2014

2014 Symposium Brochure

STEM SURE/IRES, NANOSAFE REU, WVU SURE, CENTER FOR NEUROSCIENCE SURI

Summer Undergraduate Research Symposium

Thursday, July 24, 2014
Erickson Alumni Center
West Virginia University
Morgantown, WV

nanosafe.wvu.edu - nsf-reu
www.honors.wvu.edu/sure or /STEMSURE - www.hsc.wvu.edu/wvucn

Building the Future of West Virginia, One Idea at a Time

Summer Undergraduate Research Symposium 2014
West Virginia University

Thursday July 24, 2014
Erickson Alumni Center, Ruby Grand Hall

I. Schedule of Events

9:00-9:30 AM	Poster Setup ─*Undergraduate participants arrive, register, and put up posters. Participants must leave Erickson Alumni Center by 9:30 AM and should return at 11:00 AM.*
9:30-11:00 AM	Poster judging ─ *No participants present and not open to public.*
11:00-11:45 AM	Welcome and Key Note Speaker ─ *All welcome: parents, research advisors, graduate students, undergraduate participants, and general public.* • *Welcome: Dr. Michelle Richards-Babb, Associate Prof., WVU Chemistry* • *Introductory Remarks: Dr. Ken Blemings, Interim Dean, WVU Honors College* • *Key Note Speaker: Dr. Melanie Page, Assistant Vice President for Creative and Scholarly Activity, WVU Research Office*
11:45 AM-12:30 PM	Lunch ─ *Judges and poster presenters first priority.*
12:30 PM-2:30 PM	Poster Presentations ─ *Open to all and concurrent with final judging of posters. Poster judging will continue with judges assessing participant's ability to answer questions related to his/her research.* ***Judges have preference!***
2:30-3:00 PM	Awards Ceremony and Closing Remarks
3:00 PM	Poster Take-Down ─ *Any posters remaining after 3:30 PM will be removed by the staff.*
3:05 PM	*Post-questionnaires (Nano REU & STEM SURE participants)*

II. Poster Judges

Judge	WVU Affiliation	Category Judging
Paul Chantler	Human Performance and Ex. Physiology, School of Medicine	*Biological & Health Sciences*
Linda Vona-Davis	Surgery, School of Medicine	*Biological & Health Sciences*
Todd Petty	Forestry & Natural Resources, Davis College	*Agricultural & Environmental Sci.*
Amy Welsh	Forestry & Natural Resources, Davis College	*Agricultural & Environmental Sci.*
Cheng Cen	Physics & Astronomy, Eberly College	*Physical Sciences & Engineering*
Yong Yang	Chemical Engineering, Statler College	*Physical Sciences & Engineering*
Paul Miller	Physics & Astronomy, Eberly College	*Specialty Fields: Nanoscience, Outreach, Other*
Cate Schlobohm	Freshman Engineering, Statler College	*Specialty Fields: Nanoscience, Outreach, Other*

We want to take this opportunity to thank our poster judges. Their willingness to act as judges for this event is greatly appreciated by the organizers and participants!

WestVirginiaUniversity.

III. Undergraduate Participants and Faculty Research Mentors

A. Nano Research Experiences for Undergraduates (REU) Site: Multifunctional Nanomaterials (PI: Michelle Richards-Babb; co-PI: David Lederman)

Participant	Poster	Major	Home School	Faculty Advisor
Emily-Jean Bankes	Spec Fields #10	Chemistry & Mathematics	Andrews University	Kung Wang, Chemistry
Ashley Batesole	Phys Sci & Eng #12	Mechanical & Electrical Eng.	Ohio Northern University	Alan Bristow, Physics
Lauren Dallachiesa	Phys Sci & Eng #11	Physics	Grove City College	Mikel Holcomb, Physics
Zachary Decker	Spec Fields #14	Chemistry	New College of Florida	Fabien Goulay, Chemistry
Stacy Farley	Spec Fields #7	Comprehensive Chemistry	Concord University	Nick Wu, Mechanical & Aerospace Engineering
Quincy Hathaway	Phys Sci & Eng #5	Biology & Environ. Sci.	Waynesburg University	Tim Nurkiewicz, Physiology & Pharmacol.
Kelly Humphreys	Spec Fields #16	Chemistry & Biology	Fairmont State U.	Peter Gannett, Pharmacy
Asa Nichols	Spec Fields #6	Chemistry	West Virginia Wesleyan C.	Bjorn Soderberg, Chemistry
Taylor Price	Spec Fields #8	Physics	West Virginia Wesleyan C.	Jeremy Dawson, Elec. Eng.
Nick Sargent-Johnson	Ag & Env Sci #15	Chemistry & Chemical Eng.	Southern University A&M	Lisa Holland, Chemistry

B. STEM Summer Undergraduate Research Experiences (SURE) Site (Coordinator/Director: Michelle Richards-Babb; Assistant to Director: Corey Nida)

Participant	Poster	Major	Home School	Faculty Advisor
Darryl Baynes	Phys Sci & Eng #17	Mathematics	WVU	Marjorie Darrah, Mathematics
Catherine Blackwood	Ag & Env Sci #14	Biology & Psychology	WVU	Dan Panaccione & Jennifer Gallagher, Biology
Corrie Burlas	Phys Sci & Eng #15	Chemistry	WVU	Jessica Hoover, Chemistry
Megan DeJong	Ag & Env Sci #8	Biology	WVU	Stephen DiFazio, Biology
Taylor Gosnell	Phys Sci & Eng #8	Mechanical & Aerospace Eng.	WVU	Patrick Browning, Mech. & Aerospace Eng.
Madison Gump	Spec Fields #11	Forensic Science	WVU	Jacqueline Speir, Forensic & Investigative Science
Eric Harshbarger	Bio & Health Sci #12	Computer Science	West Virginia Wesleyan C.	Frances VanScoy, Computer Science
Janice Hartleroad	Phys Sci & Eng #13	Physics	WVU	Mikel Holcomb, Physics
Madelyn Harwell	Ag & Env Sci #18	Animal & Nutritional Sci.	WVU	Nicole Waterland, Horticulture
Zachary Herberger	Phys Sci & Eng #23	Physics & Mathematics	WVU	James Lewis, Physics
Melissa Hernandez	Bio & Health Sci #7	Chemical Eng.	WVU	David Klinke, Chemical Eng.
Payton Laws	Ag & Env Sci #4	Biochemistry	WVU	Kristen Matak, Human Nutrition & Foods

Participant	Poster	Major	Home School	Faculty Advisor
Julianne Liebenguth	Ag & Env Sci #11	Environmental Geoscience	WVU	Amy Hessl, Geography
Kristen Mastrantoni	Ag & Env Sci #17	Biochemistry	WVU	Jianbo Yao, Animal & Nut. Sciences
Lindsey Mosmiller	Bio & Health Sci #5	Psychology	WVU	Miranda Reed, Psychology
Dustin Myers	Phys Sci & Eng #18	Mechanical Eng.	WVU	Wade Huebsch & Shanti Hamburg, Mech. & Aerosp. Eng.
Patrick Nelson	Phys Sci & Eng #14	Physics & Mathematics	WVU	Ed Flagg, Physics & Astronomy
Arlo Parker	Phys Sci & Eng #16	Chemistry	WVU	Stephen Valentine, Chemistry
Jeffrey Stevens	Phys Sci & Eng #1	Mining, Civil & Environ. Eng.	WVU	John Quaranta, Civil & Environ. Eng.
Randi Tinney	Phys Sci & Eng #9	Chemistry	WVU	Ken Showalter, Chemistry

C. Poster Presenters Supported by Faculty Research Advisors

Participant	Poster	Major	Home School	Faculty Advisor
Kathleen Baker	Spec Fields #18	Computer Science & Women's and Gender Studies	WVU	Kasi Jackson, Women's and Gender Studies
Jordan Chapman	Phys Sci & Eng #22	Chemical Eng.	WVU	Cerasela Dinu, Chem. Eng.
Christopher Doss	Spec Fields #9	Computer Science & Physics	WVU	Paul Casack, Physics & Astronomy
Kyle Krowpman	Phys Sci & Eng #4	Physics & Mathematics	WVU	Amy Keesee, Physics & Astronomy
Emily Vandevender	Spec Fields #15	Chemistry & Spanish	WVU	Kirk Hazen, English
Margery Ellen Webb	Spec Fields #17	English & Biology	WVU	Kirk Hazen, English

D. International Research Experience for Students at Jilin University in China (PI: Michael Shi - CAREER Award funding for travel and partial funding through STEM SURE)

Participant	Poster	Major	Home School	Faculty Advisor
Alex Battin	Spec Fields #13	Biochemistry	WVU	Michael Shi, Chemistry
Kate Cardullo	Bio & Health Sci #9	Biochemistry	WVU	Michael Shi, Chemistry
Julia Oliveto	Spec Fields #5	Chemistry	WVU	Michael Shi, Chemistry
Julie Peng	Phys Sci & Eng #6	Chemical Eng.	WVU	Michael Shi, Chemistry
Christopher Radcliffe	Spec Fields #12	Chemistry	WVU	Michael Shi, Chemistry
Savannah Sims	Phys Sci & Eng #7	Chem. Eng.	WVU	Michael Shi, Chemistry

E. WVU Honors administered Summer Undergraduate Research Experiences (SURE) Site (PI: Dr. Ryan Claycomb; SURE Director: Amy Cyphert)

Participant	Poster	Major	Home School	Faculty Advisor
Alex Abrahamian	Bio & Health Sci #11	Biophysics	WVU	David Klinke, Chemical Eng.
Brittany Abruzzino	Spec Fields #1	Human Nutrition & Food Science	WVU	Melissa Ventura-Marra, Animal Science
Laken Adkins	Ag & Env Sci #13	Chemical Eng.	WVU	Debangsu Bhattacharyya, Chem. Eng.
Emily Artz	Ag & Env Sci #19	Psychology	WVU	Gary Marsat, Biology
Trevor Butcher	Phys Sci & Eng #10	Chemistry	WVU	Brian Popp, Chemistry
Kelly Devlin	Bio & Health Sci #2	Exercise Phys.	WVU	Paul Chantler, Human Performance
Brian Donnelly	Bio & Health Sci #8	Chemical Eng.	WVU	Ming Pei, Orthopedics
Ali El-Khatib	Spec Fields #2	Psychology	WVU	Rosanna Sikora, Emergency Medicine
Michael Elza	Ag & Env Sci #7	Biology and Wildlife & Fisheries Res.	WVU	James McGraw, Biology
Kelby Fetter	Ag & Env Sci #6	Agroecology	WVU	Eugenia Pena-Yewtukhiw, Plant & Soil Science
Jenay Grant	Ag & Env Sci #16	Biology	WVU	Jennifer Gallagher, Biology
Caleb Griffin	Ag & Env Sci #5	Agroecology	WVU	Eugenia Pena-Yewtukhiw, Plant & Soil Science
Quinn Jones	Phys Sci & Eng #3	Computer Science & Computer Eng.	WVU	Gianfranco Doretto, Computer Science & Electrical Eng.
Hilary Kinney	Spec Fields #19	Journalism & Political Science	WVU	Bradley Wilson, Geology
Sundus Lateef	Ag & Env Sci #3	Chemistry & Biology	WVU	Janet Tou, Animal Science
Connor Levy	Bio & Health Sci #10	Chemistry	WVU	Justin Legleiter, Chemistry
Rachel Montgomery	Ag & Env Sci #2	Biology & International Stud.	WVU	Andrew Dacks, Biology
Josh Moore	Bio & Health Sci #3	Exercise Phys.	WVU	Stephen Always, Exercise Phys.
John Moredock	Ag & Env Sci #9	Wildlife & Fisheries	WVU	Yon-Lak Park, Plant & Soil Science
Brandon Neeley	Bio & Health Sci #6	Chemistry & Biology	WVU	Blake Mertz, Chemistry
Lauren Norris	Spec Fields #20	Biology	WVU	Kim Barnes, Animal Science
Cassandra Orndorff	Ag & Env Sci #10	Agric. Biochem.	WVU	Joseph McFadden, Animal Science
Alexander Panaccione	Ag & Env Sci #12	Civil & Environ. Eng.	WVU	Lian-Shin Lin, Civil & Environ. Eng.
Eric Rogers	Phys Sci & Eng #19	Civil Engineering	WVU	Karl Barth, Civil & Environ. Eng.

Participant	Poster	Major	Home School	Faculty Advisor
Nima Ronaghi	Phys Sci & Eng #2	Biochemistry	WVU	Xiaodong M. Shi, Chemistry
Rebecca Speer	Bio & Health Sci #4	Psychology	WVU	Miranda Reed, Psychology
Michael Spencer	Phys Sci & Eng #20	Physics & Chemistry	WVU	Mikel Holcomb, Physics
Melanie Wieland	Spec Fields #21	Electrical Eng.	WVU	Jeremy Dawson, Electrical Eng.

F. Center for Neuroscience Summer Undergraduate Research Internships (SURI) (Director: George A. Spirou; Coordinator: Erica Stewart)

Participant	Poster	Major	Home School	Faculty Advisor
Derek Andreini	Phys Sci & Eng #21	Biochemistry	WVU	James Simpkins, Physiology & Pharmacology
Yarden Avnor	Bio & Health Sci #24	Integrative Neuroscience	Binghamton University	George Spirou, Otolaryngology
Caitlyn Bryan	Bio & Health Sci #23	Biology	WVU	Visvanathan Ramamurthy, Ophthalmology
Stephen Frazier	Bio & Health Sci #22	Physics	U. of Georgia	Sergiy Yakovenko, Human Performance-Ex Phys
Hailey Gosnell	Bio & Health Sci #21	Biology	U. of North Carolina-Chapel Hill	Eric Tucker, Neurobiology & Anatomy
Rachel Hamilla	Spec Fields #4	Psychology	Waynesburg U.	Hawley Montgomery-Downs, Psychology
Aditya Kesari	Ag & Env Sci #1	Biology	WVU	Andrew Dacks, Biology
Victoria Ledford	Bio & Health Sci #20	Communication s Studies	Marshall U.	Sergiy Yakovenko, Human Performance-Ex Phys
Matthew Lokant	Bio & Health Sci #19	Biochemistry	WVU	Valeriya Gritsenko, Human Performance-Phys Therapy
Monica Ly	Bio & Health Sci #18	Psychology	Carnegie Mellon U.	Paola Pergami, Pediatrics
Malosree Maitra	Bio & Health Sci #17	Neuroscience & Behavior	Mount Holyoke C.	Steven Kinsey, Psychology
Kartik Motwani	Bio & Health Sci #1	Chemistry	WVU	George Spirou, Otolaryngology
Divine Nwafor	Bio & Health Sci #16	Biochemistry	WVU	Kevin Daly, Biology
Matthew Preda	Bio & Health Sci #15	Psychology	Wittenberg U.	James Lewis, Physiology & Pharmacology
Greer Prettyman	Spec Fields #3	Neuroscience	Swarthmore C.	Julie Brefczynski-Lewis, Physiology & Pharmacology
Anna Scandinaro	Bio & Health Sci #14	Biochemistry	WVU	Rae Matsumoto, Pharmacy
Rachel Zacharias	Bio & Health Sci #13	Neuroscience & Psychology	Baldwin Wallace U.	Miranda Reed, Psychology

IV. Speakers at REU/SURE Events

Speaker	Affiliation	Group(s)	Topic
David Lederman	Dept. of Physics, WVU	Nano REU	Basis Aspects Nanosci./Eng.
Barbara Foster	Dept. of Chemistry, WVU	Nano REU & SURE	Laboratory Safety
Melinda Hollander	Animal Compliance & Training Officer, Office of Research Integrity & Compl.	REU & SURE	Ethics of Animal Use & Care
Nicole Shamitko-Klingensmith, Kelly Pisane & Others	IGERT Graduate Fellows, WVU	Nano REU	Nanoscale Characterization, Peer Advice, & Oral Present. Feedback
Kolin Brown	Shared Research Facilities, WVU	Nano REU	Nanofabrication Methods
Kim Quedado	NanoSAFE, WVU	Nano REU SURE	IGERT Fellow Participation, Science Communication & Morgantown Kid's Day
Jennifer Robertson-Honecker	Extension, WVU	SURE	Science Outreach
Michelle Richards-Babb	Dept. of Chemistry, WVU	Nano REU Nano REU & SURE	Oral Present. Skills/Lab Notebks, and Poster Preparation & Present.
Patrick Tobin	Forest Service	SURE	Scientific Ethics, Authorship
Linda Blake	Wise Library, WVU	Nano REU & SURE	Scientific Search Tools
Amy Cyphert & Cate Johnson	ASPIRE Office, WVU	SURE	Prestigious Scholarships
Toni Jones	Career Services, WVU	SURE	Cover letters, resumes, & Interviewing
Constinia Charbonnette	WVU Office of Graduate Education	REU & SURE	GRE Preparation & Graduate School Roundtable
Michael T. Yura	Consultant, Biometrics Field and Prof. Counseling	Nano REU & SURE	Career Mentoring & Work in Academia/Government
Todd Hamrick	Statler College, WVU	REU & SURE	Career Mentoring & Work in Academia/Industry
R. Lloyd Carroll	Mylan Pharmaceuticals	REU & SURE	Career Mentoring & Work in Industry

Our summer programs have been enriched by the contributions of these speakers. We are deeply appreciative and want to thank all of our speakers for their time, effort, and support of summer undergraduate research experiences at West Virginia University!

