Post-docs Vital to Clemson University Innovation
By: Anand Gramopadhye
Dean of the College of Engineering and Science

Postdoctoral researchers and research advisors play a vital role in Clemson University’s research engine. They are crucial to the innovation that happens here. We want post-docs to not only conduct the best research, but also to gain the best experiences. These experiences will position them for success as post-docs at Clemson and into their careers beyond the university’s walls. The College of Engineering and Science is a proud sustaining member of the National Post-Doctoral Association. Last year, we launched the Post-Doctoral Support Office, which is overseen by Tanju Karanfil, the associate dean for research and graduate studies. Having the office and a community of scholars allows us to set high benchmarks, learn from each other and constantly improve. The office provides centralized resources to the many postdocs spread across the college. Activities have included celebrations of Post-doc Appreciation Week and a Post-doc Summer Seminar Series. We should also remember the role research advisors play. They are vital to post-docs’ professional and personal development. I wish all post-docs and research advisors the best as we embark on a new academic year. I would love to hear about your experiences in the lab with undergraduate and graduate students. I also welcome your suggestions on how we can strive to be the best we can be. Please continue to share your ideas with your respective colleges, so we can provide the best experiences and recruit top talent to Clemson.

Upcoming Events:

Next CUPDA Meeting
Join us on December 8th—3:30 to 5pm
123 Freeman Hall—Hope to see you there!

CUPDA Group Lunch—Harcombe Dining Hall—Fri. Dec. 11th at Noon $5 Friday (self-pay) Great opportunity to meet with other Postdocs!

Holiday Party—
December 17, 2015
11:30 to 2:30—Riggs 100A
Pizza and lots of laughs! Bring a gift of at least $5 and join in on the fun of the Pirate Gift Exchange! Come out and celebrate!

Keep your eyes open for more information about nominating your favorite Post-doc for the CUPDA—

Distinguished Postdoc Award!
Application information will be sent out Jan. 2016! The award will be announced in May!

CUPDA Travel Award
New application coming out soon! Be the first to submit your application and documentation to get funds to help you attend meetings to present! Good Luck!

See you next year!
CUPDA—NATIONAL POSTDOCTORAL APPRECIATION WEEK

CUPDA celebrated National Postdoctoral Appreciation Week, September 21-25, 2015. We kicked off our celebration with lunch on Friday the 18th in Harcombe dining hall. We invited all post-docs to come by and visit with each other.

On Wednesday the 23rd, the group planned a fun evening of bowling at the Underground, located in the University Union. A few post docs and their families showed up for lots of laughs.

The week wrapped up with a buffet dinner and guest panelists at the Madren Center on Friday, September 25. The panelists shared some insightful information with the group of about 30 post docs. Discussion included ideas about job searches and, how to better their research and collaborate to succeed in the future. They shared both academia insights as well as obtaining positions in the public sector.

Thank you to all who attended the events, and a special thank you to the faculty panel: Dr. Mark Blenner (Chemical & Biomolecular Engineering), Dr. Brian Powell (Environmental Engineering and Earth Science), Dr. Lukasz Kozubowski (Biochemistry and Molecular Biology) and Dr. Rachel Getman (Chemical & Biomolecular Engineering).

CUPDA 2015 SUMMER SEMINAR SERIES

TITLE: MAGNETIC STRUCTURE DETERMINATION OF NEWLY DISCOVERED MAGNETIC SOLIDS USING NEUTRON POWDER DIFFRACTION

SPEAKER—DR. DUMINDA SANJEEWA, DEPT. OF CHEMISTRY

ADVISOR—DR. JOSEPH KOLIS

Abstract—Neutron powder diffraction is increasingly recognized as one of the most powerful techniques for studying the structural and magnetic properties of advanced materials. The understanding of both the theoretical models and the concepts of low dimensional magnets gained momentum with the discovery of high Tc super-conductivity. Therefore, the study of the magnetic properties of low dimensional magnetic systems, including one dimensional (1-D) and two-dimensional (2-D) systems have played an important role in condense matter physics. For example, pyroxene group with the general formula of AMX₂O₆ (A = Li, Na; M = Ti³⁺, V³⁺, Cr³⁺, Mn³⁺, Fe³⁺; X = Si⁴⁺, Ge⁴⁺) has received considerable attention because of the presence of quasi-one-dimensional (Q1D) magnetism and multiferroic phenomena; associated with its unique M–O–M skew chains formed by edge-shared MO₆ octahedra. Further, systems with two-dimensional lattices such as Kagome and honeycomb-like framework have generated considerable interest due to their rich magnetic behavior. Their magnetic properties can be tuned from long range magnetic order to spin–liquids by changing the strength of the next-nearest-neighbor interactions.

However, unavailability of good sizable single crystals limited the detail magnetic property characterization. In this presentation I will describe the hydrothermal synthesis of new magnetic solids, magnetic property characterization and magnetic structure determination using neutron powder diffraction.

