2018

2018 Symposium Brochure

NANOSAFE

West Virginia University
OFFICE OF UNDERGRADUATE RESEARCH

NSF

The 10th Annual

SUMMER UNDERGRADUATE RESEARCH SYMPOSIUM

Thursday• July 26th • 2018
Erickson Alumni Center
West Virginia University

WVU SURE• NANOSAFE REU • CHEMISTRY REU
CANCER INST SURP • LSAMP

Summer Undergraduate Research Symposium 2018
West Virginia University

Thursday July 26, 2018 Erickson Alumni Center, Ruby Grand Hall

I. Approximate Schedule of Events

8:30-8:55 am — Poster Setup ─ *Presenters arrive, register, and put up posters. Presenters must leave Alumni Center by 8:55 am and return during assigned, judged presentation time.*

9:00-11:30 am — Poster judging ─ *Only scheduled presenters & not open to public (all presenters return at 11:30 am).*

11:30 am-12:00 pm — Break/Lunch ─ *Judges and presenters first priority, please.*

12:00-12:30 pm — Welcome and Keynote Speaker ─ *All welcome: parents, research mentors, graduate and undergraduate students, and general public.*

- *Welcome: Dr. Michelle Richards-Babb, Associate Professor & Director of the Office of Undergraduate Research, WVU*
- *Introductory Remarks: Dr. Ken Blemings, Professor & Dean of the Honors College, WVU*
- *Keynote Speaker: Provost Joyce McConnell, West Virginia University*

12:30-2:30 pm — Poster Presentations ─ *Open to all and concurrent with final poster judging.* ***Judges have preference!***

2:30-3:00 pm — Awards Ceremony, Closing Remarks, and Group Photos

3:00 pm — Poster Take-Down ─ *Any posters remaining after 3:30 pm will be removed by the staff.*

3:05 pm — *Post-questionnaires (REU & SURE participants)*

II. Poster Judges

Judge	Affiliation	Category Judging
Dr. Ember Morrissey	Plant and Soil Sciences, Davis College, WVU	*Agricultural & Environmental Sciences*
Kelly Smith	IGERT Grad. Fellow, Pharmacy, WVU	*Biological Sciences*
Dr. N. Gabriel Armatas	Chemistry, Edinboro College	*Biological Sciences*
Kathrine Curtin	IGERT Grad. Fellow, Engineering, WVU	*Engineering*
Dr. Leslie Hopkinson	Civil & Env. Eng., Statler College, WVU	*Engineering*
Dudley McNitt	IGERT Grad. Fellow, Microbiology, Immunology & Cell Biology, WVU	*Health Sciences*
Dr. Sarah Farris	Biology, Eberly College, WVU	*Health Sciences*
Dr. Hal Gorby	History, Eberly College, WVU	*Human Engagement**
Cass Crihfield	IGERT Grad. Fellow, Chemistry, WVU	*Nanoscience*
Andrew White	IGERT Grad. Fellow, Engineering, WVU	*Nanoscience*
Dr. Victoria Sanchez	Pre-Health Office, WVU	*Neuroscience*
Nicole Prince	IGERT Grad. Fellow, Chemistry, WVU	*Physical Sciences*
Dr. Cheng Cen	Physics, Eberly College, WVU	*Physical Sciences*

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!

* Includes research and scholarship pertaining to how humans interact and engage within society in the areas of business, education, creative arts, and humanities.

III. Undergraduate Participants and Faculty Research Mentors

A. Research Experiences for Undergraduates (REU) Site: Research in Chemistry at West Virginia University (PI: Michelle Richards-Babb; co-PI: Brian Popp; Assistant to Director: Steve Knowlden)

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
Rachel Gantzer	Physical Sci #5 (10:30 am)	Chemistry & Mathematics	Bethany College	Carsten Milsmann, Chemistry
Mason Hamilton	Biological Sci #11 (10:30 am)	Chemistry	West Liberty U.	Björn Söderberg, Chemistry
Jacob Layton	Biological Sci #4 (9:30 am)	Biochemistry	Waynesburg U.	Blake Mertz, Chemistry
Brandon Lowe	Physical Sci #13 (10:30 am)	Biochemistry	Saint Vincent C.	Glen Jackson, Chemistry & Forensics
Ashley Moore	Physical Sci #7 (10:30 am)	Biochemistry	Edinboro U.	Jessica Hoover, Chemistry
Angela Mosebarger	Physical Sci #3 (10:30 am)	Chemistry	Edinboro U.	Björn Söderberg, Chemistry
Alyssa Stonebraker	Biological Sci #7 (10:30 am)	Biochemistry	Kutztown U. of PA	Justin Legleiter, Chemistry
Timothy Suder	Physical Sci #15 (10:30 am)	Chemistry & Physics	West Virginia Wesleyan C.	Stephen Valentine, Chemistry
Tiffany Taylor	Physical Sci #1 (10:30 am)	Chemistry	Coker College	Brian Popp, Chemistry
Maria Vidaca	Physical Sci #9 (10:30 am)	Chemistry	California State U., San Marcos	Gregory Dudley, Chemistry

B. NanoSAFE Research Experiences for Undergraduates (REU) Site: Multifunctional Nanomaterials (PI: Lisa Holland; co-PI: Kimberly Quedado; Assistant to Director: Lindsay Veltri)

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
Eva Beeching	Nanoscience #10 (9:30 am)	Physics	Slippery Rock U.	Edward Flagg, Physics
Seth Byard	Nanoscience #9 (10:30 am)	Physics	Grove City C.	Matt Johnson, Physics
Paulo Castro	Health Sci #1 (10:30 am)	Physics	West Chester U.	Mark McLaughlin, Pharmaceutical Sci.
Andrew Charway	Nanoscience #2 (9:30 am)	Computer Eng.	U. of Scranton	Jeremy Dawson, CS & EE
Brittany Cobbs	Nanoscience #11 (10:30 am)	Biology	Bridgewater C.	Salik Hussain, Physiology, Pharmacology & Neuroscience
Sebastian Hodge	Nanoscience #8 (9:30 am)	Applied Physics	Northeastern U.	Mikel Holcomb, Physics
Courtney Kristoff	Nanoscience #7 (10:30 am)	Chemistry	Waynesburg U.	Lisa Holland, Chemistry
Patricia Loughney	Nanoscience #6 (9:30 am)	Materials Sci.	Westminster C.	Nianqiang Wu, MAE
Alayna Mickoloff	Neuroscience #5 (10:30 am)	Biology (Pre - Med)	Waynesburg U.	Werner Geldenhuys, Pharmaceutical Sci.

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
Sarah O'Boyle	Nanoscience #1 (10:30 am)	Chemistry	Messiah College	Aleksandr Stefaniak, NIOSH
Olivia Rose	Nanoscience #5 (10:30 am)	Biomedical Eng.	Gannon U.	Cerasela Zoica Dinu, Chem. and Biomedical Eng.
Katherine Thompson	Nanoscience #4 (9:30 am)	Chemistry	Mansfield U.	Xueyan Song, MAE
Morgan Vincent	Physical Sci #10 (9:30 am)	Chemistry	Seton Hill	Gregory Dudley, Chemistry

C. WVU Summer Undergraduate Research Experiences (SURE) Site (Coordinator/Director: Michelle Richards-Babb; Graduate Teaching Assistants: Kacee Caster and Cassie Drain)

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
Nada Aboraya	Human Engag #5 (10:30 am)	Accounting & Finance	WVU	Olga Bruyaka, Management
Ronald Alexander	Engineering #9 (10:30 am)	Chemical Engineering	WVU	Fernando Lima, Chemical Eng.
Sydney Beafore	Human Engag #2 (9:30 am)	History	WVU	James Siekmeier, History
Ashley Brash	Human Engag #7 (10:30 am)	Sociology & Political Science	WVU	Lynne Cossman, Sociology
Benjamin Buzzo	Engineering #14 (9:30 am)	Mech. & Aerosp. Eng.	WVU	Yu Gu, MAE
Kindra Carr	Human Engag #3 (10:30 am)	Agricultural Educ. & Extension	WVU	Jessica Blythe, Agriculture & Extension Educ.
Emily Clegg	Health Sci #3 (10:30 am)	Human Nut. & Foods	WVU	Melissa Olfert, Human Nutrition & Foods
Sarah Cokeley	Engineering #2 (9:30 am)	Industrial Engineering	WVU	Leily Farrokhvar, Industrial Eng.
Chloe Courtade	Agric & Env Sci #1 (10:30 am)	Forest Resource Management	WVU	Louis McDonald, Env. Soil Chemistry and Soil Fertility
Katelyn Delaney	Biological Sci #3 (10:30 am)	Biology	WVU	Jennifer Hawkins, Biology
Thaiddeus Dillie	Agric & Env Sci #3 (10:30 am)	Biochemistry	WVU	Scott Bowdridge, Food Animal Production
Zachery Donnellan	Physical Sci #17 (10:30 am)	Chemistry	WVU	Fabien Goulay, Chemistry
Rodney Elliott	Physical Sci #11 (10:30 am)	Physics & Russian	WVU	Sarah Burke-Spolaor, Astronomy
Olivia Friel	Agric & Env Sci #5 (10:30 am)	Biochemistry	WVU	Nicole Waterland, Horticulture
Jasmine Grossman	Nanoscience #3 (10:30 am)	Biomedical Engineering	WVU	Margaret Bennewitz, Chemical & Biomed. Eng.
Liza Grossman	Neuroscience #4 (9:30 am)	Chemistry	WVU	Elizabeth Engler-Chiurazzi, Physiology & Pharmacology

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
Rotem Hass	Neuroscience #3 (10:30 am)	Biomedical Engineering	WVU	Valeriya Gritsenko, Human Performance – Physical Therapy
Emily Hayhurst	Health Sci #8 (9:30 am)	Biomedical Engineering	WVU	Jianhai Du, Ophthalmology
Victoria Irr	Engineering #16 (9:30 am)	Chemical Engineering	WVU	Nagasree Garapati, Chemical & Biomed. Eng.
Connor Kirk	Engineering #8 (9:30 am)	Mech. & Aerosp. Eng.	WVU	Jason Gross, MAE
Molly Layne	Neuroscience #6 (9:30 am)	Biomedical Engineering	WVU	James Lewis, Neurosciences
Daniel Lohner	Health Sci #12 (9:30 am)	Biology	WVU	Jianhai Du, Ophthalmology
Eva MacFarland	Human Engag #8 (9:30 am)	Psychology & Biology	WVU	Natalie Shook, Psychology
Madison Matheny	Health Sci #14 (9:30 am)	International Studies	WVU	Lauri Andress, Health Policy, Management, & Leadership
Claire McDonald	Engineering #18 (9:30 am)	Civil & Environ. Eng.	WVU	Antarpreet Jutla, Civil & Environmental Eng.
Samantha Mehnert	Physical Sci #14 (9:30 am)	Forensic and Inv. Science & Chemistry	WVU	Glen Jackson, Forensic & Investigative Science
Zoe Moore	Engineering #10 (9:30 am)	Biomedical Engineering	WVU	Jessica Allen, Chemical & Biomed. Eng.
Madison Morrison	Biological Sci #13 (10:30 am)	Biology	WVU	Tina Moroose, Forensic & Investigative Science
Kayley Morrow	Human Engag #9 (10:30 am)	Psychology	WVU	Amy Gentzler, Psychology
Mariah Murray	Physical Sci #8 (9:30 am)	Chemistry	WVU	Jessica Hoover, Chemistry
Philip Pennock	Engineering #17 (10:30 am)	Aerospace Eng.	WVU	Patrick Browning, MAE
Jeffrey Petty	Biological Sci #1 (10:30 am)	Biochemistry	WVU	Teiya Kijimoto, Evolutionary Develop. Genetics
Makenzie Priest	Engineering #15 (10:30 am)	Civil & Environ. Eng.	WVU	Leslie Hopkinson, Civil & Environmental Eng.
Neel Rao	Health Sci #2 (9:30 am)	Sport & Exercise Psych.	WVU	Peter Giacobbi, Sport & Exercise Psychology
Michael Ream	Neuroscience #8 (9:30 am)	Biomedical Engineering	WVU	Shuo Wang, Chemical & Biomed. Eng.
Maxwell Reese	Physical Sci #2 (9:30 am)	Chemistry	WVU	Brian Popp, Chemistry
R. Madison Riffe	Neuroscience #7 (10:30 am)	Biology	WVU	Sadie Bergeron, Biology
Skyler Roth	Engineering #11 (10:30 am)	Biomedical Engineering	WVU	Gianfranco Doretto, CS & EE