V. Websites

Need more information?
NanoSAFE: http://nanosafe.wvu.edu/
Nano REU: http://nanosafe.wvu.edu/education/undergraduate-programs/reu
STEM SURE/International Experience: http://www.honors.wvu.edu/STEMSURE/
WVU Honors administered SURE: www.honors.wvu.edu/sure
WVU Center for Neuroscience SURI: http://www.hsc.wvu.edu/wvucn/Summer-Internships-(SURI)

VI. Acknowledgements

A. Personnel

Nano REU
Michelle Richards-Babb, PI
David Lederman, co-PI
Corey Nida, Asst. to REU Director

STEM SURE
Michelle Richards-Babb, Director/Educ. Coord.
Corey Nida, Asst. to SURE Director & Class TA
With help from the staff in the ASPIRE Office and in the ECAS Business Office

STEM SURE IRES/CAREER
Michael Shi, PI

WVU Honors administered SURE
Ryan Claycomb, PI
Amy Cyphert, Director
Ahnya Redman
Christian Carey

SURI
George A Spirou, Director
Erica Stewart, Coordinator

Symposium Booklet
Michelle Richards-Babb
Corey Nida
Becky Secrist

Symposium Planning
Amy Cyphert
Christian Carey
Michelle Richards-Babb
Corey Nida

B. Financial Support

1. **Nano REU (PI: Michelle Richards-Babb, co-PI: David Lederman)**
National Science Foundation (NSF) Divisions of Materials Research and Chemistry (DMR-1262075) with recreational activities funded by WVU Research Corporation and the WVU Eberly College of Arts and Sciences.

2. **STEM SURE (Director: Michelle Richards-Babb)**
Sponsored and funded by the WVU Office of the Provost with partial funding from the WVU Eberly College of Arts and Sciences, Statler College of Engineering and Mineral Resources, Davis College of Agriculture, Natural Resources, and Design and the Departments of Biology, Chemistry, Mathematics, and Physics. Special thanks to Nigel Clark and Russell Dean for their help in securing funding for the 2014 STEM SURE program.

3. **STEM SURE IRES/CAREER (PI: X. Michael Shi)**
Travel funding sponsored by a National Science Foundation CAREER grant awarded to Michael Shi (CHE-0844602). Student stipends funded by WVU Office of the Provost through the STEM SURE program.

4. **WVU Honors administered SURE (PI: Ryan Claycomb)**
Sponsored in part by the West Virginia Research Challenge Fund through a grant from the Division of Science and Research, HEPC, WVU, Davis College of Agriculture, Forestry and Consumer Sciences, Eberly College of Arts and Sciences, the College of Engineering and Mineral Resources and The Honors College.

5. **WVU Center for Neuroscience SURI (Director: George A. Spirou, Program Coordinator: Erica Stewart)**
Funded by the Center for Neuroscience and the NIH/NIGMS CoBRE Grant 8P30GM103503.

6. **LSAMP KY-WV Mid-Level Alliance (Co-PI: David Miller)**
Stipends for five SURE participants were funded through the NSF Louis Stokes Alliance for Minority Participation (LSAMP) KY-WV Mid-Level Alliance (LSAMP 1305039).

7. **Research Symposium Monetary Prizes**
Sponsored by the WVU Office of the Provost through the STEM SURE program.

Agricultural and Environmental Sciences Category

Ag & Env Sci Index:

Poster 1: *Coexpression of GABA and neuropeptides in Manduca sexta antennal lobe interneurons.* **Aditya Kesari**, Kristyn Lizbinski & Andrew Dacks.

Poster 2: *Role for olfactory attraction of neuron specific expression of a Drosophila serotonin receptor.* **Rachel Montgomery**, Lukas Meadows & Andrew Dacks.

Poster 3: *Omega-3 fatty acids and soy protein promote fatty liver in polycystic liver disease.* **Sundus Lateef**, Vagner Benedito & Janet Tou.

Poster 4: *Texture effects: Time and temperature of gel setting on catfish protein gels.* **Payton Laws**, Iigin Paker & Kristen Matak.

Poster 5: *Management of Miscanthus sinensis to improve soil quality and biomass production sustainability.* **Caleb Griffin**, Kelby Fetter & Eugenia Pena-Yewtukhiw.

Poster 6: *Impact of soil limiting conditions on NDVI as a predictor of miscanthus sinensis biomass.* **Fetter Kelby**, C. Griffin & Eugenia Pena-Yewtukhiw.

Poster 7: *Do wood thrushes (Hylocichla mustelina) alter the spatial structure of American ginseng (Panax quinquefolius) populations?* **Michael Elza** & James McGraw.

Poster 8: *Identifying the genomic basis of phosphate stress response (PSR) in Populus trichocarpa.* **Megan DeJong**, Jonathan Cumming & Stephen DiFazio.

Poster 9: *Biological control of brown marmorated stink bug (Halyomorpha halys) using spined soldier bug (Podisus maculiventris).* **John Moredock** & Yong-Lak Park.

Poster 10: *Overweight transition dairy cows mobilize more adipose and have decreased insulin sensitivity compared with lean cows.* **C. Orndorff**, J. Rico, S. Samii, A. Mathews, A. Davis & J. McFadden.

Poster 11: *Comparing time series estimates of net primary productivity in a lowland evergreen forest.* **Julianne Liebenguth**, Alex Dye & Amy Hessl.

Poster 12: *Two-stage process for co-treatment of acid mine drainage and municipal wastewater.* **Dongyang Deng**, Alexander Panaccione & Lian-Shin Lin.

Poster 13: *Mathematical modeling and simulation of photovoltaic solar panel using Aspen Custom Modeler*. **Laken Adkins** & Debangsu Bhattacharyya.

Poster 14: *Round up resistance in isolates of West Virginia yeasts.* **Catherine Blackwood**, Jennifer Gallagher & Daniel Panaccione.

Poster 15: *Assessment of the affinity of titanium dioxide nanoparticles to estradiol.* **Nicholas Sargent-Johnson**, Cassandra Crihfield & Lisa Holland.

Agricultural and Environmental Sciences Category

Poster 16: *Genetic and environmental variation of copper nanoparticle and copper resistance in S. cerevisiae*. **Jenay Grant** & Jen Gallagher.

Poster 17: *Cloning a novel zinc finger sequence into a green fluorescence protein vector.* **Kristen Mastrantoni**, Jacqelyn Hand, Lei Wang & Jianbo Yao.

Poster 18: *Lettuce is more than just a salad: an analysis of antioxidants and phylogenetics.* **Madelyn Harwell**, Janet Tou, Younyoun Moon & Nicole Waterland.

Poster 19: *High doses of cannabinoids (Tetrahydrocannabinol) suppress communication abilities in fish (Aperonotus leptorhynchus).* **Emily Artz**, Malosree Maitra & Gary Marsat.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 1:

Coexpression of GABA and neuropeptides in *Manduca sexta* antennal lobe interneurons

Aditya Kesari, Kristyn Lizbinski and Andrew Dacks

Department of Biology, WVU, Morgantown, WV, 26506

Our nervous systems process information from our environment to produce varied, appropriate responses. This processing is accomplished by diverse interneurons. To study how interneurons produce different responses to the same stimulus we used to antennal lobe of Manduca sexta as a model system. The antennal lobe receives input from olfactory receptor neurons (ORNs) in the antennae. These neurons project into the antennal lobe and synapse with local interneurons (LNs) and projection neurons (PNs). PNs relay information from the ORNs to higher order regions of the brain. However, we find that PNs can respond differently to the same stimuli. This suggests that LNs process and refine information from ORNs. While LNs are mostly GABAergic, they do express a diverse set of neurotransmitters. Often coexpressed with these neurotransmitters are other signaling molecules like neuropeptides. Using immunocytochemistry we have found that FMRFamide is often coexpressed with GABA. We expect to find that allatostatin, allatotropin, and tachykinin are also coexpressed with GABA and that MIP is not coexpressed with GABA.

Ag & Env Sci Poster 2:

Role for olfactory attraction of neuron specific expression of a Drosophila serotonin receptor

Rachel Montgomery, Lukas Meadows and Andrew Dacks

[1]*Department of Biology, West Virginia University, Morgantown, West Virginia, 26506*

Nervous systems process environmental information in order to make appropriate decisions, yet the state of the animal (hunger, reproduction, etc.) influences these decisions. For instance, the olfactory system of *Drosophila* must be more sensitive to food odors when the animal is hungry. The nervous system achieves this adjustment via neuromodulation, the alteration of neuronal response properties, yet the mechanisms of this process are poorly understood. On the antennae of *Drosophila*, proteins called odor receptors bind volatile chemicals, activating olfactory receptor neurons (ORNs) that provide input to the antennal lobe (AL). All of the ORNs expressing the same odor receptor converge on an AL structure called a glomerulus. Serotonin neuromodulates odor-evoked responses. However, the neurons directly affected are unknown. In this study, we used the GAL4-UAS system to knock down the serotonin receptor expressed by ORNs specifically responsive to apple cider vinegar, an attractive odor. We then tested the olfactory sensitivity of these flies in two behavioral assays to determine the consequences of manipulating neuromodulation exerted on a highly restricted population of neurons.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 3:

Omega-3 fatty acids and soy protein promote fatty liver in polycystic liver disease

Sundus S. Lateef[1], Vagner A. Benedito[2] and Janet C. Tou[3]

[1]C. Eugene Bennett Department of Chemistry, [2]Division of Plant and Soil Sciences and [3]Division of Animal and Nutritional Sciences, West Virginia University, Morgantown, WV 26506

Autosomal recessive polycystic kidney disease (ARPKD) has a mortality rate of nearly 30% following birth and results in high morbidity and mortality beyond the neonatal period due to the development of comorbid polycystic liver disease (PCLD). No effective medications exist for PCLD. This study investigated the therapeutic potential of diet rich in anti-inflammatory omega-3 polyunsaturated fatty acids (n-3 PUFAs) and anti-estrogenic soy protein isolate (SPI) in attenuating the severity of PCLD. In a female polycystic kidney disease rat model, diet rich in SPI and n-3 PUFAs led to the unexpected development of fatty liver. Liver tissue was analyzed using real time quantitative polymerase chain reactions for gene expression of lipogenesis and lipolysis. Because enzymes (SREBP-1c, $p=0.38$; PPARα, $p=0.48$) and transcription factors (SCD-1, $p=0.15$; FAS, $p=0.28$) were not up-regulated, we eliminated abnormal fat metabolism as the cause of fatty liver. Therefore, the probable mechanism of fatty liver was decreased lipid circulation due to worsening cystic blockages. Further research on the effectiveness of diet is necessary to develop potential therapies for incurable genetic diseases such as PCLD.

Ag & Env Sci Poster 4:

Texture effects: Time and temperature of gel setting on catfish protein gels

Payton R. Laws, Ilgin Paker and Kristen E. Matak

Division of Animal and Nutritional Sciences and the Davis College of Agriculture Natural Resource and Design, West Virginia University, Morgantown, WV 26505

Fish processing by-products contain nutritionally valuble protein that is often discarded as waste. These proteins can be recovered and used as a functional ingredient in value-added food products. The purpose of this study was to analyze the texture and color of protein gels formed with different gel setting conditions. Proteins were separated from headed and gutted catfish (Ictalurus punctatus) using a pH-shift process called isoelectric solubilization and precipitation (ISP). The recovered protein was made into gels by the addition of salt, enzymes and starches. Different gel setting times and temperatures were applied prior to cooking and incubating. Results showed that protein gels were hardest ($p<0.05$) when allowed to set at 25oC for 12 hrs. Other textural attributes benifited from gel setting at higher temperatures and shorter times ($p<0.05$). Whiteness ranged from 94.85-67.70 and was best when gels set for less time at lower temperatues. Therefore, gel setting conditions before cooking effect both the textural and color characteristics of protein gels.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 5:

Management of *Miscanthus sinensis* to improve soil quality and biomass production sustainability

Caleb Griffin, Kelby Fetter and Eugenia Pena-Yewtukhiw

Davis College of Agriculture, Natural Resources and Design, West Virginia University, Morgantown, WV 26506-6108

Miscanthus sinensis is a perennial grass often used for biofuel production. This study was conducted to measure the effects of residual soil fertility and low input management on soil quality and biomass production. It is expected that soil quality and M. sinensis productivity will improve with increasing residual fertility, and high crop adaptability to limiting soil conditions. In 2010, M. sinensis was established in 40 completely randomized residual fertility plots (five levels of residual fertility). Soil quality was evaluated by measuring soil fertility, organic matter, aggregation, porosity, bulk density (BD), and daily moisture. Crop height was an indicator of biomass and crop adaptability. High residual fertility exhibited higher (0.35cm3/cm3) and low residual fertility exhibited lower (0.32cm3/cm3) daily moisture than other treatments, implying that residual fertility influenced soil moisture. Treatments with low residual fertility showed higher BD (1.34g/cm3), lower porosity (0.49cm3/cm3), shorter plants (1.88m) than high residual fertility treatments (BD=1.26, porosity=0.52, height=2.10m). Data suggests that there may be an effect of plant adaptability on soil quality under soil limiting conditions resulting in sustained biofuel crop production.

Ag & Env Sci Poster 6:

Impact of Soil Limiting Conditions on NDVI as a Predictor of Miscanthus Sinensis Biomass

Kelby Fetter, C. Griffin and E. Pena-Yewtukhiw

Davis College of Agriculture, Natural Resources, and Design, West Virginia University, Morgantown, WV 26506

Miscanthus sinensis is a biofuel crop that is poised to be the dominant plant for commercial biofuel production. NDVI is a canopy vegetative index that is useful for predicting biomass yield production. The objective was to observe the effect of different soil conditions on the performance of NDVI readings to predict *Miscanthus sinensis* biomass. NDVI measurements were taken with a handheld scanner, the Greenseeker by NTech Industries. It was held at six inches above the canopy of the crop and scanned for six seconds each pass. Records of height were obtained daily, and crown width was taken at the beginning of the season. Chlorophyll data was taken using a SPAD meter. There is an overall positive correlation between plant height and NDVI, (r=0.80). Although the trends in time of plant height and NDVI were similar between treatments, they varied in magnitude. Therefore, soil properties do not have a continuous effect on NDVI as a predictor of *Miscanthus sinensis* biomass.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 7:

Do wood thrushes (*Hylocichla mustelina*) alter the spatial structure of American ginseng (*Panax quinquefolius*) populations?

Michael C. Elza and James B. McGraw

Department of Biology, West Virginia University, Morgantown, WV, 26506

American ginseng is America's premier wild-harvested, medicinal plant that inhabits the forest understory of eastern deciduous forests. Recent research using camera-traps showed that birds, in particular wood thrushes, are dispersers of ginseng seeds. We aimed to determine if the spatial organization of ginseng populations was affected by wood thrush presence or suitability of wood thrush habitat, as defined by mid-story density. To do this, 28 ginseng populations distributed across seven states were surveyed for wood thrush presence and mid-story density, and the average distance between sub-populations was determined for each population. The ratio of sub-populations to the total number of plants was calculated as a dispersion indicator for each population. We found that the mean dispersion index differed for populations with and without wood thrushes ($F= 5.411$, $p= 0.028$), but wood thrush presence was unaffected by mid-story density ($\chi^2= 0.316$, $p= 0.574$). The distance between sub-populations was unaffected by wood thrush presence ($F= 0.670$, $p= 0.440$)**. There also was no relationship between the mean dispersion index and mid-story density among populations ($F= 0.429$, $p= 0.518$). These findings highlight the demographical and structural impact that wood thrushes have on ginseng populations, consequently influencing plant recruitment, range-expansion rates, competition, mating, gene flow, and genetic structuring of ginseng populations.