CUPDA FALL 2015 TRAVEL AWARD RECIPIENTS

In an effort to enhance the professional development of postdocs on campus, the Clemson University Post-Doctoral Association (CUPDA) is pleased to announce the availability of Travel awards beginning in the Fall (2015).

These funds are only intended to assist postdocs with travel expenses to conferences where research will be presented.

Three $500 awards were given in the Fall semester to postdocs who met the criteria. The recipients were:

Jorge Rodriguez (Bioengineering)
Milanoo Rahman (Mech Eng.)
Gabriel Rodriguez (Chem. Eng.)

The application for Spring 2016 will open soon—be on the look out if you are interested!
Abstract: Previously thought to be found exclusively in the bacteria, XFP catalyzes the production of acetyl phosphate from the breakdown of xylulose 5-phosphate or fructose 6-phosphate, is also present in pathogenic fungi "Cryptococcus neoformans". We are investigating the xylulose-5-phosphate/fructose-6-phosphate phosphoketolase1 (Xfp1)-acetate kinase (Ack) pathway, one of two possible pathways for acetate production in C. neoformans. Unlike other bacterial and some fungi C. neoformans has two XFP enzymes. Earlier, our lab has characterized the Cn-XFP2 and Cn-Ack in this pathway. Until now, the biochemical characterization of fungal XFP1 has not been reported. We have expressed and purified recombinant C. neoformans XFP1 (Cn-XFP1) in E.coli system using various expression vectors with different purification tags. However, the recombinantly expressed and purified Cn-XFP1 is soluble but lack activity. Many eukaryotic proteins undergo Post Translation Modification (PMT) to be active. Based on previous studies, fungal XFP1 family members needed to be phosphorylate to be active. We cloned, expressed and purified recombinant C. neoformans XFP1 (Cn-Xfp1) in E.coli system using various expression vectors with different purification tags. However, the recombinantly expressed and purified Cn-XFP1 is soluble but lack activity. Many eukaryotic proteins undergo Post Translation Modification (PMT) to be active. Based on previous studies, fungal XFP1 family members needed to be phosphorylate to be active. We cloned, expressed and purified recombinant C. neoformans XFP1, pSer454 using Rinehart lab reagents for improved expression of pSer proteins. The pSer476 Cn-XFP1enzyme is active. The phosphorproteome studies C. neoformans var. grubii and conserved motif "RxxSP" shows, cAMP depended Protein Kinase A (PKA) phosphorylates Cn-XFP1. The structur-al camparision with other XFP crystal structure shows pSer476 regulates the activity of Cn-XFP1 by regulating catalytic glutamate residues. The structural and functional studies of pSer476 were discussed using the bacterial and fungal XFP2 as models.
TITLE - THE IMPACT OF THE GOLD nanoparticle STABILIZING lig-
ands on CATALYSIS

SPEAKER - DR. SIYAM M. ANSAR, DEPT. OF CHEMICAL & BIOMOLECULAR ENGINEERING

ADVISOR - DR. CHRISTOPHER KITCHENS

Abstract - During the past few decades, gold nanoparticles (AuNPs) have attracted enormous attention due to their unique catalytic activities, which are not revealed in bulk gold. Examples of the reactions catalyzed by AuNPs include the oxidation of hydrocarbons, alcohols, and glucose, as well as, direct synthesis of H2O2 from H2 and O2. In most nanoparticle applications, surface functionalization with ligands is essential to prevent from aggregation, however this surface passivation causes significant reduction of catalytic activity and selectivity. For example, organo sulfur compounds are well known poisons of AuNP catalysis. The effect of stabilizing ligand on the catalytic property of AuNP is yet to be explored in detail. In this work, we perform an in-depth study of effect of nanoparticle stabilizing ligands such as mercaptoundecanoic acid (PEG) and 11-mercaptoundecanoic acid (MUA) on the nanoparticle catalytic activity. The AuNP catalyzed reduction of 4-nitrophenol (4-NP) to 4-aminophenol (4-AP) by sodium borohydride (NaBH4) is used as a model reaction. Our results show that decreasing PEG chain length and increasing surface coverage of PEG on AuNP reduces the catalytic activity. Moreover, the functionalization of AuNPs with MUA completely inhibits the catalytic activity. Studying the correlation between the ligand molecular structure and percent surface coverage on the AuNP catalytic activity is important for our fundamental understanding of the mechanisms and the rate of catalytic activity of AuNPs for different redox reactions. This work also reports the synthesis of thiolated poly (acrylic acid) (PAA) functionalized AuNPs and explored its application as a recoverable catalyst where the PAA provides pH responsive dispersibility in aqueous media. Thus PAA-AuNPs are easily and completely recovered from the reaction mixture and reused in subsequent reactions. It was found that the AuNP-PAA catalyst was highly active and reusable in the catalytic reduction of 4-NP to 4-AP with 100% conversion and modest reductions in the reaction rate with up to four catalyst recycles.