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
Afsoon Sabet	Biological Sci #10 (9:30 am)	Biology & Music	WVU	Rita Rio, Biology
Jeremiah Scarborough	Physical Sci #12 (9:30 am)	Physics	WVU	Weichao Tu, Physics
Trinity Shaver	Neuroscience #2 (9:30 am)	Psych. & Multidisciplin. Studies	WVU	Cole Vonder Haar, Psychology
Nathan Shull	Agric & Env Sci #9 (10:30 am)	Environmental Geoscience	WVU	Eungul Lee, Geography
Katy Sines	Agric & Env Sci #6 (9:30 am)	Animal & Nut. Sciences	WVU	Joseph Moritz, Poultry Science
Hannah Somerville	Agric & Env Sci #2 (9:30 am)	Soil Science	WVU	Eugenia Pena-Yewtukhiw, Soil Science
Lynsey Soule	Health Sci #13 (10:30 am)	Biology	WVU	Rondalyn Whitney, Occupational Therapy & Renee Nicholson, Multidiscip. Stud.
Aaron Stavrakis	Biological Sci #6 (9:30 am)	Biology	WVU	Steve Leonard, NIOSH
Kathryn Taylor	Biological Sci #5 (10:30 am)	Biochemistry	WVU	Janet Tou, Human Nutrition & Foods
Joshua Taylor	Health Sci #11 (10:30 am)	Biology	WVU	Scott Weed, Biochemistry
Kevin Tennant	Engineering #3 (10:30 am)	Mechanical Engineering	WVU	Ed Sabolsky, MAE (Materials Science)
Kayla Tokar	Human Engag #1 (10:30 am)	Music Therapy	WVU	Travis Stimeling, Musicology

D. WVU Summer Undergraduate Research Experiences (SURE) Site (Participants funded for participation by other mechanisms.)

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
[a]Safa Ahad	Biological Sci #8 (9:30 am)	Chemistry	WVU	Lisa Holland, Chemistry
[b]Jacob Cahn	Health Sci #4 (9:30 am)	Speech Pathology & Audiology	WVU	Kimberly Meigh, Communic. Sci. & Disorders
[c]Jillian Clemente	Agric & Env Sci #8 (9:30 am)	Wildlife & Fisheries & Journalism	WVU	Todd Petty, Wildlife & Fisheries Resources
[a]Amy Gregory	Biological Sci #14 (9:30 am)	Chemistry	WVU	Brian Popp, Chemistry
[d]Keelan Hendricks	Engineering #1 (10:30 am)	Mech. & Aerosp. Eng.	WVU	Jason Gross, MAE
[d]Annalisa Huckaby	Biological Sci #9 (10:30 am)	Chemistry	WVU	Mariette Barbier, Microbiology, Immunology & Cell Biology
[d]Dylan Johnson	Engineering #4 (9:30 am)	Computer Eng. & Comp. Sci.	WVU	Thirimachos Bourlai, Computer Sci. & Elect. Eng.
[d]Muriithi-David Kem	Engineering #5 (10:30 am)	Mech. & Aerosp. Eng.	WVU	Kostas Sierros, MAE

Participant	Poster (Judged Time)	Major	Home Institution	Faculty Mentor
[d]Mitch Kirman	Engineering #13 (10:30 am)	Petroleum and Natural Gas Eng. & Geology	WVU	Ebrahim Fathi, Petroleum & Natural Gas Eng.
[e]Joseph Lokant	Physical Sci #4 (9:30 am)	Biochemistry	WVU	Jessica Hoover, Chemistry
[d]Scott Lopez	Nanoscience #12 (9:30 am; poster & video)	Chemistry	WVU	Blake Mertz, Chemistry
[d]Geoffrey MacRae	Engineering #12 (9:30 am)	Petroleum Engineering	WVU	Ebrahim Fathi, Petroleum & Natural Gas Eng.
[d]Oriana Ovide	Physical Sci #16 (9:30 am)	Forensic Science & Chemistry	WVU	Tatiana Trejos, Forensic & Investigative Science
[f]Matthew Richardson	Engineering #6 (9:30 am)	Mathematics	WVU	Marjorie Darrah, Mathematics
[b]Kenyane Simpson	Human Engag #6 (9:30 am)	Speech Language Pathology	WVU	Amy Root, Learning Sciences & Human Development
[f]Abby Sine	Human Engag #4 (9:30 am)	Mathematics	WVU	Vicki Sealey, Mathematics
[d]Nicole Utano	Agric & Env Sci #4 (9:30 am)	Applied & Environmental Microbiology	WVU	Matt Kasson, Forest Pathology
[g]Jordan Vance	Health Sci #7 (10:30 am)	Immunology & Medical Microbiology	WVU	Cory Robinson, Microbiology, Immunology & Cell Biology
[d]Mya Vannoy	Health Sci #5 (10:30 am)	Immunology & Medical Microbiology	WVU	Duaa Dakhlallah, Microbiology, Immunology & Cell Biology
[g]Sydney Westfall	Health Sci #9 (10:30 am)	Immunology & Medical Microbiology	WVU	John Barnett, Microbiology, Immunology & Cell Biology

[a]Funded by the WVU C. Eugene Bennett Department of Chemistry.
[b]Funded by the WVU College of Education and Human Services.
[c]Funded by a grant to Dr. Todd Petty Faculty grant.
[d]Funded by an NSF Louis Stokes Alliance for Minority Participation (LSAMP) KY-WV Mid-Level Alliance Phase II (LSAMP-1305039; WV PI: David Miller).
[e]Funded by the WVU Undergraduate Intercollegiate Biochemistry Program.
[f]Funded by the WVU Department of Mathematics.
[g]Funded by the WVU Department of Microbiology, Immunology and Cell Biology.

E. Immunology and Medical Microbiology Research Internships (Director: John Barnett)

Participant	Poster (Judged Time)	Major	Home School	Faculty Mentor
Courtney Amend	Biological Sci #15 (10:30 am)	Immunology & Medical Microbiology	WVU	Edwin Wan, Microbiology, Immunology & Cell Biology
Sophia Kenney	Neuroscience #1 (10:30 am)	Immunology & Medical Microbiology	WVU	Candice Brown, Neuroscience
Caleb Kisamore	Health Sci #15 (10:30 am)	Immunology & Medical Microbiology	WVU	Heath Damron, Microbiology, Immunology & Cell Biology
Andrea Pettit	Health Sci #10 (9:30 am)	Immunology & Medical Microbiology	WVU	Jennifer Franko, Microbiology, Immunology & Cell Biology
Alyson Stevens	Health Sci #6 (9:30 am)	Immunology & Medical Microbiology	WVU	Ivan Martinez, Microbiology, Immunology & Cell Biology

F. WVU Cancer Institute Summer Undergraduate Research Fellowship Program (Coordinator: Alexey Ivanov)

Participant	Poster (Judged Time)	Major	Home School	Faculty Mentor
Yongjia (James) Deng	Biological Sci #17 (10:30 am)	Biochemistry	Vanderbilt U.	Elena Pugacheva, biochemistry
Terezia Galikova	Health Sci #17 (10:30 am)	Immunology & Medical Microbiology	WVU	Ivan Martinez, Microbiology, Immunology & Cell Biology
Nolan Holley	Health Sci #16 (9:30 am)	Biochemistry	WVU	Laura Gibson, Microbiology, Immunology & Cell Biology

G. Undergraduate Water and Energy Systems Scholars (Coordinator: Shawn Grushecky)

Participant	Poster (Judged Time)	Major	Home School	Faculty Mentor
Matthew Kelly	Agric & Env Sci #7 (10:30 am)	Petroleum Eng.	University of Kansas	Shawn Grushecky, Energy Land Management
Dinuka Rejapakse	Agric & Env Sci #10 (9:30 am)	Chemical Eng.	University of Kansas	Shawn Grushecky, Energy Land Management

H. Self-funded

Participant	Poster (Judged Time)	Major	Home School	Faculty Mentor
Sierra Ciccone	Physical Sci #6 (9:30 am)	Chemistry	WVU	Jessica Hoover, Chemistry
Nicole Fama	Biological Sci #16 (9:30 am)	Biology	WVU	Craig Barrett, Biology
Taylor Fama	Engineering #7 (10:30 am)	Biomedical Eng.	WVU	David Klinke, Chemical & Biomed. Eng.
Caroline Leadmon	Biological Sci #12 (9:30 am)	Biochemistry	WVU	Daniel Panaccione, Plant and Soil Sciences
Meredith Montgomery	Biological Sci #2 (9:30 am)	Chemical Eng.	WVU	David Klinke, Chemical & Biomed. Eng.
Sarah Morgan	Physical Sci #18 (9:30 am)	Chemistry & Forensic & Inv. Studies	WVU	Jessica Hoover, Chemistry
Taylor Stump	Biological Sci #2 (9:30 am)	Biomedical Eng.	WVU	David Klinke, Chemical & Biomed. Eng.

IV. Speakers at REU/SURE Events

Speaker	Affiliation	Group(s)	Topic
Barbara Foster	Dept. of Chemistry, WVU	REU & SURE	Laboratory Safety
Ali Elliott	Biosafety Officer Health Sciences Center	REU & SURE	Biosafety Training
Graduate Students	Various WVU Depts.	REU & SURE	Peer Advice, Networking
Graduate Coordinators	Various WVU Depts. & Colleges	REU & SURE	Graduate School & Recruitment
Natalie Shook	Psychology, WVU	SURE	Diversity Awareness & Implicit Bias
Michelle Richards-Babb	Chemistry & Office of, UG Research, WVU	REU & SURE	Ethics, Responsible Conduct of Research, Poster Preparation
Kevin Walden	Office of UG Research, WVU	SURE	Get to Know Bingo & Photos
IGERT Graduate Fellows	Various WVU Depts.	SURE	Mentee Training, Graduate Student Panel, Public Abtsract & 3-min. Research Story
Matt Steele	WVU Library	REU & SURE	Library Research Search Tools
Ian Harmon	WVU Library	REU & SURE	Scholarly Publishing
Amy Cyphert & Cate Johnson	ASPIRE Office, WVU	SURE	Prestigious Scholarships &

Speaker	Affiliation	Group(s)	Topic
Leigh Pratt	ASPIRE Office, WVU	SURE	NSF Graduate Research Fellowship
Betty Mei	Graduate Academic Aff.	SURE & REU	Professional Etiquette
Brian Ballentine, Todd Hamrick, Steve Valentine, Renee Nicholson and Carrie White	WVU Faculty/Staff	SURE	Work in Academia vs. non-Acad.
Jessie Barclay, Çağla Çelik	Career Services, WVU	SURE	Interview Simulations & Resume Feedback
Shelly Quance	WVU Office of Graduate Admissions & Recruiting	REU & SURE	Ice Cream Social & Graduate Recruitment Networking Event
Zachariah Fowler	WVU Arboretum Dir.	SURE	Volunteer Scient. Service Learning
Sarah Farris, Lisa DeFrank-Cole, Christa Lilly & Nicholas Turiano	WVU Faculty	SURE & REU	First Generation Student Workshop
Barbara Watkins	Director, Main Street Morgantown	SURE	Kid's Day Service Learning
Catherine Whitworth	WVU Community Partner Coordinator	SURE	Community Engagement Workshop
Brian Popp	Chemistry, WVU	REU & SURE	ChemDraw Training & NMR Intro
Justin Legleiter	Chemistry, WVU	REU & SURE	Graduate Recruit. & STM/AFM
Stephen Valentine	Chemistry, WVU	REU & SURE	Intro to Mass Spec

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?