Ag & Env Sci Poster 8:

Identifying the genomic basis of phosphate stress response (PSR) in *Populus trichocarpa*

Megan DeJong, Jonathan R. Cumming and Stephen DiFazio

Department of Biology, West Virginia University, Morgantown, WV 26506

Phosphorus (P) is a vital molecule for both a plant's structure and necessary biological processes. Inorganic phosphate (Pi) is the form of phosphorus used directly by plants; yet, Pi exists in limited amounts in soils. To help minimize the effect of this nutritional deficit, plants have evolved a suite of responses that increase Pi availability and uptake from the rhizosphere. One of these responses in the production of the enzyme acid phosphatase (APase), which releases Pi groups from organic molecules in the soil. The purpose of this experiment is to investigate the production of APase in a population of *Populus trichocarpa*. The experiment involves a large hydroponic exposure system, which allows for the collection of a wide range of physiological data, such as root length and leaf mass. It also enhances the uniformity of the experiment, making the process of genome sequencing much more efficient. The results of this study will ultimately work to help improve the national capacity to produce biofuels and feedstock on non-agricultural soils.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 9:

Biological control of brown marmorated stink bug (*Halyomorpha halys*) using spined soldier bug (*Podisus maculiventris*)

John T. Moredock[1] and Yong-Lak Park[2]

[1]*Department of Entomology, Davis College Division of Plant Soil Sciences, West Virginia University, Morgantown WV, 26506*

The brown marmorated stink bug (BMSB), *Halyomorpha halys* (Hemiptera: Pentatomidae), is an invasive insect pest from Asia. Since their invasion in late 1990s, frequent outbreaks of BMSB have reported considerable economic damages on orchards, field crops, and vegetables in the United States. As an alternative or supplemental strategy to pesticides that cause adverse effects on beneficial biota and the environment, we investigated the potential of using the spined soldier bug, *Podisus maculiventris* (Hemiptera: Pentatomidae), as a biological control agent. In this study, we used choice and non-choice tests to determine which stages of spined soldier bugs (i.e. third and fifth instars) can effectively kill which stages of BMSB (i.e. eggs or nymphs) using videography. In addition, prey searching and feeding behavior of spined soldier bugs and defensive behavior of BMSB were also described. Our study showed that BMSB eggs and nymphs attacked by spined soldier bugs did not hatch and died, respectively. The results of this study indicate that spined soldier bugs have the potential for controlling BMSB.

Ag & Env Sci Poster 10:

Overweight transition dairy cows mobilize more adipose and have decreased insulin sensitivity compared with lean cows.

Orndorff, C., J. E. Rico, S. S. Samii, A. Mathews, A. Davis and J. W. McFadden

Division of Animal and Nutritional Sciences, West Virginia University, Morgantown, WV 26506

Dairy cattle transitioning from gestation to lactation mobilize fatty acids from adipose to meet increased energy demands. In turn, transition dairy cows develop metabolic disease. Overweight dairy cows are at greater risk of metabolic disease because they mobilize more adipose compared with lean cows; however, the mechanisms responsible are unknown. In monogastrics, increased adiposity promotes insulin resistance. Since insulin is anti-lipolytic, insulin resistance may promote greater fat mobilization. Our objective was to delineate the relationship between adiposity and insulin sensitivity in transition dairy cows. In lean and overweight Holstein transition cows, intakes, body weights, and body condition were recorded. Insulin and glucose tolerance tests were performed pre- and postpartum. For tests, plasma glucose concentrations were determined. Overweight transition cows had lower intake compared with lean cows. As a result, overweight cows lost more adiposity postpartum compared with lean cows. Furthermore, postpartum insulin sensitivity was impaired in overweight cows. We validated that overweight cows lose more adiposity postpartum compared with lean cows, and conclude that insulin action may play a role in mediating fat mobilization.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 11:

Comparing Time Series Estimates of Net Primary Productivity in a Lowland Evergreen Forest

Julianne G. Liebenguth, Alex Dye and Amy E. Hessl

Department of Geography and Geology, West Virginia University, Morgantown, WV 26506

Estimates of forest net primary productivity (NPP) are important for understanding rates of terrestrial carbon sequestration but instrumental records of NPP from eddy flux towers extend only a few decades back in time. One method for estimating longer time series of NPP is to develop tree-ring based estimates of aboveground NPP. For this study, we used tree ring data to estimate the annual aboveground NPP of a predominately red spruce (*Picea Rubens*) stand in Howland Research Forest, in central Maine. We used annual ring width measurements and allometric equations to calculate yearly NPP back to 1996. We compared these estimates with carbon flux measurements produced by an eddy covariance flux tower in Howland Research Forest. We compared absolute estimates, variance over time, and trends over time during a variety of climatic conditions in order to assess the correlation between these two different methods of measuring forest NPP. Results to follow.

Ag & Env Sci Poster 12:

Two-stage process for co-treatment of acid mine drainage and municipal wastewater

Dongyang Deng, Alexander L. Panaccione and Lian-Shin Lin

Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

This research evaluates feasibility of a two-stage process for co-treatment of acid-mine drainage (AMD) and municipal wastewater (MWW), a green approach that promises significant environmental, economic, and energy benefits. The first stage involves mixing of AMD with MWW to increase alkalinity, and promote iron phosphate precipitation. In the second stage, the mixture is treated in an anaerobic biological reactor in which sulfate reducing bacteria (SRB) are employed to facilitate biological reduction of sulfate to sulfide and immobilizes heavy metals to form metal sulfides. In addition, iron was used to recover and recirculate sulfur for maintaining sufficient sulfur in the process. It is observed that the reduction rate was increased with the COD/sulfate ratio and the sulfate reducing bacteria population. The co-treatment resulted in increased alkalinity, pH, and removal of sulfate and most of the metals (Fe, Al, Mn, Ca, Mg, and Na). Iron sulfide recirculation proved to be effective. This treatment method is more energy efficient for managing the two prevalent wastes than current methods such as passive wetlands approach and active chemical treatment.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 13:

Mathematical modeling and simulation of photovoltaic solar panel using Aspen Custom Modeler

Laken E. Adkins and Debangsu Bhattacharyya

Department of Chemical Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV, 26506-6070

Due to climate change, high cost of energy, and depletion of fossil fuels, solar energy has strong potential as an alternative energy source. In this project, Aspen Custom Modeler was used to model and simulate an ideal isothermal photovoltaic (PV) panel. The initial model was validated with current-voltage and power-voltage data obtained from existing literature. Furthermore, a model was developed to calculate the average irradiance for a day in Morgantown, West Virginia. Sensitivity studies were conducted to quantify the effects of varying temperature and irradiance. It was observed that the power generated was the highest when cell temperature was the lowest. However, a cooling system is necessary to obtain temperatures lower than the ambient temperature. A model was developed to calculate the penalty due to the cooling system. Finally, an optimized design of the PV panel to be located in Morgantown, WV was obtained to maximize power production. The optimization approach can be applied for designing a panel for any location. Future works may include development of non-isothermal model and loss model.

Ag & Env Sci Poster 14:

Round up resistance in isolates of West Virginia yeasts

Catherine Blackwood, Jennifer Gallagher and Daniel Panaccione

Department of Biology, Eberly College of Arts and Science, Morgantown, WV 26506

Round Up is an herbicide containing glyphosate used worldwide that targets aromatic amino acid synthesis. Round Up resistance is genetically engineered into crops but arises as a result of selective pressure in other plants. Yeasts have the ability to either take up chorismate or synthesize aromatic amino acids, so Round Up resistance can occur. Because yeasts primarily metabolize sugars, they are readily available in sources such as fruits, leaves, and bark extrudes. Yeasts may develop resistance to Round Up like weeds. To assess the prevalence of Round Up resistance yeast, samples were collected from managed environments and pristine wilderness areas. After applying a yeast enrichment protocol and plating samples to yeast enrichment plates, colonies with yeast-like appearance were identified using species-specific primers. Of the 127 samples collected, there were 75 unique colonies on 32 plates. Colonies were identified as Saccharomyces cerevisiae (18), S. kudriavzevii (1), S. bayanus (1), S. arbicolus (1), and S. mikatae (1). Cell growth and glyphosate resistance between strains that have and have not been exposed to Round Up was characterized.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 15:

Assessment of the affinity of titanium dioxide nanoparticles to estradiol

[1]Nicholas C. Sargent-Johnson, [2]Cassandra L. Crihfield and [2]Lisa A. Holland

[1]Department of Chemistry, Southern University and A&M College, Baton Rouge, LA, 70813; [2]C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV, 26506

Titanium dioxide is an endocrine disrupting compound (EDC) that is widely used in commercial products such as cosmetics, milk and toothpastes. EDCs lead to health issues like defects in reproduction and obesity because they are disposed of in our water systems. In this study, a prototype for capturing and concentrating 17β-estradiol using titanium dioxide nanoparticles is created using a frit of magnetic micro-beads. This system contains a pinched fused-silica capillary held inside a piece of grooved wood. Two magnets are used to hold and load magnetic micro-beads, titanium dioxide, and 17β-estradiol. The collected amounts of 17β-estradiol are quantified using capillary electrophoresis (CE). The use of CE is important because it allows the use of small sample volumes and is ideal because the output volume of the prototype is very small. Similar systems used in previous studies have shown the ability to concentrate samples thus lowering the detection limit of EDCs. The results of our prototype will be to concentrate and determine the binding affinity of 17β-estradiol to titanium dioxide via CE.

Ag & Env Sci Poster 16:

Genetic and environmental variation of copper nanoparticle and copper resistance in *S. cerevisiae*

Jenay Grant and Jen Gallagher

West Virginia University, Eberly College Department of Biology

Copper nanoparticles are a new innovation which uses the powerful antimicrobial mechanisms of copper. With the possible integration of copper nanoparticles in plastics and other consumer products, it is expected that resistant microbe strains will increase under strong selective pressure. Genetically distinct *Saccharomyces cerevisiae* strains GSY147, which is copper resistant, and YJM789K5a, which is copper sensitive, were used to study mechanisms of copper nanoparticle and copper resistance. An additional copy of CUP1, a gene which encodes a copper chaperone, is thought to contribute to resistance in GSY147. CUP1 was knocked out via homologous recombination in both GSY147 and YJM789K5a, to observe copper sensitivity under different copper treatments. For each concentration of copper treatment, the antioxidant, glutathione and its precursor, N-acetyl cysteine, were added to observe if resistance increased. Plating assays were also done to measure the number of viable cells after short term exposure to varying concentrations of either copper or copper nanoparticles. Once obtained the results to this study should shed light on the mechanisms underlying copper and copper nanoparticle resistance.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 17:

Cloning a Novel Zinc Finger Sequence into a Green Fluorescence Protein Vector

Kristen Mastrantoni, Jacqelyn Hand, Lei Wang and Jianbo Yao

West Virginia University, Division of Animal and Nutritional Sciences, Morgantown WV 26506

Molecular cloning is a technique often employed in the field of genetics in order to introduce a specific gene fragment into another host, such as a bacterial or mammalian cell line, for the purpose of studying functional characteristics of a gene. In this experiment, sub-cloning was used to introduce the open reading frame of a novel zinc finger transcription factor, specific to the bovine oocyte, into a green fluorescence protein vector, pEGFP. A truncated form of the gene containing only the zinc finger binding domain was also introduced into the pEGFP vector using direct cloning. Cloning success was measured by PCR and restriction digestion, and in each case a band was seen corresponding to the size of each gene fragment suggesting the desired sequences were present. Sequencing was performed as final verification of the clones. The resulting plasmids, ZNF ORF: pEGFP and ZNF Truncated: pEGFP, are now being used in the transfection of a mammalian cell line (HEK293) in order to confirm the predicted nuclear subcellular localization of this novel zinc finger protein.

Ag & Env Sci Poster 18:

Lettuce is More Than Just a Salad: An Analysis of Antioxidants and Phylogenetics

Madelyn Harwell, Janet Tou, Youyoun Moon and Nicole Waterland

Davis College of Agriculture, Natural Resources and Design, West Virginia University, Morgantown, WV 26506

Lettuce is a highly consumed vegetable worldwide, yet is lacking in nutritional aid. The goal of this project is to gather information about the different nutritional profiles of lettuce varieties in order to target a specific nutrient to be amplified to provide more nutritional benefits per lettuce leaf consumed. The prediction for the phylogenetic tree is that it will show a linkage between cultivar/varieties based on antioxidant production. To demonstrate antioxidant production as genetically linked, a phylogenetic tree was constructed and total antioxidants were determined. Thirty-two different varieties of lettuce were selected to give an assortment of nutritional contents found in lettuce. Using universal primers for polymerase chain reaction (PCR), specific DNA sequences were amplified to construct a phylogenetic tree. An oxygen radical absorbance capacity test (ORAC) was then conducted to determine the overall amount of antioxidants found in each lettuce was determined. Based on previous experiments, red leaf lettuce provides more antioxidants. The conclusions drawn from the phylogenetic tree analysis could potentially be used in further studies pertaining to this area or research.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 19:

High doses of cannabinoids (Tetrahydrocannabinol) suppress communication abilities in fish (*Aperonotus leptorhynchus)*

Emily Artz[1], Malosree Maitra[2] and Gary Marsat[1]

[1]Eberly College of Arts and Sciences Department of Biology and [2]Department of Psychology, West Virginia University, Morgantown, WV, 26506-6070

Neuroscientists have a renewed interest in examining cannabinoid receptors (CRs) as their ubiquitous role in the nervous system continues to be revealed. One important role for CRs is to adjust the sensory gating mechanism that discriminates between relevant and irrelevant stimuli. However, the exact function of CRs remains unclear. The weakly electric fish species model, *Aperonotus leptorhynchus*, is used to advance our understanding of sensory processing since its sensory gating mechanisms are well-characterized. Since the ultimate goal is to determine CRs role in the sensory gating mechanism, we first needed to characterize the behavioral effect of different doses of a cannabinoid (Tetrahydrocannabinol [THC]) in order to (1) determine effective dosage levels and (2) relate physiological mechanisms with behavioral effects. We quantified the impact of cannabinoids on communication behavior and social interactions by exposing the fish to a series of mock communication signals and analyzing (1) measured rate of production of communication signals and (2) observed differences in quantifiable aggressive behavior. Large doses of THC completely suppressed both communication and locomotion and intermediate doses had more subtle and diverse effects. These results show CRs may impact inhibitory neurons.

Biological and Health Sciences Category

Bio & Health Sci Index

Biological and Health Sciences Category

Poster 16: *Blocking input from flight sensory motor centers modulates antennal lobe olfactory processing.* **Divine Nwafor**, Samual Bradley & Kevin Daly.

Poster 17: *Cannabinoid withdrawal alters emotion and motivation in mice.* **Malosree Maitra**, Sara Nass & Steven Kinsey.

Poster 18: *Comparing methods of detecting white matter abnormalities in neonates with hypoxic-ischemic encephalopathy.* **Monica Ly**, Tania Nanavati, Christopher Frum & Paola Pergami.

Poster 19: *Parametric analysis of major white matter tracts in healthy and post-stroke brains.* **Matthew Lokant**, William Talkington, Marc Haut & Valeriya Gritsenko.

Poster 20: *Behavior model of sensorimotor adaptations in rats mirrors post-stroke gait.* **Victoria Ledford**, Kiril Tuntevski, Justine Shaffer & Sergiy Yakovenko.

Poster 21: *JNK signaling is required for migratory stream integrity during corticogenesis and layering in the adult cortex.* **Hailey Gosnell**, Abigail Myers & Eric Tucker.

Poster 22: *Electrophysiological activity related to reaching movements of the upper limbs.* **Stephen Frazier**, William Talkington Erienne Olesh, Brad Pollard & Valeriya Gristenko.

Poster 23: *The dark side of photoreceptor neuron degeneration in a model of retinitis pogmentosa..* **Caitlyn Bryan** & Visvanathan Ramamurthy.

Poster 24: *Assembly of a synapse: proteins of the postsynaptic density.* **Yarden Avnor**, Doug Kolson & George Spirou.

Biological and Health Sciences Category

Bio & Health Sci Poster 1:

Intrasomatic polarity underlying site-specific innervation of the Calyx of Held

Kartik Motwani[1], Paul Holcomb[1], Tom Deerinck[2], Mark Ellisman[2] and George Spirou[1]

Center for Neuroscience[1], West Virginia University School of Medicine and NCMIR[2], UCSD

Position of the cell nucleus is important during embryonic differentiation, migration and specialization in laminar tissue types (e.g. hair cells, photoreceptors). However, little is known about the role of polarity in development of non-laminar systems. Recent data taken from non-laminar tissue in the central nervous system, the medial nucleus of the trapezoid body (MNTB), suggests that cell nuclei are eccentrically located within the soma. Furthermore, growth of the large primary terminal—known as the calyx of Held—onto these cells appears to be localized to the cell surface opposite the nucleus. To quantify observations across developmental ages (P2-P9), 3D models of MNTB cells and associated terminals were reconstructed from high resolution serial block-face scanning electron microscopy (SBEM). Cells were aligned similarly across ages, and data confirm ($p<0.05$, $n=46$) that innervation respects intrasomatic polarity (ISP), suggesting an exclusivity in nucleus and terminal location. Further work is in progress to analyze nuclear sphericity and to determine the necessity of ISP in terminal formation by untethering the nucleus from the cytoskeleton and examining effects on terminal size, location and competition between terminals.

