-assemble into prescribed nano-scale architectures upon mixing via electrostatic complementarity. Expressing each peptide as a recombinant fusion tag appended onto a different protein ligand enables fabrication of multi-functional biomaterials with modular composition via mixing-induced co-assembly. This talk will highlight examples of nano- to macro-scale biomaterials with integrated functional protein ligands fabricated via charge-complementary fusion tags.

Biography:

Dr. Hudalla is currently an Assistant Professor in the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida. Prior to his current appointment, Dr. Hudalla was an NIH F32 post-doctoral fellow at the University of Chicago under the guidance of Prof. Joel H. Collier, and a visiting scholar at Northwestern University under the guidance of Prof. Milan Mrksich. Dr. Hudalla received his B.S. in Chemical Engineering from the Illinois Institute of Technology in 2004 and an M.S. in Biomedical Engineering from the University of Wisconsin in 2006. He received his Ph.D. in Biomedical Engineering from the University of Wisconsin in 2010 for research conducted under the guidance of Prof. William L. Murphy. Dr. Hudalla has published numerous research articles, is the co-editor of the book, “Mimicking the Extracellular Matrix: The Intersection of Matrix Biology and Biomaterials”, and holds two patents for technologies related to self-assembled biomaterials. Dr. Hudalla received the NSF Career award in Biomaterials in 2015 and is supported by research grants from NIH. Dr. Hudalla was named an *Emerging Investigator* by the Journal of Materials Chemistry B in 2016, a *Young Innovator* by Cellular and Molecular Bioengineering in 2016, and was recognized for *Outstanding Contribution* by the Biomedical Engineering Society in 2014.

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