Honors College: http://www.honors.wvu.edu/
Chemistry REU: http://undergraduateresearch.wvu.edu/reu-site-research-in-chemistry-at-wvu
Nano REU: http://research.wvu.edu/researchers/nanosafe/nano-reu
WVU SURE: http://undergraduateresearch.wvu.edu/summer-undergraduate-research-experience
Community Engagement in Science Through Art (CESTA): http://www.cestaprogram.com/
WVU Cancer Institute Summer Undergraduate Research Fellowship Program: http://wvucancer.org/education/undergraduate/
Office of Undergraduate Research: http://undergraduateresearch.wvu.edu/

VI. Acknowledgements

A. Personnel

Chemistry REU
Michelle Richards-Babb, PI
Brian Popp, co-PI
Steve Knowlden, Asst. to REU Director

WVU SURE
Michelle Richards-Babb, Director/Educ. Coord.
Kacee Caster, Teaching Assistant
Cassandra Drain, Teaching Assistant
Kevin Walden, Program Specialist
Kimberly Quedado, Assistant Director

Nano REU
Lisa Holland, PI
Kimberly Quedado, co-PI
Lindsey Veltri, Asst. to REU Director

Symposium Booklet
Michelle Richards-Babb
Kevin Walden
Kacee Caster

B. Financial Support

Chemistry REU (PI: Michelle Richards-Babb, co-PI: Brian Popp) National Science Foundation (NSF) Division of Chemistry (CHE 1559654) with recreational activities funded by WVU Research Corporation and the WVU Eberly College of Arts and Sciences.

Nano REU (PI: Lisa Holland, co-PI: Kimberly Quedado) National Science Foundation (NSF) Divisions of Materials Research and Chemistry (DMR 1559880) with recreational activities funded by WVU Research Corporation and the WVU Eberly College of Arts and Sciences.

WVU SURE (PI: Michelle Richards-Babb) Sponsored in part by (i) the West Virginia Research Challenge Fund through a grant from the Division of Science and Research, HEPC, (ii) WVU Office of the Provost, and (iii) the Davis College of Agriculture, Forestry and Consumer Sciences, Eberly College of Arts and Sciences, the Statler College of Engineering and Mineral Resources, the College of Business and Economics, the Health Sciences Center, the Colleges of Creative Arts and Physical Activity and Sports Sciences, and the Departments of Chemistry and Biology.

Immunology and Medical Microbiology Research Internships (Coord: John Barnett and Rosana Schafer) Financial support for the internships comes from the Department of Microbiology, Immunology and Cell Biology.

WVU Cancer Institute Summer Undergraduate Research Program (Coord: Alexey Ivanov) Financial support for the fellowship program comes from the Edwin C. Spurlock Fellowship Fund, the Edward L. Reed Cancer Research Endowment, the Dr. David B. McClung Cancer Research Endowment Fund, and the Joe Marconi Cancer Research Fellowship Endowment.

Undergraduate Water and Energy Systems Scholars (Director: Shawn Grusecky) Funded under the NSF EPSCoR project "Improving Water Management, Treatment and Recovery in Oil and Gas Production" – a joint project between the University of Kansas and WVU.

LSAMP KY-WV Mid-Level Alliance (WV PI: David Miller) Stipends and tuition for two SURE participants were funded through the NSF Louis Stokes Alliance for Minority Participation (LSAMP) KY-WV Mid-Level Alliance Phase II (LSAMP-1305039).

Agricultural and Environmental Sciences Category

Ag & Env Sci Index:

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 1:

High phosphorous soil phytoremediation using foliar-applied ZnO nanoparticles

Chloe Courtade and Louis McDonald
Davis College of Agriculture, Natural Resources and Design, Department of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26505

High phosphorous (P) soils are a consequence of animal manure applications in excess of plant P requirements. These soils can lead to environmental issues including eutrophication. Current methods to correct this are ineffective, costly, and extensive. Zinc oxide nanoparticles (ZnO-NP) have been shown to stimulate P uptake in mung bean grown in P-deficient soil. We hypothesized that ZnO-NP would similarly stimulate P uptake in a more common legume, soybean (*Glycine max*) grown in a high P soil. High P soils were collected from the WVU Animal Sciences Farm. The soybeans were grown in a greenhouse for two weeks before applying ZnO-NP treatments of 0, 5, 10, 15, and 20 mg/L as a foliar spray and a Zn-equivalent concentration of $ZnSO_4$. After an additional two weeks, plants were harvested, dried and ground before microwave digestion in concentrated HNO_3. Levels of Zinc, phosphorous, and sulfur dry weight tissue concentrations were determined by ICP. We expect the results to support the hypothesis that application of ZnO nanoparticles will increase phosphorous uptake in plants. These results could show the potential for use of ZnO nanoparticles in phytoremediation.

Ag & Env Sci Poster 2:

Past management influences soil health and bioenergy crop productivity far into the future

Hannah L. Somerville and Eugenia M. Pena-Yewtukhiw
Davis College of Agriculture, Natural Resources and Design, Department of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506

As fossil fuel dependence grows, so does society's collective carbon footprint. Bioenergy solutions present low carbon-cost alternatives to fossil fuels. *Miscanthus giganteus* is one such solution that is especially well suited to sub-par soil. In this study, the effects of past management on soil health in a zero input, organic *Miscanthus gigantus* production system were analyzed. From 2000 to 2005, *Miscanthus giganteus* plots at the WVU Organic Research Farm received five compost/fertilizer rates,and after 2005 no additional compost was applied. Results indicated that higher levels of past compost application in positively affects future soil health. Bulk density was found to be 0.13-0.21gcm^{-3} lower in composted/fertilized plots than in control plots. In control plots, soil exhibited increased strength as compared to fertilized plots, with an aggregate dry mean weight diameter 2%-7% higher than fertilized plot values. Additionally, average growth rates of *Miscanthus giganteus* were higher in fertilized plots than control plots. However, improved soil did not translate to crop yield improvements in previous years.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 3:

Differences in ovine antibody production to specific peptides of *Haemonchus contortus* tropomyosin

Thaiddeus D.N. Dillie[1,2], Brynnan P. Russ[1] and Scott A. Bowdridge[1]
[1]Davis College of Agriculture, Natural Resources and Design, Division of Animal and Nutritional Sciences and [2]Eberly College of Arts and Sciences, West Virginia University, Morgantown, WV, 26506

Haemonchus contortus is a blood-feeding parasitic nematode and particularly pathogenic in sheep. Sheep breeds such as St. Croix are resistant whereas Suffolk are susceptible. Previous data indicated that St. Croix sheep have greater antibody specificity to *H. contortus* tropomyosin. To determine specific peptides of *H. contortus* tropomyosin, recognized by St. Croix antibody, 5 different peptides were synthesized, based on computer predictions and previous studies, to determine differences in St. Croix and Suffolk IgG antibody binding to peptides. Unique Enzyme Linked Immunosorbent Assays (ELISA) were optimized for all 5 peptides and peptide-specific ELISA was performed to determine breed differences in IgG specificity between St. Croix and Suffolk sheep. Based on absorbance, St. Croix serum had statistically higher levels of IgG specific for peptides 54, 66, and 80 than Suffolk serum ($P < 0.05$). These data have identified preferential binding to specific tropomyosin peptides by serum from St. Croix sheep that will serve as potential vaccines candidates in future work.

Ag & Env Sci Poster 4:

Defining the thallism of *Neonectria* fungi associated with the beech bark disease complex

Nicole Utano, Cameron Stauder and Matthew Kasson
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Beech bark disease (BBD) is a disease complex of American beech (*Fagus grandifolia*) resulting from infestation by an exotic scale insect (*Cryptococcus fagisuga*) followed by the invasion of one of two canker fungi (*Neonectria faginata* and *N. ditissima*). Fungal mating systems manifest as self-sterility (heterothallic) regulated by the presence of one of two MAT idiomorphs or self-fertility (homothallic) with both MAT idiomorphs present. Previous studies have resulted in conflicting conclusions regarding the thallism of *Neonectria* fungi. This study aims to elucidate the thallism of *N. faginata* and *N. ditissima* through molecular- and culture-based approaches. An analysis of the MAT locus within an available *N. ditissima* genome revealed the presence of a single MAT idiomorph (MAT1) likely indicating heterothallism. Molecular primers were developed to screen *Neonectria* isolates for the MAT1 idiomorph. To test for homothallism, 23 *N. ditissima* and 46 *N. faginata* single-spore isolates were grown in pure culture, and perithecia formation will be observed. The results of this study will help to further characterize and understand the mating system of *N. faginata* and *N. ditissima.*

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 5:

Nutrient uptake analysis of light and hormone insensitive *Arabidopsis thaliana* mutants

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Development of plants enriched with minerals could be beneficial to improve the quality of agricultural crops, but the effects of major players, light and plant hormones, on mineral uptake are not clearly understood. It is hypothesized that genes encoding light receptors and involving in hormone biosynthesis would affect the mineral uptake in plants. *Arabidopsis thaliana* mutants insensitive to red or blue light, and to plant hormones, ethylene or jasmonic acid, were selected in our study. Mutants were grown for 8 weeks from the seeds in the greenhouse with 1/5th strength of Hoagland solution. Leaf tissues were harvested, freeze-dried, ground to a fine powder, and the mineral contents were analyzed using an inductively coupled plasma spectrometer. Pair-wise comparisons among ten minerals were conducted within each mutant and among mutants. The knowledge obtained from this study could allow us to ameliorate nutrient uptake in food crops. It could benefit us by improving the diets to reduce nutrient deficiency, reduce disease and improve human health overall.

Ag & Env Sci Poster 6:

Synthetic methionine use in organic meat-type chickens improves production not health

Katy L. Sines, Angela E. Lamp and Joseph S. Moritz
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Marketing claims for human foods influence consumer buying decisions. Consumers generally believe that organic is healthier for themselves and the birds. Regulations in organic poultry rearing allow for the feeding of synthetic methionine-- an amino acid critical to poultry growth. The current study hypothesized that diets devoid of synthetic methionine would negatively influence health and production of organic meat-type chickens relative to diets containing synthetic methionine. The objective of the study was to measure growth performance, mortality, and carcass traits of organic meat-type chickens fed diets that differed in synthetic methionine inclusion. Four treatments were replicated five times. Data were analyzed using a randomized complete block design model. Synthetic methionine inclusion early in production (d1-21) did not influence growth performance or mortality ($P>0.05$). Overall 21 – 53d production demonstrated that diets devoid of synthetic methionine decreased ending weight, live weight gain, and bone-in-breast weight ($P\leq0.05$). However, mortality was not affected ($P>0.05$). These data suggest that methionine use in organic meat-type chickens has a greater benefit for production of saleable product than bird health.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 7:

Water use and recovery related to unconventional drilling in West Virginia

Matthew Kelly[1], Shawn Grushecky[1] and Ed Peltier[2]
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The objective of this project was to investigate water consumption, use during drilling, and flow back volumes in West Virginia. Currently the West Virginia Department of Environmental Protection tracks the number of wells, well production, and flow back water data. An industry and trade association database, Frac-focus provides public access to reported chemicals and water use by unconventional operators in West Virginia and surrounding states. Data were extracted from both sources and combined to create a central database of information on water use per well, total vertical length, total depth drilled, lateral length, and water used per foot for the period of 2011 to 2016. Results indicate that there was an increase in water consumption per foot and total consumption from 2011 to 2013, then a stabilization through 2016. Spatial analyses of water consumption and location was used to evaluate relationships between water use per well and geology in the shale region. Preliminary results indicate that water consumption per well has hit has stabilized.