Bio & Health Sci Poster 2:

Exploring the link between obesity and cardiovascular function independent of obesity related comorbidities

Kelly M. Devlin[1], Evan R. DeVallance[1,2], Sara B. Fournier[1,2], David A. Donnely[1], Daniel E. Bonner[1], Kyuwan Lee[1,2], Jefferson C. Frisbee[2,3] and Paul D. Chantler[1,2]

[1]Division of Exercise Physiology, School of Medicine, West Virginia University. [2]Center for Cardiology and Respiratory Sciences, School of Medicine, West Virginia University, [3]Department for Physiology and Pharmacology, School of Medicine West Virginia University.

Obesity [measured as body mass index (BMI) or waist circumference (WC)] negatively affects cardiovascular (CV) function. Co-morbidities such as hypertension, hyperlipidemia, hyperglycemia and insulin resistance enhance CV dysfunction. To investigate the relationship between obesity and CV dysfunction independent of obesity associated co-morbidities, we examined changes in CV function/structure in 102 subjects with differing levels of obesity lacking overt CV disease. Arterial structure/function were assessed at rest and during exercise while inflammatory biomarkers were assessed from resting blood draw. Overall, age triglycerides, and hypertension were correlated with carotid thickness, but BMI and WC were not. Both BMI and WC were related to brachial systolic pressure ($p<0.05$), but only BMI predicted central systolic pressures ($p<0.05$). In a subset of the cohort, BMI predicted MMP10 levels ($p<0.01$) and BMI was also weakly related to TPAI levels ($p<0.074$). WC and sEselectin also showed a trending correlation ($p<0.054$). Through our investigation of obesity and CV function, we concluded that, obesity, in the absence of overt CV disease, may increase the risk of a CV event via changes in CV function.

Biological and Health Sciences Category

Bio & Health Sci Poster 3:

Physiological role of SIRT1 protein in satellite cells leading to muscle regeneration

Joshua J. Moore, Rebekah Honce, Matt Myers and Stephen E. Always

Robert C. Byrd Health Sciences Center Department of Exercise Physiology, West West Virginia University, Morgantown, WV 26506

Satellite cells are the primary cells responsible for muscle regeneration in adults. They are normally quiescent, but when activated after injury, they act as a renewable source of muscle-forming cells. Although it is known that SIRT1 (silent information regulator) protein regulates cell growth, differentiation, and inflammation, the role of SIRT1 in muscle regeneration is poorly understood. The purpose of this study was to look at the physiological role of SIRT1 in satellite cells during muscular regeneration following an injury. SIRT1 knockout and control mice were injected with cardiotoxin from *Naja mossambica* in the Tibialis Anterior muscle in one leg to induce muscle injury and the contralateral muscle was injected with 0.9% phosphate buffered saline as control. After removing these muscles 4 or 8 days later, we compared the knockout and control mice by using immunohistochemistry to determine the difference in satellite cell number, myofiber size, and percent recovery of the injury. Although additional studies are needed, these data are consistent with the idea that SIRT1 may improve the quality of life by increasing muscle repair.

Bio & Health Sci Poster 4:

Synaptic alterations in an STZ-induced diabetic mouse model

Rebecca R. Speer, Carolyn C. Rudy and Miranda N. Reed

Department of Psychology, West Virginia University, Morgantown, WV 26506-6040

The hippocampus is essential in the formation of memory and the process of learning. Various stimuli, such as drugs and diseases, can alter the functioning of the hippocampus by changing the expression of synaptic proteins found within the post-synaptic density (PSD). For example, diabetes, a risk factor for Alzheimer's disease, causes cognitive deficits as the disease progresses, resulting in impairments in memory and learning. The present study examined the PSD, a protein-rich portion of the synaptic cleft, of the hippocampus and synaptic alterations that result in memory impairment due to diabetes. A mouse model of streptozotocin-induced type II diabetes was used to promote synaptic alterations. After chemically isolating the hippocampal PSD fractions, immunoblotting was used to detect differences in synaptic proteins important for learning and memory. It is expected that markers of improper synaptic functioning will be identified in the STZ-induced diabetic mice. Better understanding of the biochemical changes that occur in the brain due to diabetes may help with preventive measures for diabetes-related neurodegeneration, as well as precautionary measures for Alzheimer's disease.

Biological and Health Sciences Category

Bio & Health Sci Poster 5:

Effects of riluzole on an Alzheimer's mouse model

Lindsey Mosmiller, Daniel Weitzner, Holly Hunsberger, Carolyn Rudy and Miranda Reed

Department of Psychology, West Virginia University 26506-6040

Glutamate, the primary excitatory neurotransmitter in the brain, plays a key role in learning and memory. However, overstimulation of glutamatergic receptors results in synaptic alterations and cell death, a process termed excitotoxicity. Excitotoxicity occurs in many neurodegenerative disorders, including Alzheimer's disease (AD), and may underlie memory deficits. To determine whether reducing excitotoxicity in a mouse model of AD can prevent memory deficits, we will administer riluzole, an FDA-approved drug to treat amyotrophic lateral sclerosis (ALS) that regulates glutamate levels. To assess the effects of riluzole on memory, mice will undergo spatial learning and memory testing using the eight-arm radial water maze. It is anticipated that riluzole treatment will attenuate memory deficits in a mouse model of AD. Findings of reduced memory deficits would provide an important first step toward the development of an off-label, proof-of-concept investigation of riluzole in AD patients.

Bio & Health Sci Poster 6:

Potential allosteric modulators of focal adhesion kinase activity determined by virtual screening techniques

Brandon C. Neeley and Blake Mertz

C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26506

Focal adhesion kinase (FAK) is a non-receptor protein kinase that acts as an integrator and scaffolding protein to regulate cytoskeletal dynamics, cell migration, cell cycle, apoptosis, and many other cellular functions. FAK is commonly over-expressed and over-active in aggressive cancers. Virtual screening is a technique employed by medicinal chemists in which a computational method called molecular docking is used to identify ligands with the potential for specific, high-affinity binding to a protein of interest before progressing to wet laboratory testing. By using virtual screening and combinatorial chemistry techniques, costs and time requirements for high throughput drug development can be significantly reduced. In this study, our lab used AutoDock Tools, AutoDock Vina, and PyMOL molecular docking and visualization software to determine the most favorable ligand binding conformations and important non-bonded interactions between ligands and FAK. We analyzed a total of 164 ligands from the NCI Diversity III library and identified potential allosteric modulators that bind at the hydrophobic patch between the C-lobe of the kinase domain and the F2-lobe of the FERM domain of FAK.

Biological and Health Sciences Category

Bio & Health Sci Poster 7:

Analyzing 2D6-Th1 cell line secretome to gain an understanding of cellular communication

Melissa A. Hernandez[1], Christina Byrne-Hoffman[2], Yueting Wu[1], Nehal Lal[3] and David J. Klinke II[1,3]

[1]Department of Chemical Engineering [2]Department of Basic Pharmaceutical Sciences [3] Department of Microbiology, Immunology and Cellular Biology and Mary Babb Randolph Center, West Virginia University, Morgantown, WV 26505

The immune system is known to play a role in cancer eradication. However, there is still much to learn about cellular communication between T-cells and tumor cells. Mapping these interactions will provide insight for cancer immunotherapy and treatment of other immune related diseases. This study will examine the secretome (secreted proteins) of a 2D6 T helper cell line and identify the key proteins involved in intercellular communication. It will isolate the exosomes (nano-sized vesicles containing protein and nucleic acids) from the secretome and locate key proteins through a proteomics workflow. The techniques and procedures were refined using a secretome sample from a B16F0 cell line. Aseptic tissue culture was used, and the exosome sample was collected via ultracentrifugation. Proteins in the sample were then quantified and separated in a 1-D gel electrophoresis. To complete the study, the 2D6-Th1 cells will be used with these techniques, and cell communication proteins will be mapped using a liquid chromatography-mass spectroscopy protein identification method.

Bio & Health Sci Poster 8:

Heparin sulfate proteoglycans enhance cell expansion and growth for cartilage engineering

Brian Donnelly, Ying Zhang, Kayla Branyan, Patrick Suggs and Ming Pei

Stem Cell and Tissue Engineering Laboratory, Department of Orthopaedics/Exercise Physiology, West Virginia University, Morgantown, WV, 26505

Prior research demonstrates that expansion of stem cells on a three dimensional matrix improves cartilage growth. Heparin Sulfate Proteoglycans (HSPGs) are major components of biological matrices and little is known about such structures. In this study, human Bone Marrow Stem Cells (hBMSC) were induced to form cartilage after expansion on either plastic flasks, matrices with HSPGs, or matrices without HSPGs. Flow cytometry was utilized to produce a proliferation index for comparison of expansion groups. Cells expanded in matrices containing HSPGs produced the greatest proliferation index of 1.92. Cartilage formation was observed through staining and quantification of various components. A Glycosaminoglycan (GAG) to DNA content ratio is one such statistic and a larger ratio indicates higher quality cartilage. At day 35 of culture, cells expanded on matrices containing HSPGs produced the greatest average GAG/DNA ratio of 27.182. This value is significantly greater that the other two groups and may specify the importance of HSPGs in cartilage formation. Cartilage engineering has the potential to treat various medical conditions, and improved understanding of the components involved is necessary.

Biological and Health Sciences Category

Bio & Health Sci Poster 9:

Development of an Allosterically Driven and ATP-Regulated Artificial Glutathione Peroxidase

Kate Cardullo[1], Tiezheng Pan[2] and Junqiu Liu[2]

[1]West Virginia University Department of Biology, Morgantown, West Virginia, 26505
[2]Jilin University State Key Laboratory of Supramolecular Structure and Materials, Changchun, China, 130012

Reactive oxygen species (ROS) are a variety of molecules and free radicals that are created as byproducts of cellular metabolism and the immune response. While they are important for some cell signaling pathways as well as maintaining homeostasis, ROS can also be deleterious agents that cause damage to nucleic acids and proteins as well as contribute to the aging process and diseases such as cancer and neurodegenerative disorders. Antioxidants such as the selenoprotein glutathione peroxidase (GPx) function to reduce ROS and make them unreactive. GPx binds poorly to its substrate and has low enzymatic activity; current research works to create more efficient mimics of this enzyme. This research shows how the adenylate kinase (AKe) protein can be modified to have a new active site and exhibit GPx activity. This artificial enzyme is sensitive to ATP concentration and can remove excess ROS by the correlation between the levels of ROS and cytosolic ATP.

Bio & Health Sci Poster 10:

Fibril Formation of Huntingtin Protein through Pre-Aggregated Seeding

Connor Levy, Justin Legleiter and Maxmore Chaibva

C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26506

Many neurodegenerative diseases work by the same general mechanism; there is a misfolding of proteins that leads to neurological pathway inhibition. With huntingtin protein, we are investigating the effects of "seeding", or adding pre-aggregated proteins, to regular proteins, through the formation of fibrils, the aggregate thought to be the cause of the disease. Huntingtin proteins with a 35 amino acid long polyglutamine region are being seeded with pre-aggregated proteins with a polyglutamine region 51 amino acids long at predetermined proportions, weight-to-weight, 5%, 1%, and 0.1%. The samples will be spotted on mica and imaged using atomic force microscopy at the time points 1 hour, 3 hours, 5 hours, and 24 hours. The expected results of this on going experiment are that the higher amount of seeds present in the 35-protein solution will result in more fibril formation than with the lower quantities. Further studies are required to track the kinetics of the formation of the fibrils in the 35 protein samples containing their respected amounts of seeds.

Biological and Health Sciences Category

Bio & Health Sci Poster 11:

Mathematical Modeling of Avascular Tumor Growth

Alex Abrahamian[2], Nick Horvath[2,3], Yueting Wu[3], Vanessa Cuppett[3] and David Klinke[1,3]

[1]Department of Microbiology, Immunology and Cell Biology, [2]Department of Physics & Astronomy and [3]Department of Chemical Engineering, West Virginia University, Morgantown, WV, 26506-6045

Tumor growth is known to be caused by unchecked cell proliferation. When tumor growth is observed over time, a distinct three layer spatial arrangement of cells becomes apparent. The cells separate into layers that are proliferating, quiescent and necrotic based on the ability of nutrients to diffuse and reach cells at different locations inside of the tumor. Several attempts have been made to design a theoretical mathematical model of this phenomena. The goal of this experiment is to accurately calibrate a set of equations describing three layer tumor progression against real data in order to effectively model avascular tumor growth. Time point measurements of layer radius from various imaging sources are used, and Markov Chain Monte Carlo sampling methods are utilized in order to calibrate the parameters of the equations. With this model, future research will be better equipped to quantify and map the changes in growth brought about by introduction of a new variable, such as an immune factor or other protein.

Bio & Health Sci Poster 12:

Using the Emotiv EPOC to Help People with Aphasia

Eric D. Harshbarger, Taylor C. Cutlip and Frances L. Van Scoy

Lane Department of Computer Science and Electrical Engineering West Virginia University, Morgantown, WV 26506-6045

The purpose of this research was to explore a new way to assist individuals with brain injuries like aphasia communicate using the Emotiv EPOC neuroheadset. The headset has 14 electrodes that tap into brainwaves/EEG signals produced by the brain to detect a user's thoughts. The project modeled a basic conversation such as ordering pizza. The goal was to build a software system that will be trained by having a person think about a specific object, like the size and kind of crust and topping. The data collected for each of the objects had 14 columns and about 100 rows of sensor input. For every object the centroid was computed for each of the columns. Then for each of the objects, for each row of data, the row closest to each object's centroid was determined. Finally, the percentage of rows closest to each centroid for all of the objects were calculated. The percentages were generally very high, but similar toppings such as ham and prosciutto seemed to get confused and had low percentages.

Biological and Health Sciences Category

Bio & Health Sci Poster 13:

Tau pathology in mice with STZ-induced diabetes

Rachel Zacharias[1], Carolyn Rudy[2] and Miranda Reed[2]

[1]Department of Psychology & Neuroscience Program, Baldwin Wallace University, Berea, OH 44017-2088
[2]Department of Psychology, West Virginia University, Morgantown, WV 26506-6040

Tau, a protein implicated in a number of neurodegenerative diseases, becomes hyperphosphorylated and mislocalizes to the dendritic spines in Alzheimer's disease. Because diabetes is a significant risk factor for Alzheimer's disease, the present study examined tau pathology in the hippocampus of mice with streptozotocin-induced type II diabetes. The hippocampal post-synaptic densities (PSD) were chemically isolated from transgenic mice with wild-type human tau, and immunoblotting was used to identify markers of total tau and tau pathology. It is expected that streptozotocin-induced type II diabetes will result in higher levels of markers of early pathological changes in tau, which are also present in Alzheimer's disease. If higher levels of pathological tau are found in mice with streptozotocin-induced type II diabetes it would provide a common pathological link between type II diabetes and Alzheimer's disease. Understanding the commonalities between diabetes and Alzheimer's disease will aid in the development of preventative measures to deter the co-morbidity of these two highly-prevalent disorders.

Bio & Health Sci Poster 14:

Modified Dextromethorphan Displays Antidepressant-Like Effects in the Forced Swim Test in Mice

Anna Scandinaro, Linda Nguyen and Rae Matsumoto

Department of Basic Pharmaceutical Sciences, West Virginia University

Dextromethorphan, a potential safer alternative to the fast acting antidepressant ketamine, has recently been shown to produce antidepressant-like effects in the forced swim test (FST), the most validated animal model for predicting antidepressant efficacy. However, the rapid metabolism of dextromethorphan poses a challenge in its use as a routine clinical drug. Two approaches to inhibit the metabolism of dextromethorphan are 1) addition of the CYP2D6 inhibitor, quinidine, and 2) chemically modifying dextromethorphan. The purpose of this study was to determine if a chemically modified form (analog) of dextromethorphan that is more resistant to metabolism too elicits antidepressant-like effects in male, Swiss Webster mice using the FST. We found that the dextromethorphan analog exhibited antidepressant-like effects independent of increases in locomotor activity. Addition of quinidine to further slow the metabolism of the dextromethorphan analog did not alter the antidepressant-like effects of the dextromethorphan analog, but it significantly decreased the stimulant effects, suggesting a way to reduce abuse potential and increase safety when considering the use of this compound in humans.

Biological and Health Sciences Category

Bio & Health Sci Poster 15:

Human auditory cortex is sensitive to acoustic signal attributes characteristic of human speech

Matthew Preda[2], William J. Talkington[1], Chris Frum[2], Laura Hitt[3] and James W. Lewis[2]

Center for Advanced Imaging, and Sensory Neuroscience Research Center, and [1]Department of Neurobiology & Anatomy, [2]Department of Physiology & Pharmacology, [3]Department of Theatre

West Virginia University, Morgantown, WV 26506, USA

Human language evolved to facilitate spoken communication between individuals. Because this often takes place in complex acoustic environments, speech sounds must be distinguished from environmental stimuli before they can be understood and interpreted; this process likely occurs in several stages. It has been shown that human auditory cortex is arranged tonotopically, indicating that a primary step in auditory processing is frequency discrimination, and that regions of auditory cortex are sensitive to the harmonic content of sound stimuli. Using functional magnetic resonance imaging during a passive listening task, we identified the cortical regions that are most responsive to iterated rippled noises modulated to simulate the spectral and/or temporal characteristics of speech. We expect to find that the different sound classes activate distinct regions of auditory cortex and are organized hierarchically, with the noises more closely resembling speech processed nearer to speech sensitive areas. This research is expected to further our understanding of auditory and speech processing, and has applications in the development of biomimetic speech-selective amplification devices such as microphones and hearing aids.

