The Central Massachusetts Section of the American Chemical Society

invites you to a Section Meeting to be held at

Fitchburg State University

160 Pearl Street, Fitchburg, MA 01420

Falcon Hub, Hammond Hall

Wednesday, March 29, 2017

New Faculty Night

In continuing our recent tradition, we have asked three new faculty within the section to present a brief overview of their research to help introduce them to the local chemistry community. We will continue the format used last year – a dinner meeting preceded by a reception with cash bar.

5:30 - 6:30 **Social Hour – hors d'oeuvres and cash bar (beer and wine)**

6:30 - 7:30 **Buffet Dinner**

7:30 – 8:30 **Presentations**

Dr. Steven Fiedler, Assistant Professor, Fitchburg State University

Dr. Susan Mitroka, Assistant Professor, Worcester State University

Dr. Anita Mattson, Associate Professor, Worcester Polytechnic Institute

You must pre-register for the meeting. Cost of dinner is $15 per person (members and non-members); students: $8 per person. The section is subsidizing the cost of dinner. No cost for attending lecture only. Payment can be made when you check in – checks preferred. To register, please e-mail Dr. Mel Govindan at mgovindan@fitchburgstate.edu. Phone: 978-660-8831. We must have a head count by **March 22, 2017**. Please indicate your choice of entrée: Chicken, Fish or Vegetarian. You may park in any of the parking lots along North Street – your entryway to FSU. Hammond Hall is the tall brick and glass building at the entrance to the Campus.

Abstracts and Bios

Steven Fiedler is currently an Assistant Professor of Chemistry at Fitchburg State University. He earned his B.S. in Chemistry at Michigan Technological University and received a Ph.D. in Chemistry from the University of California, Irvine in 2002 working with Professor Ara Apkarian. He subsequently served as a post-doctoral fellow at the University of Jyväskyla in Finland and was a Senior Research fellow at the University of Michigan. Dr. Fiedler's research interests include the study of solvated environments by electronic structure and molecular modeling approaches.

Interrogating Solvation with Atomic and Molecular Probes. The interaction between a solute and solvent can provide insight into very different solution environments. Electronically excited helium atoms and molecular excimers can serve as probes of high-energy excitation events in liquid helium. Small molecules approaching the nanoparticle size can interrogate the passive diffusion process of molecules through the stagnant water layer adjacent to cell membranes. Electronic structure and molecular modeling calculations on these systems are used to support experimental observations.

Susan Mitroka is in her fourth year at Worcester State University as a member of the Chemistry Department, currently serving as co-coordinator for the Biotechnology program. After earning her Ph.D. from Virginia Tech in 2010, Dr. Mitroka spent three years working as a post-doctoral researcher at Wake Forest University before joining the faculty at Worcester State. Her research interests broadly lie in the area of redox reactions and their involvement in biological and environmental chemistry. In her spare time, Dr. Mitroka is an avid runner, fencer and piano player.

Nitroxyl (HNO) Targeting of Thioredoxin Reductase 1 and Selenocompounds: A Novel Approach to Cancer Therapy. My current research centers around nitroxyl (HNO) chemistry, studying the effects of HNO on seleno-compounds. Nitroxyl (HNO), the simplest nitroso compound, reacts as a potent electrophile and rapidly forms addition products with nucleophiles. There is evidence to indicate that selenium-containing proteins would be a preferred target of HNO suggesting the possible selective inhibition of seleno-enzymes with HNO based compounds. Of specific interest to my research group is the enzyme Thioredoxin Reductase 1 (TrxR1). The unique chemical composition of TrxR1 and its link to cancer progression make inhibition of this redox protein an attractive anti-cancer strategy. Given the unique chemical nature of the enzyme active site, irreversible modification through an electrophilic agent promises to be a viable means of deactivating the protein. Our preliminary work indicates in vitro deactivation of this protein via HNO. Current chemical and computational studies are further developing the reaction rate, transition state energy and overall affinity of this selenoprotein for nitroxyl.

Anita Mattson received her B.S. from Northern Michigan University. She then joined Northwestern University for her Ph.D. where she worked with Prof. Karl Scheidt developing new thiazolium-based strategies for acyl anion addition reactions. After post-doctoral research with Prof. Michael Crimmins at UNC- Chapel Hill, she joined the faculty of the Ohio State University in 2009 as an assistant professor in the Department of Chemistry. She was promoted to associate professor with tenure in 2015. Dr. Mattson moved to WPI last fall as an associate professor of chemistry. Her current research interests include solving problems in complex molecule construction through the strategic design and application of new non-covalent catalysts.

Enantioselective C–C Bond Construction with Non-Covalent Catalysis. Reactive cations, such as oxocarbenium ions and benzopyrilium ions, are useful intermediates in complex molecule synthesis. Unfortunately, it can be challenging to control the stereochemical outcome of reactions with these species as conventional catalysts (i.e., Lewis acids, transition metals) that operate through covalent bonding are often not effective. One aspect of our research program is focused on advancing innovative families of non-covalent catalysts and their associated methodology to enable the enantioselective functionalization of biologically relevant heterocycles that are difficult to control with currently available catalysts. This presentation will focus on recent advances made in our laboratory with the design and application of silanediol catalysts in enantioselective chromen-4-one functionalization.