Ag & Env Sci Poster 8:

Perceptions of fracking on stream health in West Virginia

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Unconventional oil and gas (UOG) extraction, often referred to as fracking, is a newer form of energy extraction that has recently expanded in West Virginia. The impact of how this extraction process affects the states surface waters is still relatively unknown to both researchers and citizens alike. Previously, our lab studied fish populations, water chemistry and stream habitat before and after UOG well pads were constructed within several watersheds. We are currently performing a companion study in northern West Virginia by assessing pre- and post-fracking streams to see how stream quality has been affected. I developed a survey to interview and assess land owner's and frequent users' perceptions of stream quality. These perceptions were then examined against the accompanying collected water quality data. Thus, I examined the perception's accuracy and precision to the stream's actual status. These findings will show how perceptions of those surveyed compare to real data; these finding may shed light on how proximity to UOG activity affects the understanding and bias of perceived water quality.

Agricultural and Environmental Sciences Category

Ag & Env Sci Poster 9:

April vegetation greenness and its impacts on near-surface climate conditions in South-Central Appalachia

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The Earth system consists of complex processes that occur between the land, atmosphere, and oceans. Changes in land surface conditions such as vegetation cover can substantially alter atmospheric conditions. Knowledge of land-atmosphere interactions between vegetation and climate is a critical factor in predicting, protecting, and thoroughly understanding the coupled Earth system. This study seeks to identify the impacts of vegetation changes on near-surface climate conditions in Appalachia from 1982 to 2015. The remotely sensed Normalized Difference Vegetation Index (NDVI) was used as a vegetation indicator in this study. We used linear regression analysis to detect spatiotemporal change patterns of vegetation in Appalachia, and composite difference analysis to explore the near-surface climate conditions associated with vegetation dynamics. The results showed that vegetation significantly increased in South-Central Appalachia in April. The increased vegetation resulted in increasing latent heat flux and near-surface specific humidity and a corresponding decrease in sensible heat flux, which may lead to increasing precipitation and decreasing temperature in South-Central Appalachia.

Ag & Env Sci Poster 10:

Can Barium and Strontium concentrations in flowback water be reduced using activated carbon?

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Hydraulic fracturing has accelerated the process of extracting natural gas from unconventional reservoirs. This leads to increased levels of flow back water being recovered at the well head. Flow back water can contain a wide variety of chemical constituents including radioactive materials, salts, heavy metals and hydrocarbons, of which Barium and Strontium make up a large component. KOH-activated carbon has shown promise as a method to reduce Ba and Sr and was investigated in this research. Two methods of carbon activation were tested in this research and varied based on the timing of KOH additions. We expect our results to support our alternative hypothesis that after the water treatment, Barium and Strontium concentration of the frack water will be reduced and the reduction in concentrations will be related to the amount of activated carbon used. Results from this research could give new options to the water treatment industry.

Biological Sciences Category

Bio Sci Index:

Biological Sciences Category

Poster 15: STAT5 tetramer-dependent expression of proinflammatory mediators in monocytes. **Courtney D. Amend**, Kelly L. Monaghan and Edwin C.K. Wan.

Poster 16: Genetic diversity and morphological variation in a vulnerable WV native orchid, *Corallorhiza bentleyi.* **Nicole Fama**, Brandon Sinn and Craig Barrett.

Poster 17: Characteristics of metastatic development in patient derived xenograft models. **Yongjia Deng**, Hye-Ran Choi, Kristina Marinak, Marc Purazo, Naira Margaryan, and Elena Pugacheva.

Biological Sciences Category

Bio Sci Poster 1:

Tissue-specific regulation of relationships between *doublesex* and Hedgehog pathways

Jeffrey Petty and Teiya Kijimoto
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Organisms deploy existing genes to invent an evolutionary novel trait (e.g. mammalian hair). During this process, deployed genes can form regulatory relationships that did not exist in the "original" context. We utilize the horned beetle species *Onthophagus taurus* and their horns as a model to study this important biological process. The Hedgehog pathway gene *smoothened* (*smo*) that promotes tissue growth is one of such deployed genes that contributes to the horn development and also the generation of polyphenism, an extreme case of phenotypic plasticity. Another gene, *doublesex* (*dsx*), also contributes to polyphenism in horns, however, genetic interactions between these newly deployed genes are not entirely understood. We aim to understand the evolution of polyphenism in the beetle horn and the establishment of novel genetic regulatory relationships upon gene deployment by performing RNAi on *smo*, tissue dissection such as horns, RNA extraction, and gene quantification by quantitative real-time PCR to analyze *dsx* activity after *smo* knockdown. Our most current findings explaining polyphenic development regulation in *O. taurus* will be presented.

Bio Sci Poster 2:

Exploring the oncogenic role of Wnt-inducible signaling protein-1 in zebrafish (Danio rerio)

Meredith Montgomery[1], Danielle Norman[1], Taylor Stump[1], Wentao Deng[2], Sadie Bergeron[3] and David Klinke[1,2]
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Melanoma is an aggressive skin cancer that is caused by ultraviolet radiation damage to genes. To explore how specific genes impact the spontaneous development of melanoma, zebrafish (Danio rerio) is an attractive animal model. While transplantable animal models suggest that increased expression of Wnt-inducible Signaling Protein-1 (WISP1) promotes an aggressive form of melanoma, the role of WISP1 in the spontaneous development of melanoma is unknown. Here, the goal is to clarify the role that WISP1 plays in promoting melanoma. As WISP1 plays a role in normal bone development and has two genetic homologs in Danio rerio Wisp1a and Wisp1b, our initial studies focus on quantifying bone and cartilage development in developing Danio rerio and knocking down either Wisp1a or Wisp1b. To carry out the knockdown, antisense morpholino oligomers, which prevent transcription of the protein, will be used. Current progress in knocking down Wisp1a and Wisp1b and quantifying bone and cartilage development in zebrafish will be discussed.

Biological Sciences Category

Bio Sci Poster 3:

SOS1 and NHX2 expression changes after NaCl exposure in two genotypes of *Sorghum bicolor*

Katelyn E. Delaney, Ashley Henderson and Jennifer Hawkins
Department of Biology, Eberly College of Arts and Sciences, West Virginia University, Morgantown WV 26505

With climate change, environments are becoming less favorable for plant growth and production. The severity of soil salinity is expected to increase and will ultimately affect the agricultural and biofuel industry. Therefore, a deeper understanding of plant responses to salinity stress will be vital in the prevention of worldwide shortages. In this project, both salt-tolerant and salt-sensitive genotypes of *Sorghum bicolor* were treated with salt free water or 150 mM NaCl solution. Quantitative PCR (qPCR) was conducted on various tissues collected at sequential time points to quantify the expression of two genes, SOS1 and NHX2, which are involved in different salt response pathways. Expression in plants treated with NaCl was compared to that of the control to delineate the effect of salt exposure on gene expression. While there is not a significant genotype effect, the data shows that there is prolonged expression of NHX2 in the salt-tolerant genotype, possibly contributing to the higher salinity tolerance. This data will provide insight into the mechanisms responsible for salinity tolerance in an important agricultural grain crop.

Bio Sci Poster 4:

Computational study of the thermodynamic process of the binding and folding of pHLIP

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pHLIP (pH low insertion peptide) is a protein that selectively inserts into cell membranes at an acidic extracellular pH. Since acidity is also associated with tumor cells, pHLIP can potentially be used to transport cargo molecules for cancer diagnosis and treatment by folding and inserting into the cell membrane as a transmembrane (TM) helix. The thermodynamic process by which pHLIP binds and folds on the membrane surface and inserts into the membrane as a TM helix is still poorly understood. Prior to using pHLIP in living cells, a fundamental understanding of the details of this process is required for the optimization of its potential applications. The unfolding of pHLIP in solution is established to be energetically unfavorable. Molecular dynamics (MD) simulations were employed to model the unfolding of pHLIP in solution from α-helix to coiled conformations. This will ultimately characterize the thermodynamics of unfolding in addition to observing the structural changes pHLIP undergoes as it unfolds. The determination of the free energy of unfolding from this computational approach will give us insight into the contribution of the lipid bilayer in the folding process of pHLIP. Preliminary results indicate that the free energy of folding is at least 3 kcal/mol. Future simulations will further characterize this range in greater detail.

Biological Sciences Category

Bio Sci Poster 5:

Consumption of Silver Carp (Hypophthalmichthys molitrix) sarcoplasmic protein on bone health

Kathryn Taylor, Derek Warren, Chris Skinner, Kristen Matak and Janet C. Tou
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Silver carp are an invasive species that poses an environmental threat in the U.S. Recovery of water-soluble sarcoplasmic proteins (SSP) from silver carp during processing has led to interest in its development for human consumption. Due to its protein, calcium, and phosphorous content carp SSP supplementation may be beneficial to bone health. The study objective was to determine whether effect of feeding carp SSP on bone is comparable to commercially available milk protein. Growing (age 28 days) female Sprague-Dawley rats were randomly assigned (n=8 rats/group) into diet groups consisting of a standard purified rodent diet with 10% w/w protein as either carp SSP, whey, casein, or no protein. Morphometry of the femurs and total mineral content determined by ashing at 600^{o}C indicated significant differences between no protein and the remaining diet groups (p=.0001). Bone strength determined by three-point bending test showed no significant differences between the diet groups (p=.165). Based on the results, carp SSP supplementation is comparable to milk protein in maintaining bone health in growing rats indicating it is safe for human consumption.

Bio Sci Poster 6:

Evaluation of toxicity of mild and stainless-steel welding fumes on mouse macrophage cells

Aaron C. Stavrakis[1], Anna M. Morris[1,2], Nicole S. Olgun[2] and Stephen S. Leonard[1,2]
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Welding fume is a metal oxide particulate dust generated during welding using metal rods. Five million worldwide and 600,000 in the U.S. are occupationally exposed. Health effects of welding fume exposure include metal fume fever, asthma, bronchitis, and lung cancer. The goal of our study is to identify the effects of the total, soluble, and insoluble fractions of fumes generated from different types of welding rods (mild steel, and two types of stainless steel). Welding fumes were characterized using X-ray diffraction and scanning electron microscopy, which showed differences in size and chemical make-up. Cells exposed to the fume fractions were assessed for viability, membrane damage, generation of reactive oxygen species (ROS), and cytokine release to determine possible toxic effects. Results demonstrated that the total, soluble, and insoluble fractions of welding fume had differential effects on cytotoxicity. Chromium levels were a strong indicator of toxicity; the fume fractions that contained more chromium had greater effects on toxicity. Results indicate the use and development of less toxic varieties of welding fume materials may decrease occupational risks.

Biological Sciences Category

Bio Sci Poster 7:

Identifying small molecules that modulate the ability of huntingtin to bind membranes

Alyssa R. Stonebraker and Justin Legleiter
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Huntington's Disease, a fatal neurodegenerative disease, is caused by an elongated poly-glutamine domain in mutant forms of the Huntingtin (htt) protein. The ability of htt to bind and disrupt lipid membranes may play a role in htt-related toxicity. Small molecules that can alter the interaction of htt with lipid membranes could represent novel therapeutic agents. As such, there is a critical need to identify such compounds. The effects of the small molecules to modify the ability of htt to bind lipid membranes are being screened using colorimetric polydiacetylene (PDA) assays. When incorporated into lipid vesicles, PDA molecules are blue. Proteins binding to these vesicles invoke a mechanical stress onto the PDA molecules, resulting in a color change to red that can be quantified spectroscopically. Significant deviation from a protein-lipid only control is used to identify small molecule promoters and inhibitors of the htt/lipid interaction. Once candidate small molecules are discovered, additional controls and replication of the experiment will be performed to validate the ability of candidate compounds to alter htt/lipid binding.