Bio & Health Sci Poster 16:

Blocking input from flight sensory motor centers modulates antennal lobe olfactory processing

Divine Nwafor, Samual Bradley and Kevin Daly

Department of Biology, West Virginia University, Morgantown, WV 26506

Sensory systems function by detecting changes within their sensory landscape. In olfaction active sampling strategies, such as sniffing in mammals or wing beating in the moth *Manduca sexta*, impose a temporal structure on olfactory stimuli. This temporal structure is preserved in the responses of the insect antennal lobe (AL) and is correlated with enhanced behavioral performance. In *Manduca,* a single pair of histamine immuno-reactive neurons connecting from flight sensory motor centers to the AL. Previous studies show that histamine application enhances the ability of AL neurons to track periodic stimuli at 20Hz but do not indicate how disruption of histamine affects AL function. Here, we use multiunit extracellular recordings to show the effects of cimetidine (a histamine receptor antagonist) on AL responses. We use power spectral density (PSD) analysis to quantify the presence and relative strength of pulse tracking before during and after cimetidine application. Cimetidine application disrupted cell pulse tracking ability. These results suggest that the motor to sensory circuitry associated with active sampling modulates olfactory processing of high frequency, behaviorally relevant stimuli.

Biological and Health Sciences Category

Bio & Health Sci Poster 17:

Cannabinoid withdrawal alters emotion and motivation in mice

Malosree Maitra, Sara R. Nass and Steven G. Kinsey

Department of Psychology, West Virginia University, Morgantown, WV

Cannabis is the most commonly abused illicit substance in the world. Cannabis withdrawal induces anxiety, depression, insomnia, as well as drug-craving. These symptoms contribute to relapse. However, no safe and effective medications are available. Furthermore, current preclinical animal models do not model the emotional components of cannabis withdrawal. Δ^9-tetrahydrocannabinol (THC), the primary psychoactive component of cannabis, causes similar behavioral changes in humans and mice. The goal of this project was to determine the behavioral effects of THC withdrawal in mice. Male C57BL/6 mice were randomly assigned to receive chronic injections of THC (50 mg/kg, sc) or vehicle, twice daily, for 6 days. Withdrawal was precipitated by rimonabant, an antagonist of CB_1 receptors on which THC acts. THC withdrawal symptoms were quantified using the marble-burying test (anxiety-like behavior) and tail-suspension test (TST; depressive-like behavior). We hypothesized that THC withdrawal would increase marble burying and immobility in either test. However, THC withdrawal significantly decreased marble burying and decreased immobility in the TST. An effective treatment should cause partial or complete reversal of the post-withdrawal effects.

Bio & Health Sci Poster 18:

Comparing methods of detecting white matter abnormalities in neonates with hypoxic-ischemic encephalopathy

Monica T Ly, Tania U Nanavati, Christopher A Frum and Paola Pergami

Center for Neuroscience at the Robert C. Byrd Health Sciences Center, West Virginia University, Morgantown, WV 26506

Hypoxic-ischemic encephalopathy (HIE) is a major cause of mortality and adverse neurodevelopmental outcome in infants. Conventional magnetic resonance imaging can characterize lesions associated with HIE, but there remains a need for more immediate, objective methods of injury detection. Fractional anisotropy (FA), a quantitative measure of directional diffusivity acquired from diffusion tensor imaging, allows the assessment of brain tissue microstructure including fiber coherence and myelination. FA is traditionally analyzed through manually labeled regions of interest, which may have significant inter-subject variability and do not easily allow for whole-brain comparisons. Tract-based spatial statistics (TBSS) is a newer automated approach that detects group differences in white matter pathways throughout the brain. Testing the methods on FA values from 9 infants with HIE and 11 controls, we found that the two methods were comparable in sensitivity, specificity, and the ability to detect significant differences in FA. Both showed decreased FA in infants with HIE compared to controls and similar inter-subject variability. TBSS is therefore a viable option for diffusion analysis that may be preferable for its ease of use.

Biological and Health Sciences Category

Bio & Health Sci Poster 19:

Parametric Analysis of Major White Matter Tracts in Healthy and Post-Stroke Brains

Matthew S. Lokant, William J. Talkington, Marc W. Haut and Valeriya Gritsenko

Department of Human Performance Division of Physical Therapy, West Virginia University School of Medicine, Morgantown, WV, 26506

Stroke often results in lesions affecting the structure and function of gray and white matter tissues within the brain. Magnetic resonance imaging (MRI) has been extensively used to describe the effects of stroke on these injured regions. After stroke, white matter integrity in major fiber tracts in the brain (e.g. corticospinal) has been correlated with functional motor assessment measures. However, these white matter measurements, such as fractional anisotropy, often only result in global scores of injury for an entire tract. This potentially ignores valuable information regarding precise injury localization and the resulting motor impairment. We aimed to describe the structural integrity of major white matter tracts in healthy and post-stroke brains at a finer scale than prior studies. Using a new methodology and software package (TRACULA) for white matter analysis, we show that it may be possible to extract parametric white matter measurements and correlate them with an individual's motor behavior. Additionally, these techniques may prove useful in the future for designing individualized rehabilitations strategies.

Bio & Health Sci Poster 20:

Behavioral model of sensorimotor adaptations in rats mirrors post-stroke gait

Victoria Ledford[1], Kiril Tuntevski[2], Justine Shaffer[2] and Sergiy Yakovenko[2]

Center for Neuroscience[1], Department of Human Performance, Neural Engineering Laboratory[2], West Virginia University, Morgantown, WV 26506

Stroke is the leading cause of long-term disability, decreasing overall quality of life and leading to progressive deterioration of health. Locomotor training is often used in rehabilitation to promote walking and minimize joint damage in patients with stroke and other cortico-spinal injuries. However, no animal models have been previously developed for probing the mechanisms responsible for locomotor sensorimotor adaptations caused by behavioral tasks. In this study, we used a peg walkway to impose two training tasks that induce sensorimotor adaptations similar to those observed in animals with stroke. The tasks constrained paw placement to be either symmetric with preferred stride length or asymmetric with reduced lateralized load. In 4 Sprague-Dawley rats, we demonstrated persistent adaptations developed after 50 steps during the asymmetric task ($p<.001$). These results provided a behavioral model of sensorimotor adaptations that produced robust and lateralized locomotor effects. This animal model will be further analyzed with intracortical stimulation techniques to develop effective rehabilitation approaches that can restore function and prevent maladaptations in stroke patients.

Biological and Health Sciences Category

Bio & Health Sci Poster 21:

JNK Signaling is Required for Migratory Stream Integrity During Corticogenesis and Layering in the Adult Cortex

Hailey L Gosnell, Abigail K Myers and Eric S Tucker

Department of Neurobiology and Anatomy, Center for Sensory Neuroscience, West Virginia University School of Medicine, Morgantown WV 26505

Inhibitory interneurons critically regulate neurotransmission in the cerebral cortex. Improper interneuron migration during corticogenesis can lead to aberrant construction cortical circuitry, and, therefore, carries inherent risk for the acquisition of developmental brain disorders. Our lab recently identified the JNK signaling pathway, particularly the JNK1 gene, as a critical regulator of interneuron migration during embryonic development. We hypothesized that JNK signaling is necessary for maintaining the tangential progression of migrating interneurons. Moreover, we predicted that interneurons might prematurely enter the cerebral cortex and mislayer due to early departure from migratory streams. My work focused on two projects: the first relied on an *ex vivo* assay for studying cortical interneuron migration, and the second examined the ultimate consequence for JNK-deficiency on the mature cerebral cortex *in vivo*. The data showed trending and statistically significant patterns favoring our predictions. Understanding the function(s) of the JNK signaling pathway during construction of cortical circuitry is essential for understanding pathogenesis of neurodevelopmental disorders impacting the function of the cerebral cortex, as well as potentially identifying novel targets for therapeutic interventions.

Bio & Health Sci Poster 22:

Electrophysiological activity related to reaching movements of the upper limbs

Stephen Frazier[1,2], William Talkington[1], Erienne Olesh[1], Brad Pollard[1] and Valeriya Gritsenko[1]

[1]Department of Human Performance, Division of Physical Therapy and [2]Center for Neuroscience, West Virginia University School of Medicine, Morgantown, WV 26506

Electroencephalography (EEG) is a widely used measure of electrical brain activity recorded from the scalp. Though used across a number of functional domains, EEG has not been extensively used to study motor control in humans. We aimed to examine the potential relationships between EEG signals, kinematics (i.e. motion parameters), and electromyographic (EMG) signals produced during upper limb reaching movements. We hypothesized that movement related brain activity would correspond to muscle activation patterns and kinematics recorded during reaching movements of the arms. Furthermore, we investigated whether these various signals depended upon gravitational dynamics. We recruited two healthy individuals to perform a variety of reaching movements with each arm. Using virtual reality software and hardware, subjects performed center-out reaching movements towards fourteen targets while EMG, EEG, and kinematic data were recorded. Using various MATLAB toolboxes (EEGLAB, ERPLAB, and SciBox), we found EEG signal features that correlated with specific movement features and muscular activity. Future work will investigate whether these signal relationships can be used to characterize motor impairments, such as those found in stroke.

Biological and Health Sciences Category

Bio & Health Sci Poster 23:

The dark side of photoreceptor neuron degeneration in a model of retinitis pigmentosa

Caitlyn P. Bryan and Visvanathan Ramamurthy

Ophthalmology and Biochemistry, Center for Neuroscience, West Virginia University, Morgantown, WV 26506

A mouse model (*retinal degeneration10-rd10*) with mutation in the gene encoding the β-subunit of rod cGMP phosphodiesterase (*Pde6b*) mimics the disease progression observed in human retinitis pigmentosa (RP). Despite extensive use of this model, the molecular mechanism behind degeneration of rod photoreceptor neurons is unknown. Interestingly, this degeneration is delayed when *rd10* mice are dark-reared, suggesting that light, and therefore PDE6 activation, accelerates photoreceptor cell death. To investigate this issue, we will measure retinal cGMP levels from *rd10* animals raised in normal light and complete darkness to correlate with photoreceptor degeneration. Finally, to study the pathway leading to light-dependent photoreceptor cell degeneration, we will cross *rd10* mice with a model lacking functional transducin, a G-protein (*rd17)*. Electroretinogram (ERG) showed reduced (*rd10*) or absent (*rd17*) rod photoreceptor light response. Preliminary immunocytochemistry tests confirmed no degeneration and reduced rod transducin levels in the *rd17* model at 112 days. However, in *rd10* animals, more than half of the photoreceptor nuclear layer is lost at day 22. These preliminary results confirm the validity of the animal models. Studies are underway to test the mechanistic basis behind neuronal degeneration.

Bio & Health Sci Poster 24:

Assembly of a Synapse: Proteins of the Postsynaptic Density

Yarden Avnor[1], Doug Kolson[1] and George Spirou[1,2]

[1]Center for Neuroscience, 2Department of Otolaryngology, West Virginia University, Morgantown, WV, 26506

The early formation and stabilization of synapses requires the intricate interactions between the presynaptic and postsynaptic cells. To more completely understand the initial steps in synapse development, our lab is studying the assembly of a protein rich region found on the postsynaptic neuron known as the postsynaptic density (PSD). Our lab uses the calyx of Held (CH) terminal in the mouse auditory brainstem, the largest synaptic terminal in the mammalian brain, as our system model. We hypothesize that there is a pre-patterning of PSD molecules that predicts the site of synapse formation. In this study the expression patterns of selected PSD scaffolding proteins SAP102, PSD-95, and Homer and the glutamate neurotransmitter receptor NR2B were studied through immunofluorescence and confocal imaging. These proteins were chosen for analysis based upon their high copy number and presence in a previous microarray study from our lab of the neurons postsynaptic to the CH. We will present a time series of confocal microscopy images and microarray data to chart the assembly of the PSD relative to growth of the CH.

Physical Sciences and Engineering Category

Phys Sci & Eng Index

Physical Sciences and Engineering Category

Poster 16: *Examination of mechanisms of binding of Nt17 region of Huntingtin protein*. **Arlo Parker**, James Arndt, Megan Maurer, Justin Legleiter & Stephen Valentine.

Poster 17: *Using mathematics to test real-world scenarios*. **Darryl Baynes**, Marjorie Darrah, Kristen Duling & Marcela Trujilo.

Poster 18: *Avian flight analysis through videography and particle image velocimetry*. **Dustin Myers**, Shanti Hamburg, Christopher Griffin & Wade Huebsch.

Poster 19: *Assessing live load distribution in short-span bridges utilizing press-brake-formed steel tub girders*. **Eric Rogers**, Karl Barth & Greg Michaelson.

Poster 20: *Analyzing magnetic domains to understand coupling with a ferroelectric material.* **Michael Spencer**, Jinling Zhou, Chih-Yeh Huang & Mikel Holcomb.

Poster 21: *The effect of TNF-alpha on neuronal secretion of microRNAs*. **Derek Andreini**, Danielle Doll & James Simpkins.

Poster 22: *Preserving enzyme functionality through encapsulation*. **Jordan Chapman** & Cerasela Dinu.

Poster 23: *Computational simulations of trans- and cis-azobenzene and derivatives.* **Zachary Herberger**, Hong Wang & James Lewis.

Physical Sciences and Engineering Category

Phys Sci & Enq Poster 1:

Non-Conventional Mine Subsidence and Dams: A Case Study with Fault Tree Analysis

Jeffrey Stevens, Harold Russell and John Quaranta

Department of Civil and Environmental Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

For many years, the mining industry has primarily followed traditional mine subsidence theory. This theory placed all displacements due to vertical ground subsidence to within a 'draw angle' which was used to design the protection areas for important surface infrastructure including building structures and dams. Recent incidents, such as the breaching of the Ryerson Station Dam in Pennsylvania, have indicated that subsidence impacts can extend far beyond this angle. These impacts are believed to be the result of non-conventional mine subsidence behavior, termed valley closure and upsidence. The Ryerson Station Dam was studied and a fault tree created to map the progression of events and mechanisms of mine subsidence and non-conventional behavior. Additionally, computer models were evaluated for applicability in predicting and quantifying this non-conventional behavior. Results indicated that the topographical and geologic conditions of Southwestern Pennsylvania can support non-conventional subsidence behavior and the fault tree analysis identified the causal sequence of conditions and events propagating the dam breach. Additionally, numerical models like LaModel were found to offer the best potential to predict this phenomenon.

Phys Sci & Enq Poster 2:

Oxidative Cross-Coupling of Alkynes through Gold Catalysis

Nima Ronaghi, Haihui Peng and Xiaodong Shi

Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, West Virginia 26506, United States

Alkynes are a group of organic compounds that contain a sigma bond and two pi bonds between at least two of the carbon atoms. Alkynes are extremely electron rich, making them a very interesting group of compounds to study. In the past, homo-coupling of alkynes has been possible, through the use of a copper catalyst and the Glaser-Hay reaction; however cross-coupling of alkynes has been very difficult to accomplish through this mechanism. Gold acts as a Lewis acid by accepting pi electrons into its empty d orbital, thus producing an activated pi complex; this process is known as pi backbonding. In our study, we have proposed using a gold catalyst to cross couple alkynes. Using this procedure, asymmetric diynes and triynes can be created. Gold, unlike other metal catalysts, is not harmful to the body if trace amounts are found in pharmaceutical products. The data obtained shows that the cross-coupling product can be achieved with a good conversion and yield percentage. This process can be extended to use intramolecular cross-coupling to form large asymmetric rings.

Physical Sciences and Engineering Category

Phys Sci & Eng Poster 3:

Automatic Classification of Neuron Morphology by Age or Type

Quinn Jones[1], Michael Morehead[1], Gianfranco Doretto[1] and George A. Spirou[2]

[1]Lane Department of Computer Science and Electrical Engineering and [2]Sensory Neuroscience Research Center, West Virginia University, Morgantown, WV 26506

Neuron cells are typically classified by their age or type, each can be identified by cell morphology. Knowing the class of a cell can predict its attributes and behavior in the neural circuit. The ability to automatically classify cells will increase throughput in anticipation of an increase in the availability of cell model data due to President Obama's BRAIN initiative. We used the bag of keypoints method for classifying images which we are extending by using spin-images, a technique form surface mesh recognition to create an invariant descriptor of the local cell morphology. We modified the normal method by reducing the amount of spin-images and reducing the size of the spin-images to isolate local features. The spin-images are clustered using kmeans to find the number of features on the cells. A support vector machine classifies the cells based on having similar number of features. Validation was done using leave one out and 3-fold validation. With only 36 cell models for training data we achieved an 86% accuracy rate of classification.