TITLE - HUMAN-ROBOT COLLABORATION IN FLEXIBLE LIGHT ASSEMBLY IN MANUFACTURING

SPEAKER - DR. MIZANOOR RAHMAN, DEPT. OF MECHANICAL ENGINEERING

ADVISOR- DR. SOPHIE WANG

Abstract - Manufacturing industries are facing severe challenges and global competitions due to the requirements of high productivity and quality, cost effectiveness, and skilled workforces. Based on our case studies, we realize that assembly in light manufacturing is the stage where expenditures occur the most as the utilization of manpower and materials and the requirements of maintenance and utilities are high in this stage. Manual assembly is tedious, burdensome to workforces, inefficient, and affects worker’s health and safety. Hence, automation of assembly should be prioritized, but industrial automation is expensive and inflexible. The recent advancements in low cost light-weight flexible robot manipulators such as Baxter, Kinova, etc. have opened the door to improve assembly productivity and quality through effective human–robot collaboration. To exploit this opportunity, we develop human-robot hybrid cells where a human and a robot collaborate to perform flexible light assembly in manufacturing. We implement various strategies to make the collaboration effective such as (i) we implement an affection-based motion planning strategy for the robot that helps the robot change its affections (emotions) based on assembly task situations on dynamic contexts and adjust its motion accordingly, (ii) we develop human-robot mutual trust-based optimal subtask allocation and motion control algorithms, (iii) we develop the robot’s handover strategy to hand over assembly parts to the human co-worker based on robot’s trust in the human. We develop various detection strategies that help the robot detect wrong assembly parts, unsafe events, and wrong orientation of assembly parts during the assembly. The strategies integrate concepts from various fields such as robotics, control theories, system dynamics, human factors, biomechanics, computer vision, artificial intelligence and manufacturing. Evaluation of the novel strategies shows significant improvement in productivity, quality and safety in human-robot collaborative assembly tasks.
Abstract- The Marcotte lab in the Genetics and Biochemistry Department is involved in the study of spider silk protein fibers. We are interested in how spiders make them, what conditions are required for proper production and how to replicate this in a laboratory setting. Currently, we have 2 systems that utilize eukaryotic expression to produce mimics of the major ampullate gland proteins MaSp1 and MaSp2 which make up the protein core of drag line silk. Our first system uses tobacco plants to produce the drag line protein mimics for isolation from leaf tissue. The second system uses Leishmania parasites to secrete the drag line protein mimics into culture media. Both systems have been successful in producing fibers and we are studying the physical properties of these fiber mimics.

Abstract- Inorganic oxide materials display a wide array of applications both in chemistry and also in materials science. Structural diversity in these materials is evidenced through the various connectivity and compositions within the structure as well as the various oxidation states that the metal can adopt. Many naturally occurring oxides display interesting properties such as optical activity, catalytic activity, and specifically of interest to our group, magnetic properties. Of particular interest is Cu$^{2+}$ due to its unpaired d-electron. The synthesis of these materials is accomplished through both a lower temperature (≤220°C) and a high temperature (500-700°C) method. To identify the materials synthesized, single-crystal X-Ray diffraction is employed. One particular material of interest is the naturally occurring mineral euchroite which contains a magnetically interesting arrangement of copper (II) atoms. Furthermore, the system can be complicated by changing the transition metal from copper to iron, nickel, manganese or cobalt, and a secondary metal such as molybdenum or tungsten can be added. My talk will provide an introduction into the exploratory chemistry of these systems and a discussion of a new mixed-valent iron molybdate synthesized through the lower temperature hydrothermal method.
POSTDOC ASSOCIATION

The Clemson Post-Doc Association was established in September 2014 as an organization to connect and unify the Clemson University population of post-doctoral scholars.

To contact the CUPDA: cupostdoc@g.clemson.edu

NATIONAL POSTDOCTORAL ASSOCIATION

CUPDA is a member of the National Postdoctoral Association (NPA). The National Postdoctoral Association (NPA) is a member-driven, 501(c)3 nonprofit organization that provides a unique, national voice for postdoctoral scholars. Since 2003, we have taken on the ambitious agenda to enhance the quality of the postdoctoral experience in the United States. We have assumed a leadership role in addressing the many issues confronting the postdoctoral community that are national in scope and requiring action beyond the local level. Headquartered in Washington, D.C., the NPA meets its agenda through advocacy, resource development and community-building.

The National Postdoctoral Association (NPA) Annual Meeting is the largest meeting and networking event in the postdoctoral community. Each meeting is highly engaging and productive for postdoctoral scholars, administrators, and other individuals working to enhance the postdoctoral experience. Our Annual Meetings are held each year in the spring. To see more visit: http://www.nationalpostdoc.org/?2016AnnualMeeting

MARCH 4 - 6, 2016
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