Bio Sci Poster 8:

Determination of estrogens at nanomolar levels using capillary electrophoresis-UV-visible absorbance detection

Safa Ahad and Lisa A. Holland
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Endocrine-disrupting chemicals mimic and inhibit natural hormone binding sites or impact protein expression, which can cause harmful effects on the body. Literature reports have used biomarkers from zebrafish in order to understand how endocrine-disrupting chemicals impacted the human body at a genetic level. Evaluation of steroids is integral to monitoring endocrine disruption. Steroid separations using capillary electrophoresis allow for us to study these endocrine-disrupting chemicals using a fast method capable of low detection limits using an automated instrument that is moderately priced to purchase ($70,000) with very low consumable costs. By using an integrated stacking and separation method that was described in which steroids were concentrated with a 60-sec pH mediated injection followed by a 5-minute separation based on secondary equilibria with beta-cyclodextrin and sodium dodecyl micelles. The results summarized in this poster describe the optimization of the separation technique and include the analytical figures of merit such as linear range and reproducibility in peak areas and time.

Biological Sciences Category

Bio Sci Poster 9:

Generating bioluminescent Gram-negative bacteria to improve visualization of bacterial pathogenesis

Annalisa B. Huckaby, Emel Sen-Kilic, Kelly Weaver, Catherine Blackwood, F. Heath Damron and Mariette Barbier
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Bioluminescence is a natural phenomenon occurring in marine organisms, fireflies, fungi and in some bacteria such as *Vibrio harveyi*. These organisms utilize the luciferase enzyme which oxidizes flavin mononucleotide ($FMNH_2$) and emits blue-green light. The luciferase gene (*lux*) was previously inserted into bacterial plasmid, pUC18-mini-Tn27-Gm, and used to study bacterial pathogenesis. However, the efficiency of the light production is dependent on the availability of $FMNH_2$. We hypothesized that expression of flavin reductase (*frp*) will increase the availability of $FMNH_2$ and maximize the bioluminescent production. Therefore, we created several constructs of pUC18-mini-Tn27-lux-Gm containing the *frp* gene. These plasmids were inserted in different pathogenic bacteria, and the luminescence was monitored overtime. We observed that the inclusion of the *frp* gene increased the luminescence of the bacteria and that the amount of bioluminescence was dependent on the promoter region of *frp*. Following *in vivo* experimentation, promoters of *frp* will be optimized for each bacterium. These bioluminescent constructs will be used to visualize the dissemination of bacteria through the body to improve vaccine development for antimicrobial resistant strains.

Bio Sci Poster 10:

DNA methylation in tsetse flies (Diptera: Glossinidae)

Afsoon Sabet, Miguel Medina Munoz and Rita V.M. Rio
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DNA methylation, the addition of a methyl group to a cytosine, is important for gene regulation and subsequently, phenotype determination. Folate is necessary for the synthesis of S-adenosyl methionine, the methyl donor for methylation. However, due to a lack of dietary folate, the genome methylation status of strict blood feeders is of interest. Here, we determine the methylation status of the medically significant tsetse fly (Diptera: Glossinidae) using methylation-sensitive Amplified Fragment Length Polymorphism assays. Additionally, phylogenetic analyses of DNA methyltransferase-2, the sole Dipteran DNA methyltransferase, were performed to examine whether diversification has occurred, relative to animals that contain additional DNA methyltransferases. The gene tree paralleled the species tree of the respective organisms, indicating a lack of divergence from the evolutionary trajectory. Preliminary results indicate the presence of DNA methylation in the tsetse. This is significant due to the lack of a predicted *de novo* DNA methyltransferase in Diptera. This expands our understanding of the tsete fly genome and suggests novel ways to transcriptionally control its role as a biological vector.

Biological Sciences Category

Bio Sci Poster 11:

Synthetic efforts towards an unusual indole, dilemmaone C

Mason Hamilton[1], Katharine E. Lambson[2], Charles Byrum[2] and Björn C. G. Söderberg[2]
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A unique indole alkaloid, dilemmaone C, has been isolated along with two related compounds from a collection of seas sponges off the coast of South Africa. This molecule, however, has yet to be synthesized. One of the major challenges in the synthesis involves the cyclization of the indole core. The initially proposed, late-stage method of cyclization for dilemmaones A-Cwas the Watanabe-Cenini-Söderberg reaction. For this family of molecules, however, it was found that the substituents create too much steric hindrance for this reaction to take place. With this in mind, a new approach was necessary for the successful synthesis of dilemmaone C. The new method proposes a series of aryl ring manipulations, a Stille coupling reaction, epoxidation, and a one-pot reduction and cyclization to afford dilemmaone C. A similar approach has been successfully applied to the syntheses of dilemmaones A and B, and thus it is hypothesized that dilemmaone C can be similarly accessed.

Bio Sci Poster 12:

Conditionally dependent production of toxic ergot alkaloids by fungi in the genus *Metarhizium*

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Publicly available sequence data indicate that *Metarhizium* species fungi have the capacity to produce lysergic acid-derived ergot alkaloids, but accumulation of ergot alkaloids in these fungi has not been demonstrated. We assayed several *Metarhizium* species grown under different conditions for accumulation of ergot alkaloids. *Metarhizium* flavoviride did not accumulate ergot alkaloids on any of three culture media, but *Metarhizium anisopliae* accumulated large quantities of several lysergic acid amides exclusively on sucrose yeast extract agar. *M. anisopliae* secreted over 80% of its alkaloid yield into the medium, whereas ergot alkaloids of other fungi are retained in their hyphae. We inoculated roots of corn, bean, and *Medicago truncatula* with *M. anisopliae* and *M. flavoviride*, and no ergot alkaloids were detected. *Metarhizium* species produced high concentrations of ergot alkaloids in live infected larvae of the model insect *Galleria mellonella* but significantly lower concentrations in dead larvae. The data demonstrate that several *Metarhizium* species produce ergot alkaloids of the lysergic acid amide class and that production of ergot alkaloids is tightly regulated and associated with insect colonization.

Biological Sciences Category

Bio Sci Poster 13:

Effectiveness of SDS as a solvent when swabbing for touch DNA after fingerprint processing

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Recovery of touch DNA continues to be a hurdle many law enforcement agencies struggle with daily. Approximately 1ng of DNA is needed to produce a full DNA profile while 40pg of DNA is left from fingerprints. This experiment was designed to assess the use of the solvent sodium dodecyl sulfate (SDS) when swabbing fingerprints that have been treated with various fingerprint dusting powders. Glass slides were cleaned with a 10% bleach solution and UV cross-linked before placing fingerprints. After swabbing with 2% SDS solution or distilled water, the cotton swabs underwent DNA extraction techniques using the QIAGEN QIAamp DNA Investigator Kit. The DNA extracts were quantified using a 7500 Real-Time PCR instrument and the Quantifiler Trio DNA Quantification Kit. SAS JMP was used to analyze the data which indicated that fingerprint powder affected the quantity of DNA extracted ($p=0.0337$). Trends of an interactive effect between the solvent and fingerprint powder were present. This suggests that non-porous substrates treated with various fingerprinting processing methods may be swabbed with SDS instead of water for more complete profiles.

Bio Sci Poster 14:

Synthesis and characterization of novel boron-functionalized nonsteriodal anti-inflammatory drugs

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Nonsteroidal anti-Inflammatory drugs (NSAIDs), such as Ibuprofen (Advil®) and Naproxen (Aleve®), are a group of pharmaceuticals used to reduce acute pain, fever, and inflammation. For many people with chronic pain, extended use has significant adverse gastrointestinal and renal effects. There continues to be a need to identify new analgesics that do not have the side effects of NSAIDs nor the addictive properties of opiods. In recent years, boron containing compounds have been identified as potent therapeutics for a variety of cancers, and because of this success, researchers believe that boron holds significant promise in new drug discovery ventures. The Popp research group recently developed a new synthetic reaction that allows for the installation of boron in traditional NSAIDs. The new reaction, termed boracarboxylation of alkenes, is very "green" since it uses an inexpensive earth-abundant metal catalyst (copper), readily available sources of boron and alkene, and carbon dioxide (CO_2) gas under quite mild conditions.

Biological Sciences Category

Bio Sci Poster 15:

STAT5 tetramer-dependent expression of proinflammatory mediators in monocytes

Courtney D. Amend, Kelly L. Monaghan and Edwin C.K. Wan
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Activation of the transcription factor STAT5 forms dimers and tetramers, both of which are critical for regulating gene expression. Our previous studies demonstrated that STAT5 tetramer-deficient mice are resistant to the development of experimental autoimmune encephalomyelitis (EAE), a mouse model of multiple sclerosis. Disease amelioration is accompanied by the reduction of proinflammatory mediators CCL3, CCL17, CCL22, and IL-1α. In the current study, we tested the hypothesis that monocytes are the predominant producers of these mediators, and their expression is regulated by STAT5 tetramers. We determined the expression levels of *Ccl3, Ccl17, Ccl22,* and *Il1a* genes in monocytes isolated from the wild type and STAT5 tetramer-deficient mice following stimulation with the STAT5-activating cytokine GM-CSF. We found that expression of all targeted genes is induced in monocytes by GM-CSF, but only the expression of *Ccl17, Ccl22, and Il1a* is STAT5-tetramer dependent. These findings suggest that the STAT5 tetramer-dependent expression of CCL17, CCL22, and IL-1α in monocytes may contribute to the pathogenesis of EAE, and they may become novel therapeutic targets for multiple sclerosis.

Bio Sci Poster 16:

Genetic diversity and morphological variation in a vulnerable WV native orchid, *Corallorhiza bentleyi*

Nicole Fama, Brandon Sinn and Craig Barrett
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Corallorhiza bentleyi is an orchid species endemic to five counties along the West Virginia/Virginia border, and is both geographically restricted and locally rare. More research is needed to characterize the genetic diversity the orchid requires for long-term survival. We took a three-fold approach to quantify diversity among populations of *Corallorhiza bentleyi*. Inter-simple sequence repeat (ISSR) markers were developed to quantify genetic variation within *C. bentleyi*. The internal transcribed spacer region (ITS) was sequenced to assess the degree of specificity between the orchids and their ectomycorrhizal fungal hosts. Floral morphometrics and principal components analysis were used to analyze morphological diversity among individuals sampled. Data from ISSR banding patterns and floral measurements have revealed evidence of genetic variation between *C. bentleyi* populations, and among individuals within populations. *Corallorhiza bentleyi* appears to associate with a single species of fungus, *T. fuscocinerea*. The ultimate goal of this research is to obtain more information concerning genetic diversity, relationships with its fungal host, and environmental requirements in order to influence management of *C. bentleyi* populations and their habitats in southern Appalachia.

Biological Sciences Category

Bio Sci Poster 17:

Characteristics of metastatic development in patient derived xenograft models

Yongjia Deng, Hye-Ran Choi, Kristina Marinak, Marc Purazo, Naira Margaryan, and Elena Pugacheva
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Patient-derived xenograft models (PDXs) represent a new way of modeling cancer development and are theoretically a better representation of tumor and metastatic development than traditional cell lines. However, one of the major shortcomings of PDX models is that they are difficult to establish and are relatively rare as a result. In this project, we catalogued the development of multiple PDX lines by staining organ sections derived from PDX-associated mice with various antibodies and then taking high resolution photos of the sections. These photos were then analyzed through computational means. Preliminary results indicated that lung metastases grew at a faster rate than liver or spleen metastases within the context of PDX models and were more common than the latter as well. Additionally, we found that different antibodies would result in variation with respect to the extent of metastatic development in all organs. The significance of these results is that they provide valuable information about different PDX lines for scientists looking into acquiring lines with specific traits for their research.