Phys Sci & Eng Poster 4:

Comparing observed ion temperatures in the plasma sheet with two temperature-predicting models to determine intervals of internal heating

Kyle Krowpman and Amy Keesee

WVU Department of Physics & Astronomy, NSF, NASA

Plasma is a gaseous system of free electrons and ionized atoms in which the electromagnetic forces between particles cannot be ignored. Plasma surrounds the Earth in a region enveloped by the geomagnetic field called the magnetosphere. The geomagnetic field heavily influences the paths taken by individual particles in this region. Solar activity can disturb the magnetosphere, increasing the energy of particles within this region; the effects of those disturbances can be observed in the plasma sheet. Ion temperature in a hot, dense sheet along Earth's equatorial plane (the plasma sheet) were calculated using data from NASA's TWINS mission and are compared with two independent temperature models. Observed temperatures are compared to predictions made by these models and periods of disagreement are analyzed with special attention being given to auroral electrojet (AE) index, a measurement of substorm activity. The disagreement between the two given models and the observed temperatures suggests that some heating mechanism other than the solar wind plays a significant role in determining temperature in the plasma sheet during these intervals.

Physical Sciences and Engineering Category

Phys Sci & Enq Poster 5:

Nanomaterials and their indirect effects on the vascular reactivity of mesenteric arterioles

Quincy A. Hathaway, Phoebe A. Stapleton, Valerie C. Minarchick and Timothy R. Nurkiewicz

Department of Physiology and Pharmacology, School of Medicine, West Virginia University, Morgantown, WV 26506

Nanomaterials, ≤ 100 nanometers in one dimension are increasingly used in home and industrial products. Nanomaterials are known to induce biological dysfunction. However, the mechanisms associated with this dysfunction are unknown. In brief, the procedure included the isolation, excision, and cannulation of mesenteric arterioles in a Living Systems Vessel chamber, [80 mmHg, 37^{o}C physiological salt solution (PSS)]. In order to evaluate baseline reactivity, dose-response curves to acetylcholine (10^{-4} M to 10^{-9} M), an endothelium-dependent dilator, and phenylephrine (10^{-4} M to 10^{-9} M), a vascular smooth muscle constrictor, were completed. Each arteriole was used as its own control. Arterioles were first tested with normal intraluminal PSS, followed by plasma from a control or exposed (to nanomaterials via pulmonary exposure) donor rat. The purpose of this study was to determine if factors contained within the plasma could cause arteriole dysfunction. Experimental results indicated significant variance within dose-response curves of nanomaterial exposed vessels, compared to controls. These studies provide foundational support that factors within the plasma (e.g. inflammatory mediators or translocated nanomaterials) may contribute to systemic arteriole dysfunction.

Phys Sci & Enq Poster 6:

Self-healing of PEO/PAA complex film

Julie E. Peng[1], Yan Wang[2] and Junqi Sun[2]

[1] *C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV, 26506*
[2]*State Key Laboratory of Supramolecular Structure and Materials, College of Chemistry, Jilin University Qianjin Street 2699, Changchun, PR China*

Self-healing properties rehabilitate films without the presence of a healing agent. Due to this phenomenon, intrinsic abilities in polyelectrolyte material have gained importance in chemistry research. Self-healing films serve as protective covers for monitor and phone screens or capacitors in a circuit. Oppositely charged polymers poly(acrylic acid) (PAA) and poly(ethyl oxide) (PEO) form hydrogen bonds and precipitate in solution. Centrifuging polymer aggregates creates a thick gel. Our experiments investigated mechanical properties of damaged and undamaged films and analyzed effects of adding 16% and 40% by mass Ca^{2+}. All films tested 90-92% transmittance displayed self-healing capabilities. Undamaged films void of Ca^{2+} withstood 0.25 MPa stress and 650% strain, while 16% and 40% Ca^{2+} samples sustained 1.2 and 1.7 MPa stress and 420% and 595% strain, respectively. Damaged samples void of Ca^{2+} tolerated .45 MPa stress and 790 % strain, while 16% and 40% Ca^{2+} films endured .5 and .6 MPa stress and 1200% and 1400% strain, respectively. Addition of Ca^{2+} diversely effected strain of undamaged samples. Nonetheless, stress capacities consistently heightened in correlation with Ca^{2+} concentration.

Physical Sciences and Engineering Category

Phys Sci & Eng Poster 7:

Investigation of Applicable Functionality of Porous, Polymer Films Using Polyoxometalates

Savannah Sims [2], Jing Liang [1] and Lixin Wu [1]

[1] State Key Laboratory of Supramolecular Structure and Materials, College of Chemistry, Jilin University, Changchun 130012, China
[2] Department of Chemical Engineering, West Virginia University, Morgantown WV, 26506, USA

A porous, polymer, thin film was fabricated in this research by mixing a polystyrene solution using a dichloromethane solvent with an aqueous didodecylamine solution to form a reverse microemulsion that was then spread onto a glass substrate inside of a temperature and humidity controlled environment, allowing the water and solvent to evaporate, leaving behind the thin film. These thin, porous films are then modified using Polyoxometalates, which are large, metal containing anions whose metal atoms bond with oxygen to form an enclosed structure. Polyoxometalates are used to line the cavities of porous films, so that further modification for tangible application can occur. By utilizing electrostatic interactions based on the largely negative charges provided by Polyoxometalates, the cavities of the films have the ability to act as microreactors. In this study, polypyrrole was successfully synthesized and assembled into the cavities of the polymer porous film utilizing layer by layer assembly with Pyrrole. Additionally, insulin aggregates were loaded into the pores of the film in order to create a glucose responsive membrane.

Phys Sci & Eng Poster 8:

Sensing detonation wave fronts in a Pulse Detonation Engine

Taylor Gosnell, Eli Thorpe and Patrick Browning

Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26505

Pulse detonation engines (PDEs) offer a more efficient and cost effective alternative to engines used in today's propulsion industry. PDEs operate by igniting a fuel and oxidizer mix in a long tube. The deflagration of the combustion propagates down the tube, then transitions into a detonation wave. This process ultimately creates thrust. The experiment was designed to build a sensor able to sense the detonation wave fronts. These sensors can be used to measure the wave speed between two points on the engine. The experimental setup consisted of a previously made PDE, our constructed ion probe sensor, and oxyacetylene oxidizer fuel mix. The sensor was made by utilizing the wheat stone bridge circuit with one open leg attached to a spark plug. A constant two volts were read across the spark plug until the wave front passed it. This caused the voltage to drop due to charged OH^- ions, released during detonation, completing the circuit. The magnitude of the voltage drop was inconsistent although there was consistently a voltage spike. It was concluded this was due to fluctuating stoichiometry in the oxyacetylene.

Physical Sciences and Engineering Category

Phys Sci & Enq Poster 9:

Propagating precipitation wave behavior with barriers

Randi Tinney, Darrell Collison, Mark Tinsley and Kenneth Showalter

C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26505

The phenomenon of propagating precipitation waves has only been seen in one type of system so far. The rarity of these waves makes understanding them difficult, but observing the waves in a variety of different environments will help us understand their properties and how they are formed. The system that is used to create these waves is a gel medium that has aluminum ions trapped within it. These ions react with sodium hydroxide as it diffuses into the gel and produces the migrating precipitation band. The propagating precipitation waves occur within this migrating precipitation front. We can determine some properties and behaviors by observing the waves pass through various sized openings in plastic barriers. By varying the size of the openings, we can determine if there is a lower limit to the opening size and how the wave behaves at this limit. We can also determine how the precipitation waves behave as they pass through multiple openings in the barrier and through a channel.

Phys Sci & Enq Poster 10:

Hydrogen fuel production from acids: Electrocatalytic proton reduction by cobalt (II)

Trevor W. Butcher, Vaishali Vajpayee and Brian V. Popp

Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, West Virginia 26506

Hydrogen fuel remains an alternative energy of wide interest, although its production currently requires the use of valuable coal and natural gas resources (e.g. Water gas shift reaction). As an alternative route to hydrogen gas, proton reduction has been gaining recent interest. One of the main obstacles to its application, however, is the large voltage overpotentials needed to initiate current flow, and consequently large energy losses. Electrocatalysts have been shown to mitigate overpotentials and even increase the faradaic yield of this process, although some aspects of the reaction are still not understood. Herein we report the synthesis, characterization, and electrocatalytic activity of a series of cobalt (II) pyridinediimine (PDI) complexes with differing ancillary coordinating groups. Through Cyclic Voltammetry (CV) titration, these complexes have been ranked in their electrocatalytic activity toward proton reduction in nonaqueous media. Preliminary data show that the solvent, supporting electrolyte, and acid anion are all critical in the reaction's efficiency, and that modest changes in catalytic activity occur as a function of the ancillary chelating functionality present in the ligand.

Physical Sciences and Engineering Category

Phys Sci & Eng Poster 11:

Study of electric control of magnetism at material interfaces for potential memory devices

Lauren Dallachiesa, Guerau Cabrera, Robbyn Trappen, Trent Johnson, Jinling Zhou, Pavel Borisov and Mikel Holcomb

Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506

As memory devices for computing are made increasingly smaller, they become inefficient due to quantum effects such as quantum tunneling of electrons. Magnetic memory devices would eliminate most of the inefficiency due to tunneling leakage. Magnetic field control of magnetic domains, however, is energy costly and hard to localize. Fortunately, with the use of electrodes and an adjacent ferroelectric layer, the magnetic properties of some materials can be controlled. The goal of this research is in the high quality growth and characterization of samples where ferroelectric and ferromagnetic materials are combined. We study the properties of these materials to determine the mechanism(s) responsible for magnetoelectric coupling (induced magnetization upon the application of an external electric field) at the boundary between materials. If these interfacial effects are more clearly understood, a greater magnitude of magnetoelectric coupling can be achieved. We are currently poling samples to study our control of the polarization in the adjacent ferroelectric layer as well as studying the magneto-optic Kerr effect to characterize the magnetization of the ferromagnetic layer.

Phys Sci & Eng Poster 12:

Multidimensional coherent spectroscopy of photonic nanostructures to determine many-body interactions

Ashley Batesole, Alan Bristow and Brian Wilmer

Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506

Defect-bound excitons in semiconductors have the potential for use as quantum emitters because of their sharp lines and ability to be placed in microcavities. Quantum emitters have multiple uses in current technology, such as for the development of new light sources, nano-electronic devices, nanoscopic probes and labels, and in the field of quantum information processing. Multidimensional coherent spectroscopy isolates the quantum interference between isolated defects (g-band) and defect complexes (v-band) in high-quality bulk Gallium Arsenide grown by molecular beam epitaxy, which is a method used to deposit single crystals. An experimental setup that employs a sequence of ultrafast laser pulses, nonlinear optics, interferometry and feedback electronics is used to acquire the spectra. Excitation-induced dephasing and shift are observed, indicating many-body interactions that are expected in solid-state systems. Moreover, a symmetric imbalance of the off-diagonal spectral features indicates a coupling to the surrounding crystal lattice, most likely mediated by non-radiative interactions. Multidimensional spectroscopy also isolates the dephasing rates of the excited state populations.

Physical Sciences and Engineering Category

Phys Sci & Eng Poster 13:

Structure Variation in Magnetic/Ferroelectric Heterostructures

Janice Q. Hartleroad, Disheng Chen and Mikel B. Holcomb

Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506

We report on the structural composition of $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) epitaxially grown on $PbZr_{0.2}Ti_{0.8}O_3$ (PZT). LSMO has a perovskite-based crystal structure of the general form ABO_3 with lanthanum and strontium occupying the 'A' sites and manganese occupying the 'B' sites. LSMO is a magnetic oxide which demonstrates competing electronic and magnetic effects, resulting in novel behavior including colossal magnetoresistance. We utilized extended x-ray absorption fine structure (EXAFS) to determine the crystal structure of our LSMO sample. Correlating the change in the crystal symmetry and lattice parameters of LSMO when grown on PZT to material properties can help to provide a better understanding of the strongly correlated electronic and magnetic properties of this material. This understanding has the potential to impact the development of technology by enabling industry to create smaller, more efficient devices. Data was collected at the Advanced Light Source at the Lawrence Berkeley National Laboratory and analyzed with the standard ATHENA and ARTEMIS programs.

Phys Sci & Eng Poster 14:

Polarimetry measurements of InGaAs quantum dot emission

Patrick E. Nelson, Gary Lander and Edward B. Flagg

Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506

Quantum dots are nanoparticles that confine excitons (electron-hole pairs) in all three spatial dimensions. They form a simple quantum mechanical system with two or more energy levels; these dots can be excited with photons of the correct energy. The quantum dot then drops back to the ground state, emitting a photon of a specific frequency and polarization. This polarization can be expressed in the form of a single vector on the Poincaré sphere. Using two liquid crystal variable retarders (LCVRs), this vector can be rotated about two axes of the sphere by known amounts, transforming it into any other polarization. A subsequent polarization filter only lets through the new horizontal component of the polarization, allowing us to systematically measure the complete polarization state of the incoming light. This device was assembled and calibrated, then used to characterize the polarization dependence of the peak wavelength of the emitted photons, giving insight into shape and energy levels of the quantum dot. The lasers used in this experiment require basic precautions when manipulating optics to avoid eye damage.

Physical Sciences and Engineering Category

Phys Sci & Enq Poster 15:

Examination of the decarboxylation of tripodal copper-(I) carboxylate complexes

Corrie E. Burlas and Jessica M. Hoover

C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26506-6045

The development of new carbon-carbon bond-forming reactions is one of the essential goals of organic chemistry. Traditional cross-couplings require prefunctionalized substrates, which limits the efficiency of these reactions. Transition metal-catalyzed decarboxylations have emerged as useful alternatives to the traditional cross-coupling methods because there is no longer a need for prefunctionalized reagents .The catalysts currently being used have limitations involving which carboxylic acids can be decarboxylated. The goal here is to find a general decarboxylation catalyst with a wider range of reactivity. A charge-neutral tris-methimazoleborate ligand was synthesized in order to make copper-(I) carboxylate complexes to be used in decarboxylative coupling reactions. This ligand has never been studied for decarboxylation chemistry, and it is possible that the ability of this class of ligands to bind to the central metal ion at three points will broaden the reactivity of the complexes. In this poster, the results for the decarboxylative coupling reactions of tripodal copper-(I) carboxylate complexes will be evaluated and presented.

Phys Sci & Enq Poster 16:

Examination of Mechanisms of binding of Nt17 region of the Huntingtin Protein

Arlo Parker, James R. Arndt, Megan M. Maurer, Justin Legleiter and Stephen J. Valentine

C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26506-6045

Huntington's disease is a neurodegenerative disease caused by a mutated huntingtin gene. When exon 1 of the huntingtin protein aggregates, disease causing amyloid formation occurs. The reactions of the seventeen residue amphipathic α-helix at the end of the N terminal (Nt17) of exon 1 are critical to the formation of aggregates for the entire exon. However, no models for the interactions between the residues at the Nt17 region have been developed. In order to determine the mechanisms for these reactions, the Nt17 region was labeled isotopically in the gas phase and covalently in solution. Nt17 was incubated so that the multimerization could occur. Examination of the isotopically labeled Nt17 showed differential deuterium uptake up through the trimer. Covalent labeling of the hydrophilic face stabilized an intermediate multimer at high label concentrations. This shows that the several structures that can be formed by Nt17 are affected by the hydrophilic face. This work begins to develop a model specifically for the binding of the Nt17 residues which could eventually be used to block huntingtin aggregation.

Physical Sciences and Engineering Category

Phys Sci & Eng Poster 17:

Using Mathematics to Test Real-World Scenarios

Darryl Baynes, Marjorie Darrah, Kristen Duling and Marcela Trujilo

Department of Mathematics, West Virginia University, Morgantown, WV 26505-6504

Unmanned Aerial Vehicles or UAV's are autonomous aircrafts that do not require a human pilot aboard to fly. Our research consists of utilizing genetic algorithms to optimally task a group of UAV's, for surveillance of a number of points of interest. In order to ensure proper performance of the computer algorithm, I was assigned to rigorously test the software. Using mathematics to model and create real-world scenarios, I fully tested different functions in the program that will be used to task the UAV's. Factors such as the arrangement of points, UAV loiter time, the camera footprint and several others all needed consideration when sketching these models. Testing these scenarios will reveal any issues within the tasking program. Later this year, a demonstration for the Army Research Lab will be held in Maryland. These tests will help ensure that the tasking algorithm will function properly and be able to handle any real-world situations.

