PENNSTATE

NEWSLETTER OF THE CENTER FOR ENVIRONMENTAL CHEMISTRY AND GEOCHEMISTRY

SUMMER 2009

Center for Environmental Chemistry and Geochemistry

INTERFACES

Environmental Chemistry Student Symposium - 2009

The 12th Annual Environmental Chemistry Student Symposium (ECSS) was held March 27-28 with keynote speaker Dr. Richard J. Reeder, Department of Geosciences, Stony Brook University. During his two keynote addresses, Dr. Reeder discussed his research in crystal growth mechanisms, sorption, and phase transformations as well as the speciation of environmental contaminants and how that relates to bioavailability and human health.

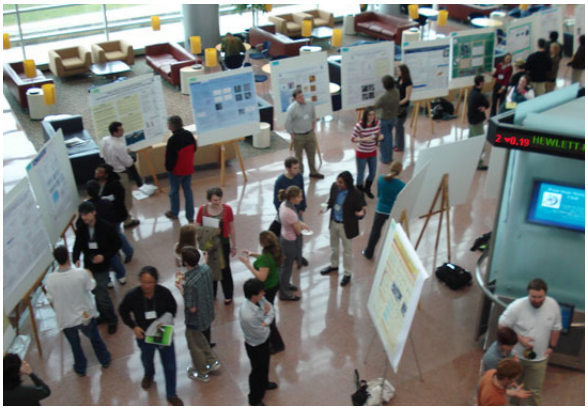
This year's symposium drew a diverse group of 65 undergraduate and graduate students who presented on a wide range of topics. Penn State participants represented several departments: Crop and Soil Sciences, Forest Resources, Horticulture, Geosciences, Materials Science and Engineering, Meteorology, Chemical Engineering, Civil and Environmental Engineering, Biology, Biochemistry and Molecular Biology, Chemistry, and Forensic Science.

In addition, 16 talks and posters were presented by students from the following regional universities: Howard University (see photo below); University of Virginia; Susquehanna

Charmaine Walker, Charlene Lawson, Maurice Jackson, Samuel Francis, Rachelle Spencer, Wm Stockwell (L to R)

University; Bucknell University; University of Maryland, Baltimore County; University of Maryland, College Park; and University of Maryland, Center for Environmental Science.

Elizabeth Herndon (Geosciences) received the highest overall score of all oral presentations for her discussion of the impact of aeolian deposition on manganese cycling in soils. The highest overall score in the poster presentations was awarded to David Doughty (Meteorology). He presented his research on the intercomparion of *in situ* tropospheric ozone measurements with Aura satellite products.



ECSS Poster Session held in the Business Building Atrium

This year's ECSS was made possible through the generous support of sponsors including the Center for Environmental Chemistry and Geochemistry, the Earth and Environmental Systems Institute, the Environment and Natural Resources Institute (as part of the College of Agricultural Sciences), the Penn State Institutes of Energy and the Environment, the Eberly College of Science, the College of Earth and Mineral Sciences, and the College of Engineering.

2009 ECSS Winners

Oral Session: Chemistry and Biochemistry
1st Prize: Caleb Strepka (Chemistry-PSU)
2nd Prize: Christin Morrow (Chemistry-PSU)
Oral Session: Biogechemistry and Soil Science
1st Prize: Elizabeth Herndon (Geosc-PSU)
2nd Prize: Heidi Albrecht (Geosc-PSU)

Oral Session: Ecology, Meteorology and Engineering
1st Prize: Alessia Eramo (Civil Engin-PSU)
2nd Prize: Luke McCormack (Horticulture-PSU)
Oral Session: Undergraduate
1st Prize: Suzanne Burns/Mallie Toth (Univ of VA)

Poster Session: Biogeochemistry
1st Prize-Tie: Prashanti Iyer (Integ Biosciences-PSU)
1st Prize-Tie: Daniel Jones (Geosc-PSU)
Poster Session: Chemistry & Soil Chemistry
1st Prize: Michael Castellano (Crop Soil Sci-PSU)
2nd Prize: Jana James (Forensic Sci-PSU)

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More Photos from the Environmental Student Symposium

1st Row: Maurice Jackson; Sue Brantley, Ming Tien, and Wayne Curtis
2nd Row: Christopher Heist; Becky Sanders and Maria Cazorla, ECSS Co-Chairs; Hengjing Yau
3rd Row: Aubrey Lashaway; Daniel Sarmiento; Charlene Lawson; Michael Castellano

Faculty Profile

Lampkin Investigates Ice Sheet Melt Dynamics

Derrick Lampkin, assistant professor of geography, uses remote sensing to investigate the response of the cryosphere to a changing climate from regional to basin scales. His research has taken him to Antarctica and led to the development of a prototype of a wireless robotic rover.