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Engineering Category

Eng Poster 1:

Benefits of integrating autonomous vehicles with robotics

Keelan Hendricks and Jason Gross
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Autonomous technology is a fast-growing field. Various industries are beginning to rely heavily on machines that need little to no human interaction. Combining these tools with high tech gadgets has the potential to streamline productivity significantly to accommodate the constantly changing needs of the modern world. Our research aims to help first responders in disaster situations like hurricanes, flash floods, etc. find important objects (people valuables, etc.) that may be hidden under debris. Our models use thermal cameras attached to drones that scope the areas that may be hard to reach or have unknown obstacles. Live video footage could be relayed back to the rescuers in order for them to better prepare for the environment they face. To further investigate the unknown surroundings, a small vehicle equipped with a LIDAR scanner that maps the local surroundings using lasers and reflected surfaces will accompany the drones. The drone will also be equipped with a reflective surface so that a reference point may be established. These pieces of equipment can help determine the best way to respond to problems and has the potential to save many lives.

Eng Poster 2:

Warehouse inventory system based on drones and QR code recognition

Sarah Cokeley and Leily Farrokhvar
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The current inventory management system of manually scanning inventory can take hours, days, or, in large warehouses, weeks, making it a time-consuming and dangerous process as workers often times have to be lifted in order to scan higher shelves. This is a highly inefficient and error-prone process leading to many discrepancies in the actual inventory and the information systems. One proposed approach of improving the accuracy of inventory database systems is to automate the process via Unmanned Aerial Vehicles (UAVs). In this research, we investigate the feasibility of using autonomous drones for inventory control in indoor warehouses. To evaluate the feasibility of this automation, the first step is to achieve autonomous navigation with the drone, followed by the implementation of QR codes for inventory identification. It is our intention to transition from QR codes to image processing. By creating a mock warehouse environment, preliminary results indicate that UAVs and QR code recognition techniques to identify, locate, and count inventory is a more efficient and accurate method of maintaining inventory information systems.

Engineering Category

Eng Poster 3:

Electroactive polymer actuator arrays for soft robotic movement

Kevin M. Tennant, Edward Sabolsky and Allison Arnold
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Many biological systems have encouraged a new type of robotic system called "soft robotics." This research will focus on electrically driven ionic polymers applications in soft robotic schemes. This work will consider the deposition of metallic nanoparticles into ionic polymers, to produce Ionic Polymer Metal Composite (IPMC) actuators. Thin film IPMCs can produce mechanical movement in response to low voltage stimuli. The fabricated IPMC membranes will be treated chemically to enhance their electrochemical properties and they will be tested to generate displacement-voltage data which will quantify displacement capabilities of these actuators. Limitations of this research concern various geometry castings of an IPMC actuator on a thin film and limited electroding methods to produce desired forms of IPMCs. The expected results could reveal the potential for thin film fabrication and actuation which could mimic biological movements. This research is important as it has many potential applications that could improve and provide new advances in medical care like implantable drug delivery and artificial muscles, as well as applications for NASA and space exploration with wearable technology.

Eng Poster 4:

Traffic intensity classification on highways using machine learning and deep learning models

Dylan Johnson and Thirimachos Bourlai
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The proposed research is focused on the development and assessment of a set of image processing, machine learning, and deep learning algorithms that automatically categorize traffic intensity on highways using images captured by state traffic cameras. Challenges associated with this problem include factors that impact image quality and classification performance, including standoff distance, weather, and illumination (daytime, nighttime). For the purpose of this study, we generated a Highway Traffic Intensity (HTI) database using a number of recordings taken from traffic cameras in West Virginia located at the I-77 US-60 Interchange, I-79 US-19 Interchange, along US-35, Exit 67 on I-79, and Mile Marker 20 on I-77. Video sequences were converted to images that were then sorted into categories. Images with tearing or severe occlusion were omitted from the dataset, and afterwards a database cleaning was performed. When processing these images, three different image sets, representing traffic intensity (low, medium, and high) were created for the purpose of training and testing classifiers. Different methods of feature extraction were used and optimized while classifier validation methods and algorithms were kept constant during testing. After testing, results pointed toward a pre-trained neural network being the most efficient (in terms of speed and accuracy) classification method, exceeding a total of 75%.

Engineering Category

Eng Poster 5:

Fabrication of Kirigami based structures for flexible electronics applications

Muriithi-David Githui Kem, Sierros Konstantinos A and Derrick Banerjee
Department of Mechanical and Aerospace Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

Modern electronics have found applications in a vast range of environments, subjecting themselves to dynamic changes within their environments. Among the numerous changes encountered, mechanical stresses and deformations on these electronics are most notable. Current technologies are plagued by their rigid nature and suffer structurally when accommodating for deformations that occur due to mechanical stress. Recently however, advancements have been made in the field of flexible electronics that will change the nature of electronics in use today. The use of direct ink writing of printable elastomers such as Polydimethylsiloxane (PDMS) with Kirigami (a variation of origami that includes cutting instead of folding) inspired designs to accommodate flexibility and stretch-ability provides a unique method of fabricating electronics that can accommodate for deformations and retain original shapes. To accomplish this, we are investigating various printing parameters to find consistencies in prints as well as designing kirigami inspired patterns that accommodate these deformations. To add functional capability and degrees of manipulation to the print, magnetic and conductive materials will be deposited onto the prints.

Eng Poster 6:

Method for colorizing LiDAR point clouds with photographic images

Matthew Richardson and Marjorie Darrah
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LiDAR (Light Detection and Ranging) is a surveying system used in many different fields. LiDAR uses laser pulses and the time they take to return to the system to gather millions of points on the surface of the surveyed area; this collection of points is called a ‘point cloud.’ 4D Tech Solutions, a startup company in Morgantown, has built a LiDAR-camera rig to attach to an Unmanned Aerial Vehicle (UAV) which will simultaneously collect LiDAR data and photographs. The purpose of this project is present a way to change the color of every point in a point cloud to the color of the corresponding pixel in the photograph. LiDAR data is generally colored by elevation, but point cloud colorization (LiDAR photo overlay) allows for a significantly more realistic survey. This problem boils down to a LiDAR and camera calibration and alignment problem; colorization is straight forward once the point cloud and image are aligned. A full LiDAR photo overlay method based on previous literature has been developed, but testing has not begun.

Engineering Category

Eng Poster 7:

Quantifying the evolution in diversity of cell subsets within B16 mouse melanoma tumors

Taylor A. Fama[1] and David J. Klinke ll[1,2],
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Immunotherapies are being increasingly used to combat cancer, whereby antibodies activate immune cells present within the tumor microenvironment. One of the barriers for response is that the tumor's different immune and stromal cell subsets provide conflicting signals with these immunotherapies to limit clinical benefit. The diversity and phenotype of these cell subsets present within the tumor microenvironment can be increasingly assayed using single cell RNA-seq methods. Here, our goal was to quantify the evolution in diversity of immune and stromal cells within the tumor microenvironment as a function of time through the analysis of single-cell RNA-seq data. Using data from the Human Cell Atlas project, we analyzed single-cell RNA-seq data obtained from the transplantable B16 mouse melanoma model. This analysis was performed on the High-Performance Computing cluster using programs such as Salmon transcript quantification, Bioconductor R based packages, and various R implemented visualization methods. These visualizations will be used to identify genes and cell types that are affected by tumor growth which will lead to further experiments to explore specific gene expression differentiation.

Eng Poster 8:

Application of mechanical and computer systems to develop an autonomous robot for first responders

Connor A. Kirk and Jason Gross
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In the world today responding to disasters at times can prove to be both dangerous and complicated. It is expected in these situations that first responders rise to the occasion to put others before themselves to try and save anyone they can. The purpose of this research project was to determine if it was feasible to build an autonomous robot that could be used to help first responders, and hopefully expedite the processes of saving people. For this project, we chose the operating condition for this robot to be a tunnel environment for its complications with navigation. Navigation within a tunnel can be difficult since standard GPS tracking cannot be used. For this reason, we are trying to implement several systems to create a virtual 3D map including: LIDAR, IMU, and a flying quadcopter with a thermal camera, so that a responder could view to get an understanding for the situation ahead. The results thus far have shown that we can drive the robot and quadcopter in the tunnel and can map the environment as well as track heat signatures. The significance of this study is to give an upper hand to first responders when they are evaluating and acting upon a disaster.

Engineering Category

Eng Poster 9:

Simulation and economic optimization of an autorefrigerated alkylation process

Ronald Alexander, Rebecca Kim and Fernando V. Lima
Benjamin M. Statler College of Engineering and Mineral Resources, Department of Chemical and Biomedical Engineering, West Virginia University, Morgantown, WV, 26506

The production of high octane fuel is a necessity for industries such as transportation and can be produced via an alkylation process. Alkylation produces trimethyl pentane compounds via a catalyzed reaction of low weight olefins and isobutane. While simulation literature is available on this process, little consideration has been given to incorporating a rigorous economic analysis and conducting optimization associated with this analysis. By introducing the equivalent annual operating cost (EAOC), both capital cost and annual utility cost can be incorporated into the analysis. The objective in this research is to model and simulate the alkylation process to perform an economic optimization for profit maximation. To design and optimize the process a commercial simulator, Aspen Plus, is used. A user derived Fortran optimization script is created using costing functions from literature and solved via the sequential quadratic programming (SQP) optimization convergence method in Aspen Plus. Results show that a decrease of approximately $300 thousand/year for the EAOC is achieved in the optimized case when compared to a base case derived from published results.

Eng Poster 10:

Ankle muscle activity in response to perturbations to standing scales with perturbation velocity

Zoe M. Moore and Jessica L. Allen
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Maintaining balance in response to perturbations is important for daily life. The purpose of this study was to replicate a prior study showing muscle recruitment to maintain balance is influenced by perturbation velocity and acceleration (Welch et al., 2009). Electromyography (EMG) from the lateral gastrocnemius was collected from three participants (2 female, 27±9 years). Participants stood on a treadmill, which moved 12cm forwards and backwards at different velocities (20, 25, 30 cm/s) and accelerations (0.1, 0.2, 0.3, 0.4, and 0.5 g) in random order. Only backwards perturbations were analyzed. Average EMG was calculated during the initial burst (IB) and plateau region (PR), occurring 0-150ms and 150-300ms after muscle onset, respectively. To determine whether EMG in each region scaled with acceleration or velocity, we performed separate linear regressions of IB and PR activity to acceleration and velocity. Consistent with Welch, PR scaled with velocity ($p<0.05$ for all accelerations). However, inconsistent with Welch our IB did not scale with acceleration ($p>0.5$ across all velocities). Absence of IB scaling may be due to lack of accurate acceleration control.

Engineering Category

Eng Poster 11:

Improving novelty detection by learning representations based on autoencoders

Skyler Roth, Stanislav Pidhorskyi, Ranya Almohsen, Quinn Jones and Gianfranco Doretto
Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

Automation of disease diagnosis often entails processing multidimensional data such as medical images like MRI, CT scans or temporal data such as EEG, ultrasound, and behavioral video of patients. The analysis of the data frequently requires revealing the occurrence of anomalies. This enables detecting abnormal masses in CT scans, or the onset of an epileptic seizure from the EEG, or the transitions of behavioral patterns in video. The abstraction of these problems, referred to as novelty detection, is the process of distinguishing whether an input measurement is an inlier or an outlier. For many applications, especially in the medical domain, the accuracy of current detectors is unsatisfactory. Therefore, here we leverage modern deep learning techniques capable of modelling the complex variability of multidimensional data in unprecedented ways, and we significantly improve the performance of novelty detection. We compare different deep autoencoders on several benchmark datasets to optimize our model and achieve a new state-of-the-art performance. In addition, we build a state-of-the-art classifier in open-set settings, where inliers are further assigned a specific class label.