Phys Sci & Eng Poster 18:

Avian flight analysis though videography and particle image velocimetry

Dustin J. Myers, Shanti Hamburg, Christopher D. Griffin and Wade W. Huebsch

Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26505-6504

Specific information about the air flow generated by bird flight and how feather movements influence the flight is scarce. Avian flight is perhaps one of the most obvious places to find lessons on improving modern technologies, as birds exhibit many flight capabilities not possible for most modern aircraft. As such, two primary goals of this project are: to gain a qualitative understanding of feather motions during glides and to image the velocity field generated by a gliding bird. The data will be acquired by analyzing high speed video taken from multiple angles and stereoscopic PIV (particle image velocimetry). The PIV technique uses a pulsed laser sheet, cameras, and suspended particles to capture velocity fields in a plane at one instant. By setting up the system to be triggered by the passing bird and varying the delay until recorded, a time lapse of the velocity will be obtained. The results will aid in qualitatively understanding wing and feather mechanics, constructing models which replicate bird wing features, and in validating future model testing with experimental velocity data. Currently, the systems have been set up to obtain the required data and tested to ensure proper functioning. Data on a trained kestrel will be acquired in the near future.

Physical Sciences and Engineering Category

Phys Sci & Eng Poster 19:

Assessing live load distribution in short-span bridges utilizing press-brake-formed steel tub girders

Eric L. Rogers, Karl E. Barth and Greg K. Michaelson

Benjamin M. Statler College of Engineering and Mineral Resources, Civil and Environmental Engineering, West Virginia University, Morgantown, WV 26506

A large percentage of bridges are labeled as structurally deficient and/or functionally obsolete due to their lack of maintenance. For this reason, research in the most cost-effective ways to replace structurally deficient bridges is in high demand. Collaboration in the steel industry has led to a newly developed press-brake-formed steel tub girder, which offers a rapid and economically competitive solution. This research focused on a computational study of the live load distribution to interior and exterior tub girders by using the finite element program ABAQUS. Twenty seven bridge configurations with varying mill plate widths, girder depths and lengths, number of girders, lanes, and plate thicknesses were analyzed. Loads were applied using the HL-93 vehicular live loading according to AASHTO LRFD Specifications, and principal stresses were recorded in the elements of cross sections with maximum shear and moment. After assessing the average percentage of shear and moment distributed to each girder, live load distribution factors were formulated and compared with the current values supplied by the code.

Phys Sci & Eng Poster 20:

Analyzing magnetic domains to understand coupling with a ferroelectric material

Michael Spencer, Jinling Zhou, Chih-Yeh Huang and Mikel Holcomb

Department of Astronomy and Physics, West Virginia University

In the interest of energy efficiency, scientists are investigating new methods for storing information via magnetic domains that can be controlled by a small electric voltage. To develop this new form of electronics, it is first necessary to analyze the properties of candidate materials. Lanthanum strontium manganite ($La_{1-x}Sr_xMn,O_3$, or LSMO) is the magnetic material used in this study. LSMO was analyzed using photo-electron emission microscopy (PEEM) at the synchrotron in the Larence Berkeley National Laboratory. The data was converted to a graphical form and used to retrieve statistical information about the magnetic domains with varying sample thickness which will be utilized to understand the coupling with an adjacent ferroelectric layer ($PbZrTiO_3$). Ultimately, it was found that most of the domains switched contrast with alternating x-ray polarization (left and right circular polarization), which indicated strong ferromagnetism in our thin films (only a few unit cells thick). Much of the analysis techniques utilized to determine directions could be applied to determining a thickness dependence for material properties, as well as to analyze material interfaces.

Physical Sciences and Engineering Category

Phys Sci & Eng Poster 21:

The effect of TNF-alpha on neuronal secretion of microRNAs

Derek E. Andreini, Danielle N. Doll and James W. Simpkins

Center for Neuroscience and Center for Basic and Translational Stroke Research
West Virginia University, Morgantown, WV 26506-6045

TNF-alpha is neurotoxic, increased in serum of stroke patients, and correlated with worsen clinical outcome. In pre-clinical models, TNF-alpha exacerbates infarct size. MicroRNAs (miRNA) are noncoding short single-stranded RNAs that play a role in the regulation of mRNA translation and degradation. Alterations in miRNA expression profiles have been observed in ischemic disease, but their role in stroke outcome is unknown. In this study, we treated HT-22 cells, a hippocampal neuronal cell type, with pathophysiological relevant concentrations of TNFalpha for 24 hours to determine if TNF-alpha causes secretion of miRNAs that are associated with inflammation, synaptic plasticity, or cell death. We collected media and performed RT-PCR to quantify miRNA 132, 146, 34a, let7-a, and let7-b. Treatment with TNF-alpha resulted in a significant dose-dependent increase in exosomal secretion of miRNA 132, 146, and 34a and 1000 pg/mL of TNF-alpha resulted in a significant increase in both miRNA 132 and 146 by 2 and 4 fold, respectively. These data indicate that miRNAs 132, 146, and 34a may mediate some or many of the neurotoxic/inflammatory effects of TNF-alpha on neurons.

Phys Sci & Eng Poster 22:

Preserving enzyme functionality through encapsulation

Jordan S. Chapman and Cerasela Zoica Dinu

Department of Chemical Engineering, West Virginia University

Enzymes are highly specialized and specific biocatalysts; enzyme functionality, stability and effectiveness in synthetic environments are functions of pH and temperature. Enzyme immobilization has been proposed as a way to preserve enzyme activity and stability for applications as diverse as biosensors or biofuel production. One method of immobilization that preserves enzyme functionality is encapsulation; enzyme encapsulation could increase enzyme shelf-life and reduces the inhibitory effects of solvents. In my research, I am studying how enzyme encapsulation preserves the catalytic behavior of model enzyme soybean peroxidase. My method relies on encapsulating the enzyme in an alginate-based matrix and studying the activity, stability and kinetics before and after encapsulation. The results are used to evaluate the efficiency of encapsulating soybean peroxidase and how the encapsulation preserves enzyme functions when incubated at high temperatures or in high concentrated solvents. The data collected will be used to evaluate the benefits that the encapsulation technique can offer to industry and further research.

Physical Sciences and Engineering Category

Phys Sci & Enq Poster 23:

Computational simulations of trans- and cis-azobenzene and derivatives

Zachary Herberger, Dr. Hong Wang and James Lewis

Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506

Azobenzene isomerization has gained considerable interest as a photochromic switch due to its versatile applications in electronics, energy storage and molecular devices. The thermodynamically favoured trans isomer is easily converted into the cis isomer upon ultraviolet light excitation. The reverse reaction is somewhat less energetically demanding at room temperature. This "molecular switch" property is promising as it could be harnessed in a metal organic framework (MOF), which would collect industrial emissions like carbon dioxide and release them for storage later by way of light. The biggest challenge in designing an efficient azo-MOF is shrinking the large selection pool since the photoisomerization is sensitive to any structural changes. Heretofore, we have utilized the molecular dynamics software package FIREBALL. We simulate several hundred copies of the same molecule, all in the excited state (which occurs after light is shone upon it). We then collect data on the shape the molecule relaxes to. In this way we can find which azobenzene derivative has the greatest "quantum yield" - the percentage of molecules which relaxed to the opposite state.

Specialty Fields Category

Specialty Fields Category Index

Specialty Fields Category

Poster 16: *Experimental optimization of DNA aptamer usage conditions*. **Kelly Humphreys**, Katherine Hickey, Peter Gannett, Kelly Pisane, Letha Sooter, Ka Hong, Emily Despeaux, Chris Bostick.

Poster 17: *Social perceptions of Z devoicing in Appalachia.* **Margery Webb** & Kirk Hazen.

Poster 18: *Science, technology, engineering and math: gender inequity in STEM and 4H.* **Kathleen Baker** & Kasi Jackson.

Poster 19: *Exploring the potential of WVU food recovery to enhance community food security in Monongalia and Preston County, West Virginia*. **Hillary Kinney**, Bradley Wilson, Josh Lohnes, Derek Stemple, Dillon Muhly-Alexander, Gerardo Valera, Amanda Marple & Ally Sobey-Deaton.

Poster 20: *Protein measured in 3T3-L1 adipocytes indicates fixed numbers regardless of treatment administered.* **Lauren Norris**, Jake Engle & Kimberly Barnes.

Poster 21: *Increasing the efficiency of LEDs through the fabrication of photonic crystals using nanosphere lithography.* **Melanie Wieland**, Taylor Price, Anand Kadiyala & Jeremy Dawson.

Specialty Fields Category

Specialty Fields Poster 1:

Primary Care Practitioners' Dietary Counseling and Weight Management Practice Patterns

Brittany N. Abruzzino and Melissa Marra

Davis College of Agriculture, Natural Resources and Design, West Virginia University, Morgantown, WV, 26506-6108

West Virginia (WV) has among the highest rates of obesity and obesity-related health conditions in the nation. The American Heart Association recommends that primary care physicians (PCPs) provide or refer patients for nutrition counseling to control weight and reduce the risk of cardiovascular disease. We conducted an online survey of WV PCPs to determine current nutrition counseling practices and to identify barriers to providing counseling or referring patients to a nutrition professional for counseling. About 600 WV PCPs specializing in family practice, general practice or internal medicine were invited to participate. Preliminary results indicate that PCPs perceive lack of patient compliance, referral sources and time as the primary barriers to providing nutrition counseling. Uncertainty about insurance coverage was the most cited barrier to referring patients to a dietitian. WV PCPs identified a need for comprehensive lifestyle programs and nutrition referral sources. The results from this survey will be used to develop and improve access to nutrition counseling programs and services in an effort to reduce obesity-related heath disparities in WV.

Specialty Fields Poster 2:

Association of health literacy and diabetes knowledge on risk of developing non-insulin dependent (type 2) diabetes mellitus

Rosanna D. Sikora, Ali H. El-Khatib, Stephen M. Davis and Debra J. Paulson

Department of Emergency Medicine, School of Medicine, West Virginia University, Morgantown, WV

Diabetes is widely prevalent in the United States. Health literacy has been shown to improve overall health outcomes for chronic conditions, but the effect of health literacy on developing health conditions has not been widely explored. A cross-sectional survey probing the relationship of health literacy and diabetes knowledge with risk of developing Type 2 diabetes was constructed using an American Diabetes Association diabetes risk assessment tool paired with validated assessments of health literacy and diabetes knowledge. This survey was conducted as a convenience sample in the emergency department and urgent care facility of WVU. Lower health literacy ($p=0.0002$), lower educational attainment ($p=0.0129$), advanced age ($p=0.0001$), and marriage ($p=0.0001$) were all initially associated with increased risk, while diabetes knowledge was not associated ($p=0.789$). In the logistic regression model, low health literacy remained significantly associated with risk of developing type 2 diabetes (OR 3.679). These findings suggest that a simple single question regarding health literacy could provide a quick and reliable assessment for health care providers and perhaps improve the approach to patient comprehension of diabetes risk.

Specialty Fields Category

Specialty Fields Poster 3:

Compassion meditation smartphone app can reduce physiological symptoms of interpersonal stress.

Greer Prettyman, Alison Johnson and Julie Brefczynski-Lewis

Center for Advanced Imaging, West Virginia University, Morgantown, WV 26506-6045

The interpersonal stress of strongly disliking someone and angrily ruminating about negative interactions produces physiological stress symptoms that endanger health and happiness over time. We hypothesized that negative interpersonal stimuli would create stress but that stress would be reduced by practicing compassion meditation with a smartphone app. Participants (7 female, 4 male) provided pictures of and narratives describing familiar people they strongly disliked. Heart rate, respiration, and eye movement were monitored while they viewed these stimuli. Before compassion training, listening to dislike narratives produced an increase in heart rate compared to impersonal narratives (average increase=4.24bpm, $t=2.97$, $p<0.05$, $n=7$). Eye tracking data indicated that more time was spent looking at disliked than liked faces, which correlates with increased heart rate ($n=9$, $r=0.53$). Participants were then instructed to practice short daily meditation exercises on the app for three weeks. Preliminary data indicate that after using the app, stress response during dislike narratives was reduced. These results suggest that practicing compassion meditation with an app can help to alleviate the stress of difficult interpersonal relationships.

Specialty Fields Poster 4:

Obstructive sleep apnea treatment and changes in pain perception:

Rachel A. Hamilla, M. Schade and H. E. Montgomery-Downs

Department of Psychology, West Virginia University, Morgantown, WV 26506-6040

Poor sleep quality and increased pain are highly correlated, as seen in patients with the sleep-related breathing disorder, Obstructive Sleep Apnea (OSA). We are in the process of exploring the connection between OSA treatment and changes in chronic pain perception. During the three weeks surrounding OSA therapy initiation (Continuous Positive Airway Pressure; CPAP), we monitor participants' sleeping behavior using Actigraphy (a watch-like motion sensor validated to monitor sleep and wake) and an electronic diary. Each day, participants complete a psychomotor vigilance test and pain surveys. We expect that consistent CPAP therapy use (and consequently improvement in sleep quality) will reduce chronic pain. We will also evaluate the magnitude of relapse after noncompliance, if this occurs. Study design and preparation were the foundation of my research experience, and included the acquisition of many valuable skills: IRB submission and protocol troubleshooting/management, obtaining copyright permissions, critically evaluating limitations, testing equipment, and participant recruitment, tracking, and retention. While working in the sleep lab I also learned to analyze actigraphy, interpret human sleep electrophysiology, and perform polysomnography hookups.

Specialty Fields Category

Specialty Fields Poster 5:

Surface-enhanced Raman scattering for biomolecule characterization

Julia Oliveto[1], Lei Chen[2], Canwei Jiang[2] and Bing Zhao[2]

[1]Department of Chemistry, Fairmont State University, Fairmont, WV 26554 and [2]State Key Laboratory of Supramolecular Structure and Materials, Jilin University, Changchun, China 130012

Biomolecules can be large and difficult to accurately characterize by traditional methods, which are not sensitive enough to notice conformation changes. A novel type of Raman spectroscopy which incorporates silver or gold nanoparticles, surface-enhanced Raman scattering (SERS), provides an enhancement factor in Raman signal intensity, is sensitive enough to distinguish between different biomolecule conformations, and is not sensitive to aqueous media. Raman provides the vibration information and fingerprint information of the target molecule, which is a useful analytic technique for the analysis of molecular structure. The characterization of biomolecules was carried out by synthesizing a substrate (magnetic Fe_3O_4 200-300 nm), a linker (ATPMS, SiO_2-ATPMS, or SiO_2-PDDA), a SERS metal (gold 15-20 nm or silver 50-80 nm), attaching a biomolecule, and testing under a 633 nm laser. Small biomolecules, 4-mercaptobenzoic acid (MBA) and 4-aminothiophenol (PATP) were characterized; large biomolecules horseradish peroxidase (HRP) and lysozyme (LYZ) were characterized with a label-free method. Each spectrum was analyzed and Ag-PDDA-SiO_2@Fe_3O_4 was found to have the highest SERS signal. The Ag-PDDA-SiO_2@Fe_3O_4 and Au-PDDA-SiO_2@Fe_3O_4 will continue to be optimized and spectra of avidin with concentration-dependent atto610-biotin labels will be analyzed to model protein-drug interaction.

Specialty Fields Poster 6:

Mechanistic investigation of reactions of aromatic nitro compounds with gold nanoparticle catalysts

Asa W. Nichols, Katharine E. Lambson and Björn C. G. Söderberg

C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26506-6045

The development of novel solid-supported catalysts for use in organic synthesis has become a topic of interest because of their molecular efficiency, recyclability, and selectivity. In the Söderberg lab, work is done to synthesize heterocyclic natural products of biological interest found throughout the world, so the organisms in which they reside may be preserved. Previous work done in the Söderberg lab has shown that gold nanoparticles can be used to perform heterocyclic cyclizations to furnish indoles in a catalytic fashion. However, the current efficiency and versatility of this reaction could be improved on. In order to accomplish this, it is desirable to garner greater knowledge of the mechanistic pathway by which the reaction proceeds. A putative reaction intermediate was prepared and submitted to the original reaction conditions. The products obtained were not consistent with the cyclization reaction previously seen; however the exact structure of the novel product has yet to be determined.

Specialty Fields Category

Specialty Fields Poster 7:

Immunoglobulin G Biosensor Based on Surface-Enhanced Raman Scattering

Stacy N. Farley, Peng Zheng and Nianqiang (Nick) Wu

Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV 26506

Detection of an Immunoglobulin G antigen was carried out using biosensor based on surface-enhanced Raman scattering (SERS). The biosensor consisted of a gold film with an attached layer of antibody and antibodies with attached SERS probe. The SERS probe, gold nanosphere@Raman label@SiO_2 core-shell nanoparticles in which the Raman label, malachite green isothiocyanate (MGITC), is embedded between the gold core and SiO_2 shell, produces a peak at 1170 cm^{-1} in the Raman spectrum. When introduced to the system, the antigen was sandwiched between antibody on the film and antibody with attached probe so that the probe remained on the film after washing. The intensity of the resulting Raman peak varied linearly with the logarithmic antigen concentration. Given the design of the system, this biosensor could easily be adapted to other antibody-antigen pairs making it a valuable tool for quantitative detection. The upper and lower limits of this biosensor, as well as the effect of replacing the gold nanospheres with gold nanostars, are to be determined.