A NASA-funded project, the rover was developed to augment the Automatic Weather Station (AWS) network by providing climate data across a range of scales. Design challenges included creating a mechanism to retract instruments when the rover is mobile, a customized track system to maneuver across ice sheet terrain, and an intra-rover communication system that could overcome terrain.

Lampkin, who grew up in Los Angeles where he attended a math/science magnet school, spent summers on his grandparents' farm outside of Cleveland, Ohio, where using a guidebook, he learned to identify rocks. Encouraged to pursue higher education by his grandparents, Lampkin opted for Ohio State, his grandfather's alma mater.

With the goal of becoming an astronaut—a childhood dream—he majored in geosciences, studying planetary geology. The physics that describe geophysical phenomenon on Earth have comparable processes in planets, says Lampkin.

His first exposure to glaciology came while working as an undergraduate research assistant at Ohio State's Byrd Polar Research Center, where he worked on passive microwave remote sensing of surface melt dynamics over Antarctica. During this period, he participated in a research expedition to West Antarctica, where he collected data to validate satellite-derived melt signatures. When he went to the University of Arizona for graduate school, he continued to work on cryosphere issues related to alpine snowmelt processes—although for NASA's Southwest Regional Earth Science Applications Center (RESAC).

Lampkin received his Ph.D. in geography from the University of Arizona. He received the NASA Earth System Science Fellowship in support of his dissertation work on improved snowmelt monitoring over alpine basins using optical and thermal satellites.

Currently, his research interests are focused on monitoring and modeling dynamics in the supra-glacial environments in both Antarctica and Greenland with a particular focus on improved assessment of melt magnitude, the spatio-temporal variability of supra-glacial lakes and their indication of how surface melt infiltrates these great ice sheets as well as atmosphere-ice sheet exchanges that drive melt dynamics.

CECG Briefs

CECG has extended a call for **Research Initiation Grants (RIGs)** in Environmental Chemistry and Geochemistry with proposals due by July 1, 2009. The objective of this program is to initiate new efforts in environmental chemistry and geochemistry at Penn State University. Awards up to $10,000 will be presented to faculty or staff who present a qualified proposal that has potential for future funding, is unique, diversified and is within the fields of environmental chemistry and geochemistry. Applications can be found on the CECG website at: www.essc.psu.edu/CECG/ and can be submitted to Debbie Lambert, 2217 EES Building.

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Poster Session: Environmental Engineering and Ecology I
1st Prize: Heather Hunt (Civil Engin-PSU)
2nd Prize: Patricia Castellanos (Univ MD, C. Park)

Poster Session: Environmental Engineering and Ecology II
1st Prize: Caroline Newcombe (Civil Engin-PSU)
2nd Prize: Hengjing Yan (Civil Engin-PSU)

Poster Session: Meteo and Atmospheric Science
1st Prize: David Doughty (Meteo-PSU)
2nd Prize: Erin Goken (Chemistry-PSU)

Poster Session: Undergraduate, Session 1
1st Prize: Victoria Dominguez (Forensic Sci-PSU)
2nd Prize: Ashley Evanoski (Susquehanna Univ)

Poster Session: Undergraduate, Session 2
1st Prize: Charlene Lawson (Howard Univ)
2nd Prize: Nathaniel Meyer (Meteo-PSU)

Photo Contest
1st Prize: Jaime Ann Miller (Undergrad-PSU)
2nd Prize: Aaron Diefendorf (Geosc-PSU)
3rd Prize: Brittany Confer (Undergrad-PSU)

T-Shirt Design Contest
Daniel Mendenhall (Undergrad-PSU)

Introducing CECG Graduate Students

Camille Stephen

Hometown: Nassau, Bahamas
Dept: Biochemistry and Molecular Biology
Degree sought: Ph.D.
Advisers: Dr. Ming Tien and Dr. Susan Brantley
Anticipated Graduation: Fall 2010

What is your research? My research focuses on the expression of outer membrane cytochrome and pili proteins, involved in electron transfer, in multilayer Geobacter biofilms. Geobacter sulfurreducens is an iron reducing bacteria that lives in anoxic subsurface environments. It is able to use various electron acceptors like iron, manganese, technetium, uranium and chromium for anaerobic respiration. This makes Geobacter a powerful tool for bioremediation of contaminated soil and groundwater. Prior research has shown that G. sulfurreducens reduces iron oxides via direct contact. There is a lack of evidence to support iron reduction in Geobacter through the production of electron shuttles or iron chelators. One way in which Geobacter can make direct contact with the iron oxide or any other solid electron acceptor is by forming a biofilm. I am interested in looking at the reduction of a solid electron acceptor in a Geobacter biofilm to determine whether there are any outer membrane cyto chromes or pili proteins that are differentially expressed based on the proximity of the cells to the solid electron acceptor. Antibodies produced against several cytochrome and pili proteins found in Geobacter will allow us to localize these proteins in the biofilm and visualize their expression with transmission electron microscopy (TEM).