Eng Poster 12:

Using data science and machine learning algorithms to further well log analysis

Geoffrey MacRae, Mitch Kirman, Dhruv Patel and Ebrahim Fathi
Department of Petroleum and Natural Gas Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

Marcellus shale is a source rock found in West Virginia and is used for unconventional hydrocarbon extraction (fracking). MSEEL works with wells in Morgantown to be used for data analysis that allowed the research to come about. A new development in the petroleum industry is using artificial software to analyze wells and their logs. Typically, wells are analyzed on the vertical. The objective of the research was to incorporate machine learning algorithms and artificial software programs into Python software to restructure given data into workable data sets and create visuals that allow for thorough analysis. This is done by carefully selecting unique features using correlation devices, creating accurate, synthetic numbers for missing data features by applying imputation devices, then testing how accurate they are (80.07%). Organization was accomplished by normalizing the data, thus reducing data redundancy, and various forms of machine learning were incorporated to create synthetic horizontal well logs. So far, the code may not explain why there are false positives within a petroleum system, because the code is not detailed enough yet.

Engineering Category

Eng Poster 13:

Unconventional well log analysis

Mitch S. Kirman, Geoffrey MacRae, Dhruv Patel and Ebrahim Fathi
Department of Petroleum and Natural Gas Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

The Marcellus Shale is the largest source of natural gas in the US and spans across West Virginia. Natural gas production is projected to keep rising over the next few years and there are many benefits to optimizing the extraction process. In this study, Python software and Machine Learning are applied to petroleum well logs previously collected by MSEEL, a local gas well company, to improve data analysis. Imputation methods generate synthetic data to fill in missing points. Normalization of the data sets reduces redundancy to create uniformity and to provide a clear visualization of the data. Machine Learning methods are then used to categorize the information and also create a model of the rock stratigraphy material. The synthetically generated data is accurate to approximately 80.07% and the overall resulting rock stratigraphy models are significantly descriptive for analyzation and identification of the pay zone. Implementation of these methods to model the rock stratigraphy appreciably decreases the bias due to human error, increases the rate of analysis, and produces abundant and accurate synthetic data.

Eng Poster 14:

The end effector to allow for the pollination of blackberry bramble bushes by autonomous mobile robots

Benjamin Buzzo, Yu Gu, Scott Harper, Conner Castle, Nicholas Ohi, Dylan Reynolds and Jared Beard
Department of Mechanical and Aerospace Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

Bumblebees are dying at an alarming rate. Bees are one of the most important pollinators in the world today and with them dying it requires another method to fill this demand. We are developing a mobile robot that will be able to autonomously move around a greenhouse, detect flowers and then pollinate those flowers completely autonomously. One of the biggest hurdles is to design the mechanism that can pollinate those flowers effectively without causing any damage to the plant itself. The solution we came up with to use 3D printed parts made from specifically black PLA and black TPU-95 with cotton inserts to allow for the collection and distribution of pollen. The PLA gives a rigid foundation to attach the flexible TPU-95 to so that when the mechanism is actuated and collecting pollen from plants it has some flexibility that allows for it to not damage the plant during the pollination process. There has been some testing done and this mechanism has been proven to be able to grab pollen and transfer it between plants.

Engineering Category

Eng Poster 15:

Design storms under a changing climate in West Virginia

Makenzie Priest and Leslie Hopkinson
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Design of flood control infrastructure in the state of West Virginia is based, in part, on the 100-year, 24-hr design storm. Such a storm is one that produces an amount of rainfall in a 24-hour period that is only expected to occur in a given location once, on average, every 100 years. The goal of this project was to evaluate the 24-hr precipitation under a changing climate in West Virginia. Daily precipitation data were collected from three rain gage stations throughout the State: Lewisburg, Sutton Lake, and Beckley. Using HEC-SSP software, a general frequency analysis was conducted for each station to calculate the 100-yr precipitation depth for various lengths of record (100, 50, 30, 20, 15, and 10 years). It was found that the 100-yr precipitation depth increased by up to three inches when decreasing the period of record to the last 10 years. Additionally, greater precipitation depths were observed in greater frequency when looking at the most recent data. This observation of more frequent high-intensity rainfall should be considered in statewide dam design and rehabilitation.

Eng Poster 16:

Subsurface modeling and well configuration design for deep direct-use geothermal development at WVU

Victoria J. Irr and Nagasree Garapati
Department of Chemical and Biomedical Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506

Renewable energy is becoming increasingly more abundant on college campuses. The Morgantown campus of West Virginia University (WVU), affords an optimal and unique combination of critical factors necessary to develop deep direct-use geothermal. The success of deep-direct use geothermal energy depends on the produced fluid temperature and flow rate. In this work, TOUGH2/EOS1 which is mainly developed for geothermal applications is used to analyze the performance of a subsurface reservoir over 60 years for different well configurations. This simulation data helps to design the optimum well configuration. Since the geothermal gradient for the site location is not confirmed, based on preliminary thermal resource assessment a range of 25-30 °C/km is used, and the reservoir parameters are obtained by performing core analysis and permeability measurements. Results indicate that the longevity of the reservoir decreases as the mass flow rate increases and increases as the well spacing increases. This research and its continuation is vital to making the best decisions with regards to optimizing the configuration.

Engineering Category

Eng Poster 17:

Design, manufacturing, testing and analysis of a highly-constrained single-use UAV wing

Philip Pennock, Levi Hubbard and Patrick Browning
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Unmanned aerial vehicle design aspects are as broad as the missions they are used to support. This project describes recent work performed at WVU to support repeated flight testing on the highly specialized wings required to help meet the overall airframe mass properties constrained by the project sponsor. The wings were fabricated using a molded polyurethane (PU) foam as the base material which was supported by several different types of rigid and flexible substructures, skins, and matrix-infused fiber elements. Expected accelerations were applied to the wing designs analytically and numerically to establish appropriate test limits and explore structural loading aspects, and static and dynamic experimental tests were employed to determine the suitability of the wing designs for the UAV. Likely wing design candidates that survived all experimental tests in the lab were subjected to final experimental tests in outdoor high-G field launches. A final design with a steel-and-braided line-reinforced box-frame carbon fiber substructure, fiberglass-infused PU foam, and fiberglass skin was found to exhibit the best combination of survivability, mass properties, cost, and ease of manufacturing.

Eng Poster 18:

Investigating the spread of pathogens: Dengue and Zika virus

Claire A. McDonald and Antarpreet Jutla
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Dengue and Zika virus are arboviruses transmitted by the same host, *Aedes* mosquitoes and have recently been circulating within the Americas, Africa, and Asia. Dengue virus has been infecting humans for centuries across the globe and causes severe symptoms such as hemorrhagic fever. Zika virus is a relatively young disease linked to Guillian Barre syndrome and sever birth defect microcephaly. Both diseases have had large outbreaks recently, causing the most damage in the Americas. The goal of this study is to analyze the spatial-temporal relationship between Dengue and Zika outbreaks. Global Dengue data when compared to Zika incidence data showed there are no countries that have only Zika virus, indicating that Zika virus is only present in countries that have previously suffered from Dengue outbreaks. Additionally, country-specific data on the two arboviruses showed that an outbreak of Zika virus occurred near a spike in Dengue cases in South American countries. Further investigation is going into how Dengue and Zika virus coincide within Brazil.

Health Sciences Category

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Health Sciences Category

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Health Sciences Category

Health Sci Poster 1:

Synthesis and evaluation of novel brachytherapy beads for potential cancer treatment

Paulo Castro[1], Sridhar Kaulagari[2], Md. Shohel Rana[2] and Mark McLaughlin[2]
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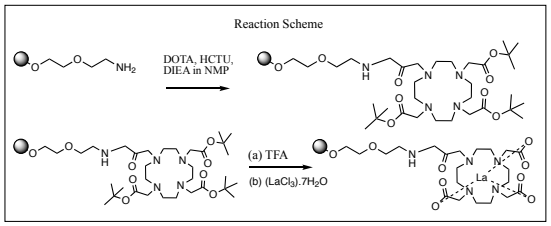
[2]Department of Pharmaceutical Sciences, West Virginia University, Morgantown WV 26506

Brachytherapy bead implantations are typically sealed radioactive sources placed within a cancerous tumor. However, encasing the bead traps the alpha particles allowing only gamma radiation to escape. Gamma radiation can penetrate long distances leading to healthy tissue damage whereas alpha particles travel only a few cell diameters, reducing potential cell damage to surrounding normal tissue. Mark McLaughlin's lab is looking to create brachytherapy beads that are large enough not to diffuse away from their implantation site and that allow alpha particle emission into the tumor where they are implanted. Samples are synthesized by exposing reactive sites on TentaGel macrobeads which are then bound with varying amounts of DOTA chelator followed by coordination with nonradioactive Lanthanum(III) ions. Lanthanum coordination is controlled and limited by the amount of reacted DOTA. Preliminary surface analysis using X-ray Photoelectron Spectroscopy has shown that beads with a high amount of reacted sites allow detection of Lanthanum while further studies will seek detection at much lower limits which are suitable for cancer treatment.



Health Sci Poster 2:

Protocol and formative development of a guided imagery lifestyle app for pregnant women

Neel Rao,[1] Peter Giacobbi, Jr.[1], Treah Haggerty,[1] Stanislav Pidhorskyi,[1] Danielle Symons-Downs,[2] Leann Long,[3] Dana Volker,[1] Melanie Clemmer,[1] Melissa Olfert,[1] Shari Steinmann,[1] Hannah Staggs,[1] Kelsey Kinnamon,[1] Thomas Hulsey,[1] and Donald Adjeroh,[1]
[1]West Virginia University, Morgantown, WV 26506,[2]Penn State University, State College, PA 16801 and
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Pregnancy offers many physical and psychological challenges including nausea, sleep issues, stress, anxiety, and excess weight gain, which, can increase risk of negative health outcomes. Guided imagery has shown promising results in studies that addressed these issues. Guided imagery is a multi-sensory and conscious experience that resembles the perception of some object, scene, or event but occurs in the absence of stimuli. The purpose of this study was to test the acceptability and usage of a guided imagery application for pregnant women (PregPal). Participants listened to one guided imagery audio file each week focused on sleep/relaxation, experiencing the baby, physical activity, diet, and body image. To date, 23 women completed the trial with 22 indicating positive experiences. Study completers used the app an average of 37.04 times during the 35-day study. The sleep/relaxation audio file was most popular with an average of 10 uses while the remaining files were listened to about 6 times each week. Overall, the PregPal app was viewed as engaging and may help women cope with the health challenges of pregnancy.

Health Sciences Category

Health Sci Poster 3:

Self-reported healthy lifestyles and fit body decisions from social media influences on teen girls

Emily N. Clegg[1], Miriam P. Leary[1], Madison E. Santella[1], Pamela J. Murray[2], Julie S. Downs[3] and Melissa D. Olfert[1]

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Previous research shows that exposure to social media leads to more body comparisons and lower self-esteem, specifically in women. The purpose of this research is to qualitatively assess the impact of repeated exposure to "fitspiration" social media (SM) on teenage girls. Nineteen high school (HS) and 8 middle school (MS) girls participated in surveys and focus groups, while 11 adults completed surveys. Thematic analysis of the focus group data was conducted by two trained researchers. MS girls are motivated by SM posts that emphasize healthy lifestyles and fit bodies, but recognize some images are manipulated and unrealistic. HS girls tend to report feelings of discouragement and envy but acknowledge that the content may be motivating. The adults rated discussing healthy behaviors with teens as extremely important, and every adult reported having discussed body image with teens. While both teen groups reported feeling discouraged and envious, MS girls reported more motivation from the SM content while HS girls appeared more aware that images are unrealistic.