Specialty Fields Poster 8:

Three dimensional self-assembly of nano- and microspheres using a Peltier cooler evaporation method

Taylor M. Price[1], Anand Kadiyala[2], and Jeremy Dawson[2]

[1]*Department of Physics and Engineering, West Virginia Wesleyan College, Buckhannon, WV 26201*
[2]*Lane Department of Computer Science and Electrical Engineering, West Virginia University, Morgantown, WV 26505*

Self-assembled arrays of nano- and microspheres are useful in many different applications. 3D and 2D lattices of nanospheres can be used to create photonic crystal structures. Similar arrays of microscale spheres show promise as calibration targets for biometric iris cameras. The main goal of this research effort is to achieve self-assembly of multiple uniform layers of micro- and nanoscale spheres comprised of polystyrene. A Peltier thermoelectric (TE) cooler was used to allow the spheres to assemble onto silicon substrates based on the angle of elevation and rate of evaporation, both optimized based on sphere size 100nm, 350 nm, 500 nm and 45µm. At the correct relationship between temperature and angle, large domains of 3D lattice assembly can be obtained. Roughly 85% of 1 cm^2 substrates were covered by at most 12-59 layers of nanospheres using 15-100 µl of aqueous solution. The study on the various temperature conditions, angles and rates of evaporation will be presented.

Specialty Fields Category

Specialty Fields Poster 9:

How Does the Solar Wind's Flow Affect Magnetic Interactions Near Earth?

Christopher Doss, Colin Komar, Matthew Beidler and Paul Cassak

Department of Physics and Astronomy
West Virginia University, Morgantown, WV, 26506

Magnetic reconnection occurs in hot gases (plasmas) where a magnetic field flips directions. It breaks and cross-connects, which expels the surrounding plasma. Since its discovery, scientists have learned much about phenomena such as solar flares, aurora, and interactions between Earth's magnetic field and the solar wind. Due to its complexity, numerical simulations of reconnection often use many simplifications. This research investigates a configuration that regularly occurs where the solar wind interacts with Earth's magnetic field - fields of different strengths with a bulk flow caused by the solar wind. This research is important to Space Weather, and addresses how this interaction damages satellites and causes power outages. This study uses two-dimensional two-fluid simulations performed on a supercomputer. We find that bulk flow slows reconnection. Also, the reconnection site drifts in the direction of the flow on the weaker magnetic field side due to the magnetic field asymmetry. We predict the drift speed of the reconnection site, and show the result is consistent with recent satellite observations of reconnection at Earth.

Specialty Fields Poster 10:

Development of new synthetic pathways for carbon nanohoops

Shuangjiang Li, Emily-Jean E. Bankes and Kung K. Wang

C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV, 26506-6045

The production of carbon nanotubes (CNTs) is very important due to the fact that they can be used in a variety of fields for many purposes. In order to produce CNTs with a constant ring size, which is useful for many nanotechnology applications, it is necessary to find a way to produce carbon nanohoops or [n]cycloparaphenylenes (CPPs) as templates for the creation of CNTs. Previously [9]CPPs containing nine benzene rings have been produced with relatively high yields using the Diels-Alder reaction as a key synthetic step. This process was adjusted with the intent of creating a [6]CPP that can be aromatized. The rings were successfully created with an adjusted set of reagents and now work is being done to make these rings aromatic possibly through bromination. If successful this process could allow for the production of aromatic [6]CPPs that can be used in the production of CNTs with a uniform size.

Specialty Fields Category

Specialty Fields Poster 11:

Footwear impression classification using phase only correlation

Madison Gump, Jacqueline Speir, Michael Fagert and Nicole Richetelli

Department of Forensic and Investigative Science, Eberly College of Arts and Sciences, West Virginia University, Morgantown, WV 26506-6045

Footwear impressions are reasonably estimated to exist at the majority of crime scenes. Unfortunately, their value is often overlooked. This discrepancy can be corrected through re-education of crime scene examiners and technological advances in the area of footwear classification and comparison. Footwear databasing has expanded in recent years; however, there is no nationally agreed upon automated comparison system that can search databases and compare footwear impressions. This research proposes that the use of the computational techniques of Fourier transform and Phase Only Correlation (POC) are valid methods that can be used to accurately classify footwear impressions within a database. To determine whether this method can be successful in classification, 90 footwear impressions from 30 different shoes were collected and compared. The resulting POC scores were used to evaluate the similarity of Known-Matches (KMs) and Known Non-Matches (KNMs) within the database using a scale from 0 to 1. The remainder of this work will discuss the method, results, and additionally strengths, weaknesses and future directions in support of using automated methods to classify footwear.

Specialty Fields Poster 12:

Investigation of UV and Zn^{2+} driven dynamic covalent libraries (DCLs) involving imines

Christopher Radcliffe[1], Chunshuang Liang[2] and Shimei Jiang[2]

[1]C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, West Virginia, USA 26505
[2]State Key Laboratory of Supramolecular Structure and Materials, College of Chemistry, Jilin University, Changchun 130012, China

Dynamic combinatorial chemistry (DCC) is an emerging field, originally focused on expediting drug discovery. It utilizes stimuli to induce self-sorting amongst a group, or library, of molecules, causing the most stable member to be preferentially formed. Imine-like molecules are one key aspect of drug discovery due to the C=N bond's prevalence in biomolecules; hence, they are intrinsically involved with protein directed DCC. With the significance of imines in mind, this study attempted to create a novel dynamic combinatorial library (DCL) whose members are reversibly and selectively affected by UV light and Zn^{2+}. To accomplish the said goal, various imines were synthesized and then subjected to characterization techniques following addition of Zn^{2+} or exposure to UV light. Ultimately, a Cl substituted imine was found to display stable complexation with Zn^{2+} whereas a tBu imine did not tautomerize after UV irradiation, as was expected. Overall, a DCL was created; however, future work must revisit the UV aspect of the system and a new design may be required.

Specialty Fields Category

Specialty Fields Poster 13:

Investigating the optimal conditions for synthesizing photo luminescent carbon nanodots

Alex Battin, Yu Bin Song, Yu Fu and Bai Yang

State Key Laboratory of Supramolecular Structure and Materials, Jilin University, Changchun, Jilin, P.R. China

Carbon nanodot technology is an emerging field of study with numerous applications due to simple synthesis processes, photoluminescence, low cost, and biocompatibility. Because the technology has recently been discovered, there is limited research on the optimal conditions for carbon nanodot synthesis. The optimal reagent ratio, pH, and temperature for carbon nanodot (CND) synthesis were investigated in this study by synthesizing CNDs in different conditions. The optimal reagent ratio was found by comparing synthesized CNDs with varying ratios of the reagents, citric acid and ethylene-diamine. The optimal pH was investigated by comparing the CNDs synthesized between a pH range of 2-10. The optimal temperature was determined by comparing CNDs synthesized between 100-200°C. The samples were compared analyzing quantum yield, photoluminescence (PL) dependence, PLintensity, light absorbance, and product yield. The optimal reagent ratio was discovered to be approximately 1:1, the optimal pH around 7, and optimal temperature between 140-150°C. Additional precise research is in progress to find specific values for synthesis conditions. With this research, the CNDs will be more efficiently synthesized and lead to a better understanding of the molecules.

Specialty Fields Poster 14:

Reducing Carbon Monoxide Emissions: A Core-Shell Bimetallic Nanoparticle Approach

Z. Decker, J. Oliveto, T.M. Selby, R.K. Abhinavam Kailasanathan, K. Pissane, M. Seehra and F. Goulay

Department of Chemistry, West Virginia University, Morgantown, West Virginia, 26506

Carbon monoxide is emitted by engine exhausts and is both toxic to humans and the environment. Auto-makers reduce CO emission using catalytic converters currently containing expensive precious metal nanoparticles such as Pt, Rh, and Pd to convert CO to CO_2. As EPA requirements on emission control become more stringent, a promising alternative to these precious metals is bimetallic core-shell nanoparticles combining a precious metal shell with a less expensive transition metal core. In this work Fe@Pt core-shell nanoparticles have been synthesized and characterized toward CO catalytic oxidation. Specifically, Fe@Pt nanoparticles were synthesized by a sequential reduction process using polyvinyl pyrolidone (PVP) as a stabilizer. The effect of PVP on nanoparticle yield and catalytic efficiency was systematically investigated. The Fe@Pt nanoparticle surface was characterized using XRD and FTIR while their catalytic efficiency examined using an in-lab built reaction chamber. Exhaust gasses were analyzed using a Hewlett Packard-5890A gas chromatographer (GC) with a thermal conductivity detector (TCD). The results of these studies, in addition to initial investigations of Sn@Pt and Al@Pt nanoparticles, will be presented herein.

Specialty Fields Category

Specialty Fields Poster 15:

Z in Appalachia: It's Cra[s]y

Emily Vandevender, Margery Webb, Kiersten Woods, Jordan Lovejoy, Isabelle Shepherd and Kirk Hazen

Department of English, West Virginia University, Morgantown, WV 26506

The West Virginia Dialect Project (WVDP) was established by Dr. Kirk Hazen in 1998 to study language variation in Appalachia. Currently, the WVDP has been conducting research on the variation of consonants, specifically z devoicing in Appalachian English. This study focused on whether or not West Virginians devoice the typically voiced [z], and what acoustic qualities affect devoicing. Using a computer analysis program, Praat, 67 interviews from the West Virginia Corpus of English in Appalachia (WVCEA) were analyzed for tokens with the sibilants in specific environments: word-internal, such as 'thou[z]and,' and word-final, such as 'bee[z].' Data such as sibilant duration, glottal pulsing, and the preceding vowel's intensity, pitch, and duration were collected through a Praat computer script. Results indicate that [z] devoicing is more complex than merely glottal pulsing, and that there is a wide range of an absence of glottal pulsing for the word-final [z] tokens across all age groups. A major trend in the data indicates that younger speakers are heading in the direction of merging [z]/[s], especially females and the non-rural youth.

Specialty Fields Poster 16:

Experimental Optimization of DNA Aptamer Usage Conditions

Kelly E. Humphreys, Katherine M. Hickey, Peter M. Gannett, Kelly L. Pisane*, Letha J. Sooter, Ka L. Hong, Emily C. Despeaux and Chris D. Bostick

Department of Pharmaceutical Sciences, School of Pharmacy, West Virginia University, Morgantown, WV 26505- 9500
**Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26506-6315*

Aptamers bind strongly and specifically to target molecules. The purpose of this study is to use Surface Plasmon Resonance (SPR) to optimize conditions for aptamer usage; attachment to a solid surface with applicability in lab-on-a-chip devices. Because the SPR instrument cannot always detect binding events between aptamers and small molecule targets, this project focused on test case aptamer R12.23TRNC1 (APT) and its small molecule target, desethyl atrazine (DEA). DEA was attached to synthesized gold nanoparticles (Au@NP) via mercaptoundecanoic acid (MUA) and flowed over the 5' immobilized APT. Preliminary data shows that the Au@NP-MUA-DEA's 30 fold increase in diameter over DEA alone produced a SPR signal of approximately 90 response units due to Au@NP-MUA-DEA binding to APT compared to no SPR signal from DEA, alone, binding to APT. Additional runs will be needed to confirm the results. Future experiments will include an alternate immobilization orientation of APT because computational studies suggest 3' immobilization will result in a more accessible DEA binding pocket.

Specialty Fields Category

Specialty Fields Poster 17:

Social Perceptions of Z Devoicing in Appilachia

Margery Webb and Kirk Hazen

Department of English, West Virginia University, Morgantown, WV 26506

The West Virginia Dialect Project (WVDP), founded in 1998 by Dr. Kirk Hazen, seeks to characterize the nature of language change in Appalachia. As an extension of an ongoing study of /z/ devoicing in Appalachian English, the WVDP has begun a perception-production study which is primarily sociolinguistic in nature. We have designed sets of words containing /s/ and /z/ sounds to use in the perception portion of the study. Through manipulation of the length of the /s/ or /z/ sound, the length of the sound that precedes the sibilant, and the voicing of the sibilant, these words with various combinations of acoustic qualities are presented to subjects in a forced-choice experiment in which the subject chooses between words containing /s/ or /z/ sounds based on what s/he hears. Although no data has been collected at this point in time, our aim is to determine the nature of the correlation—if one does indeed exist—between how a person produces sibilants and how that same person perceives /z/ devoicing.

Specialty Fields Poster 18:

Science, technology, engineering, and math: gender inequity in STEM and 4H

Kathleen M. Baker[1] and Kasi Jackson[2]

[1,2]Center for Women's and Gender Studies, West Virginia University, Morgantown, WV 26506

As a female STEM Ambassador, a representative who encourages k-12 youth to go into the STEM fields for 4H camps in West Virginia, I observed and analyzed multiple counties in regards to identity, privilege, and community. Being a very inclusive program, 4H is a youth development program that teaches leadership and community through hands on experience. Based on field observations, this paper discusses and analyzes with an intersectional framework how gender impacts STEM education and potential ways to improve upon such a foundation with works from both Feminist and Post-Structural Theory. The results found that girls who participated in the STEM curriculum required encouragement from adults as well as peers but appeared to feel more confident in their abilities during and immediately after. However, no follow up observations were made possible to validate whether this attitude stayed with the girls or not.

Specialty Fields Category

Specialty Fields Poster 19:

Exploring the potential of WVU food recovery to enhance community food security in Monongalia and Preston County, West Virginia

Hilary Kinney, Bradley Wilson, Josh Lohnes, Derek Stemple, Dillon Muhly-Alexander, Gerardo Valera, Amanda Marple, Ally Sobey-Deaton

Department of Geology and Geography, West Virginia University, Morgantown, WV 26505

How might a West Virginia University-sponsored food recovery system help meet the needs of hungry households in its surrounding communities? In this study, we utilize geographic information science (GIScience) and qualitative methods to explore the food insecurity landscape of Monongalia and Preston counties. First, we located and surveyed food pantries, soup kitchens, and food retailers. From that data, we have created a map that represents the agencies of potential food insecure areas. Second, we conducted interviews with volunteers, pantry directors, and university officials. Our research reveals that a campus-based food recovery system will be constrained by: 1) supply-side factors such as sporadic waste production, non-uniform food types, and extreme perishability, 2) logistical factors such as timing of food retrieval, transportation, communication and distance to food distribution locations and 3) distribution-side factors such as feeding program schedules, volunteer availability, food preparation, refrigeration, and ensuring client participation. We propose a WVU food recovery network as just one in a multi-faceted strategy associated with the development of a university-wide framework for action.

Specialty Fields Poster 20:

Protein measured in 3T3-L1 adipocytes indicates fixed cell numbers regardless of treatment administered

Lauren A. Norris, Jake P. Engle, and Kimberly M. Barnes

Division of Animal and Nutritional Sciences, West Virginia University, Morgantown, WV 26506

Conjugated linoleic acid reduces body fat in mice, and induces a greater reduction when mixed with coconut oil due to increased lipolysis. In this study, a cell culture model was developed to detect the effect of coconut oil and conjugated linoleic acid on lipolysis. 3T3-L1 adipocytes were seeded in 24-well plates, grown to confluence, and differentiated into adipocytes. After exposed to media containing fatty acids from either coconut oil or soy oil to allow lipid accumulation for 7 days, basal serum albumin, linoleic acid, or conjugated linoleic acid was administered to each well for 12 or 24-hour increments. Using a Bradford Protein Assay, the protein content was found to range from 0.28 to 0.9 mg per well with no significant difference ($P > 0.05$) between the wells due to various oils, treatments, or time. This indicated the number of cells in each well was constant throughout the duration of the experiment. Therefore, any differences in triglyceride or fatty acid release will not be the result of different cell numbers in future experiments.

Specialty Fields Category

Specialty Fields Poster 21:

Increasing the Efficiency of LEDs through the Fabrication of Photonic Crystals using Nanosphere Lithography

Melanie Wieland[1], Taylor Price[2], Anand Kadiyala[1] and Jeremy Dawson[1]

1Lane Department of Computer Science and Electrical Engineering, West Virginia University, Morgantown, WV, 26506
2Department of Physics and Engineering, West Virginia Wesleyan College, Buckhannon, WV, 26201

Currently, light emitting diodes (LEDs) have issues like low light extraction efficiency and suboptimal current voltage characteristics. These issues can be addressed by changing the materials used when fabricating the LEDs. However, the extraction efficiency still tends to be low due to the fact that light gets trapped within the dielectric layers. With the addition of photonic crystals (PhCs), the efficiency can be increased. There are many techniques to fabricate PhCs, but they tend to be expensive, time consuming, and only cover a small area of the substrate. Nanosphere lithography (NSL), on the other hand, is an inexpensive technique that has the ability to cover an entire substrate in a PhC. Various NSL techniques are explored to try to achieve an ordered monolayer two dimensional PhC without defects. These are done first on a smooth substrate to optimize the technique and then on a patterned substrate that simulates the patterns used on LED surfaces. The results are then observed by an optical microscope and a scanning electron microscope.