CHEMISTRY & BIOCHEMISTRY

UCMERCED

DATE **10/04/2024** | TIME **10:30am** | LOCATION **ADMIN 364**

CHEMISTRY & BIOCHEMISTRY SEMINAR SERIES:

Harnessing the Precision of Biorecognition for the Development of Responsive, Functional Nanomaterials

Abstract:

Nature has exploited the precision of biorecognition events for the development of inorganic materials for critical applications ranging from protection against predation to structural support. These materials are generated under sustainable conditions where the translation of such approaches to material compositions of technological importance could provide pathways to address current needs in applications ranging from energy harvesting and storage to biological sensors and theranostic systems. At present, only minimal understanding is known concerning the direct interaction between biological and bio-inspired molecules (e.g. peptides, DNA, peptoids etc.) with inorganic materials, where the ability to predictably design these biomolecules with affinity for the target system remains unachieved. By having such capabilities, the ability to fabricate functional materials with desired properties on demand could be accessed for immediate use in targeted applications. In addition, due to the great complexity achievable from biosystems, the biomolecules could be designed with secondary functionalities beyond inorganic material affinity, thus generating final structures with multifunctional capabilities. Our research has focused on the design of new bio-inspired systems with the ability to fabricate multifunctional materials. More recently, this includes the incorporation of functional moieties into biomolecules bound to nanoparticles to engender these structures with multifunctional catalytic capabilities. These structures are highly responsive to optical switching for remote activation for long-term catalytic control, multistep catalytic properties, or 3D reconfigurable assembly.

Marc R. Knecht

Professor and Chair
Department of Chemistry
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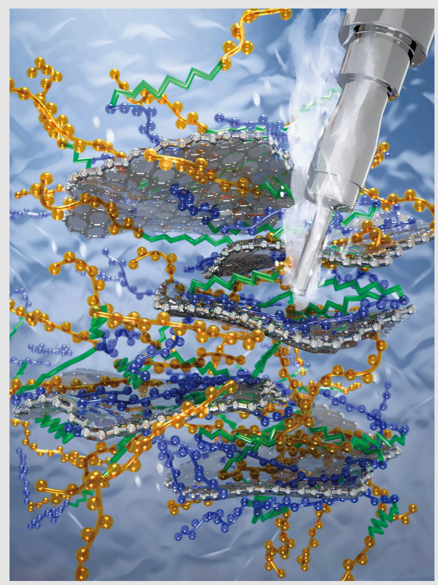

About the Speaker:

Marc R. Knecht earned a B.S. degree in Chemistry from Duquesne University in 2001. In 2004, he received a Ph.D. in Bio-Inspired Chemistry from Vanderbilt University under the direction of Professor David W. Wright, followed by postdoctoral research at the University of Texas with Professor Richard M. Crooks focused on characterizing the structure/function relationship of nanocatalysts. After completing postdoctoral studies, he began his independent career as an assistant professor of Chemistry at the University of Kentucky. In the summer of 2011, Professor Knecht joined the Department of Chemistry at the University of Miami as an associate professor, where he was appointed as the Associate Director of the Dr. J.T. Macdonald Foundation Biomedical Nanotechnology Institute at the University of Miami (BioNIUM) in 2018. In 2019, Professor Knecht was promoted to the rank of professor and subsequently became department chair in 2021. During his independent career, Professor Knecht has established a research program focused on elucidating the effects of the biotic/abiotic interface of bio-inspired nanomaterials. In this regard, his group has employed high-resolution characterization, activity studies, and synthetic analyses of peptides to demonstrate that the biological surface of bionanomaterials possesses significant control over the functionality and could serve as modification sites to control the activity. Such experimental studies are reinforced with close collaborations with computational simulation to provide atomic-level resolution on biomolecular interactions to control structure/function relationships.

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