Describe when you first became fascinated with science: I first became fascinated with science in Primary/ Elementary school. I enjoyed watching science based shows like "The Nature of Things," the "Discovery Channel" and "Bill Nye the Science Guy." I was also interested in learning about diseases that impacted the world like the 1918 Spanish Flu and the Bubonic Plague (Black Plague). In high school, I was convinced that I wanted to pursue a degree in biochemistry in college. When I went to college and took microbiology, I became passionate about this field of research. I found microbiology to be very intriguing. To be able to look at and study microorganisms that can not be seen with the naked eye, but are everywhere and impact our lives everyday was just amazing. I obtained my bachelors in Cellular and Molecular Biology. Now in graduate school, I am able to combine both biochemistry and microbiology to study the iron reduction pathway in Geobacter.

What are your future plans? My future plans are to do a post-doctoral fellowship either at a university lab or a government lab for two or three years. After that I would like to do research at one of the government labs in the area of environmental microbiology or biomedical microbiology.

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CECG Summer Fellowship Awardees

The CECG awards Summer Fellowship support to Penn State undergraduate or graduate students to pursue work on research topics related to environmental chemistry during summer sessions. This is a broad request where research areas ranging from the biological sciences to engineering to geochemistry are considered. This semester CECG has funded six students.

2009 CECG Summer Fellowship Awardees:
Meredith A. Hill Bembenic, Department of Environmental Mineral Engineering - C. Burgess Clifford, adviser
Quanying Du, Department of Ecology - Dave Eissenstat, adviser
Prashanti Iyer, Department of Chemical Biology, Ming Tien, adviser
Jana James, Department of Forensic Chemistry, Dan Sykes, adviser
Lymaris Ortiz Rivera, Department of Chemistry, Karl Mueller, adviser
Sara Smith, Department of Forensic Chemistry, Dan Sykes, adviser

(Continued from page 3)

Trinh DeSa

Hometown: Stroudsburg, Pa.
Dept: Civil & Environmental Engineering
Degree sought: M.S. Environmental Engineering
Adviser: Dr. William Burgos
Anticipated Graduation: August 2009

What is your research? My research involves the passive treatment of acid mine drainage (AMD) caused by water discharging from abandoned and active coal mines. The water is acidic and contains high metal concentrations which pollute the surrounding environment, especially streams. Thousands of AMD discharges and subsequently hundreds of miles of streams in Pennsylvania and the Appalachia region are unable to support fish or other life. Active treatment of these sites is very expensive, and therefore, most discharges are left untouched. I am working on developing low cost solutions that use natural formations and processes to remove the metals. Specifically, I am utilizing bacteria to oxidize the dissolved metals which cause them to precipitate, or form solids that fall out of the water, before the water reaches the streams. Low cost solutions would allow more AMD sites to be cleaned up and therefore bring more streams back to a healthy state. **Describe when you first became fascinated with science:** Ever since I was little, I enjoyed playing with Legos and would build structures such as houses and castles. As I got older, I started to construct entire towns and even bridges out of Knex sets for my Lego trains. This fascination with plastic land development continued to my college career where I majored in Civil Engineering. However, around my junior year, I became more interested in environmental issues, possibly because I have many outdoor hobbies, or the classes were easier. Despite the reasons, I focused on environmental studies and put transportation and land development on the backburner. But I still have my Legos and Knex in my garage and maybe one day I'll build my town again. **What are your future plans?** After graduation, I plan to work for an environmental consulting firm on surface and groundwater remediation projects. I want to focus on the clean-up component of water treatment and not distribution, which includes Brownfield redevelopment and Superfund sites. Preferably, I would like to live in the northeastern United States, but with the weak job market, I may have to relocate to other areas. My ultimate goal is to start my own water treatment company, but that is a long way down the road.

The Center for Environmental Chemistry and Geochemistry
Anne Thompson, Director
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Center for Environmental Chemistry and Geochemistry

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