Health Sci Poster 4:

The effect of manner of articulation on speech kinematics

Jacob Cahn and Kimberly Meigh

Department of Communication Sciences and Disorders, West Virginia University, Morgantown, WV 26506

The Speech Motor Control Lab at West Virginia University is conducting a study to research the idea in the field of Speech Language Pathology that some phonemes are easier to acquire and learn than others, and more specifically, ask if stop productions are less complex (i.e, easier to produce) than fricative productions. The hypothesis is that phonemes that are produced with the stop manner of articulation, which are phonemes produced with complete obstruction of airflow in the vocal tract (/t,d/, etc.), are learned more quickly (i.e. easier to produce) than phonemes that are produced with the fricative manner of articulation, which are phonemes produced with heightened obstruction of airflow, but not complete obstruction (/s, f/, etc.). In this study, learning constitutes a decrease in movement duration and variability, which are the dependent variables. Our data collection methods deal with a non-word repetition task in a motor learning paradigm, where we asked human subjects to repeat each non-word up to 36 times. We use an electromagnetic articulography in order to collect kinematic data on the tongue.

Health Sciences Category

Health Sci Poster 5:

The epigenetic role of septic microparticles in Alzheimer's disease

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Sepsis is an incapacitating systemic inflammatory disease that is associated with infection etiology. Survival sepsis patients develop neuropsychiatric symptoms of memory loss, mood disorders, delirium, and long term cognitive impairment that would exacerbates brain dysfunction with unclear explained mechanism. Sepsis patients shed into the blood high numbers of microparticles retaining epigenetic regulators (miRNA, DNMTs and HDACs) from different cell-types to be up-taken by recipient cells. MPs are membrane-enclosed vesicles that a variety of cells shed into the body. Septic-MPs play an important role in cell signaling, vascular function, and inflammation. We found increase DNMTs gene expressions in multiple organs, including the brain, increase of sickness behavior, memory loss, and cognition after 7 days of sepsis initiation in Alzheimer's disease-(AD) animal model. In this project, we are studying the epigenetic role of Septic-MPs from sepsis animal model-(CLP) in AD progression *in-vivo*. We hypothesized that transferring CLP-MPs from septic mice to AD mice would accelerate the progression of AD. We aim to provide better understanding of septic-MPs' role in the progression of cognitive diseases.

Health Sci Poster 6:

Regulation of AIMP2 and AIMP2-DX2 expression by human papillomavirus in cervical cancer cells

Alyson Stevens[1], Terezia Galikova[2], Jamie Barr[3], Tayvia Brownmiller[3] and Ivan Martinez[3]

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Cervical cancer contributes significantly to cancer-related death in women and is linked to infection of high-risk human papillomaviruses (HPVs). Though HPV vaccines can potentially reduce cervical cancer cases in the sexually naïve population, those already exposed to HPV need new molecular markers and targeted therapies. This study builds upon a previous comparison between changes in cervical cancer cell line gene expression and The Cancer Genome Atlas (TCGA) patient survival data suggesting high expression of the gene Aminoacyl tRNA Synthetase Complex Interacting Multifunctional Protein 2 (AIMP2) correlates with reduced survival and disease progression. AIMP2 exists as both AIMP2 Full length (tumor suppressor) and splicing variant AIMP2-DX2 (oncogenic). This study tested RNA and protein expression of both AIMP2 forms and potential AIMP2 regulation by HPV in normal, pre-malignant, and cancerous cervical cells by qRT-PCR and Western Blot. Results suggest increased expression of both AIMP2 forms in pre-malignant, cancerous, and HPV infected cervical cells when compared to normal cervical cells and potential regulation of AIMP2 expression by the HPV gene E6 through interactions with host tumor suppressor p53.

Health Sciences Category

Health Sci Poster 7:

Myeloid-derived suppressor cells effector gene expression in murine model of neonatal sepsis

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Human neonates are more susceptible to infectious disease due to immaturity of the developing immune system. Our laboratory has shown that the immunosuppressive cytokine, interleukin (IL)-27, is elevated in neonatal humans and mice. Myeloid-derived suppressor cells (MDSCs), which suppress T-cell functions, are more abundant in neonates. We have shown that MDSCs produce IL-27 and are a source of elevated IL-27 levels in neonates. MDSCs utilize nitric-oxide synthase (NOS2), arginase-1 (ARG1), the NADH-oxidase-complex, and IL-27 to elicit suppressive activity. To test the hypothesis that MDSCs gain enhanced immunosuppressive function during neonatal sepsis, MDSCs were isolated from neonatal mice infected with *Escherichia coli*. Infections modeled sepsis similar to humans, demonstrating reduced weight gain in infected animals compared to controls, with high levels of bacteria in blood and peripheral tissues. Gene expression analysis revealed that NOS2, ARG1, and IL-27 expression were increased in MDSCs from infected mice. Ongoing experiments are evaluating changes during *in vitro* infection, specific enzymatic activity, and the requirements for IL-27 signaling.

Health Sci Poster 8:

Quantitative and noninvasive measurement of retinal pigment epithelium mitochondrial metabolism using mass spectrometry

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Retinal pigment epithelium (RPE) transports nutrients and metabolites between the choroid and the retina through an active mitochondrial metabolism. Dysfunctions of this RPE metabolism have been linked to the pathogenesis of age-related macular degeneration, a leading cause of irreversible blindness in older population worldwide. This study aimed to develop a noninvasive, quantitative method to measure RPE mitochondrial metabolism. Primary cultured human fetal RPE cells were labeled with $U^{13}C$ glucose and incubated with 3 different inhibitors that block the mitochondrial electron transport chain. Sample media were harvested and analyzed via gas chromatography mass spectrometry at 1-hour, 3-hour, 6-hour, and 24-hour timepoints. Among the 34 metabolites detected, 22 metabolites, including amino acids and the intermediates of glycolysis and TCA cycle, exhibited a significant difference upon inhibition of mitochondrial function. Alpha-ketoglutarate, aspartate, citrate, glutamate, glutamine, pyruvate and serine decreased but lactate increased consistently among the 3 inhibitors. In future studies, these metabolites can be used as markers to quantify mitochondrial metabolism in cell culture and potentially in live patients for diagnosis and monitoring of disease progression.

Health Sciences Category

Health Sci Poster 9:

Assessment of suitability of N- methyl DCPA in the treatment of collagen- induced arthritis

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Arthritis is an autoimmune disease comprising joint inflammation and bone erosion. Because current arthritis treatments are immunosuppressive, additional options are necessary. Promising results indicate that haloanilide compound N-(3,4-dichlorophenyl)-N-methylpropanamide (N-MeDCPA) controls bone erosion caused by excess osteoclast activity in collagen induced arthritis (CIA) in mice. N-MeDCPA inhibits Orai1 calcium (Ca2+) channels, which are essential to the formation of osteoclasts. Though N-MeDCPA treatment of CIA mice reverses bone erosion, its toxicity has not been extensively studied. To investigate adverse effects associated with N-MeDCPA, we obtained serum from peripheral blood to assess anti-collagen II antibody production in N-MeDCPA-treated CIA mice. Since T cells rely on Ca2+ for activation, we also evaluated T cell activation in the splenocytes of mice. Furthermore, we performed complete blood counts and examined weight and pathology of the liver, kidney, and spleen for abnormalities compared to control mice. We found that N-MeDCPA treatment in CIA mice results in trends of decreased platelet counts and increased spleen weight. Additional studies to determine mechanisms underlying these adverse effects will allow for optimization of this novel therapeutic.

Health Sci Poster 10:

Intestinal short-chain fatty acid concentrations: the influence of XX vs XY sex chromosomes

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Recent investigations have demonstrated that biological sex differences are multi-faceted and cannot solely be attributed to sex hormone disparities between males and females. We previously demonstrated that sex chromosome complements influence both immune responsiveness and gut microbiome composition. Short-chain fatty acids (SCFAs), the metabolic end-products of bacterial dietary fiber fermentation, are currently being extensively investigated for their immunomodulatory activity. We hypothesize that SCFA concentrations vary between males and females in a sex chromosome complement-dependent manner, based upon the host's gut microbiome composition. Such differences would be expected to differentially influence immune responsiveness in males vs. females. Relative concentrations of SCFAs in the fecal pellets of Four-core genotype mice were evaluated using High-Performance Liquid Chromatography. Possession of an XX vs. XY sex chromosome complement did not influence SCFA concentrations. However, elevated concentrations were noted in females, with XY females having significantly higher levels than XY males. Sex hormones may be a contributing factor. By understanding the mechanisms contributing to sexually dimorphic immune responses, sex-tailored medical interventions can be developed to combat diseases with inherent sex-biases.

Health Sciences Category

Health Sci Poster 11:

HNSCC invasive potential in cortactin-null cells

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Head and neck squamous cell carcinoma (HNSCC) is a neoplasm of the oral cavity associated with extensive regional invasion and lymph node metastasis. Cortactin (CTTN) is a cytoskeletal actin regulator frequently overexpressed in HNSCC. Proper regulation of the actin cytoskeleton is crucial for the production of invadopodia and subsequent digestion of the extracellular matrix during tumor invasion. While previous work has implicated cortactin as a key component of this process, we have shown that genomic disruption of CTTN in HNSCC cell lines using CRISPR/Cas9 does not disrupt invadopodia formation. The fact that cells are capable of invasion through a cortactin-independent mechanism leads us to **hypothesize that a compensatory mechanism is present to maintain HNSCC invasiveness in the absence of cortactin**. In an effort to identify possible compensatory molecules, RNA-sequencing (RNAseq) was conducted of transcripts across CTTN deficient lines. Of note, transcripts for actin regulatory protein radixin (RDX) were upregulated. Determining if radixin serves a compensatory role for invasion in CTTN-null cells is critical for understanding HNSCC invasion and potentially developing improved anti-invasive treatment.

Health Sci Poster 12:

Measuring mitochondrial respiration in mouse retinal tissue

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Mitochondria metabolism is crucial for retina health and function. Dysfunction of mitochondrial metabolism contributes to pathogenesis of retinal degenerative diseases, such as diabetic retinopathy, and age-related macular degeneration. The purpose of this study is to optimize the methodology of measuring mitochondrial respiration from isolated mitochondria of mouse retinal tissue. Mitochondria were isolated from mouse retinas and mitochondrial respiration was measured using *Oxytherm* polarography. To determine the number of retinas required for consistent measurements, we experimented with samples containing two eyes vs four eyes. We found two retinas provided consistent oxygen consumption rates. Oxygen consumption was also tested across different substrates (pyruvate/malate, glutamate/malate, succinate, $CaCl_2$, ADP). Among the substrates, pyruvate/malate and ADP gave reliably high rates of oxygen consumption. Additionally, mitochondrial oxygen consumption was tested for retinas with mitochondrial defects. These mice showed lower oxygen consumption rates than their wild type counterparts (38% and 39.5% decreases in pyruvate/malate). In conclusion, we have developed a sensitive method to quantitatively and consistently measure mitochondrial function of mouse retinas.

Health Sciences Category

Health Sci Poster 13:

Grounded theory uncovers occupational potential in patients with cancer in palliative care

Rondalyn Whitney[1], Lynsey Soule[2], Renee Nicholson[3] and Elliot Theekee[1]
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This study conducted a secondary analysis of eight patient narrative of patients with cancer receiving palliative care. Previously, Quality of Life was the outcome of interest and themes of hobbies, family, and vocational pursuits were identified as important to patients. The same narratives were re-coded and re-analyzed to thematically portray patient values by viewing people having occupational potential during end of life. Advanced coding schemes were informed by the *Occupational Therapy Practice Framework: Domain and Process 3rd Edition*. The findings of this study suggest a) health narratives are richly textured portraits that reveal both patient values and barriers to quality of life during end of life care b) patient values can be thematically identified and understood through use of occupational domains and once recognized, c) these portraits can inform intervention that result in improve quality of life. The methodology developed for this study provides a tool for medical researchers and palliative care physicians who aspire to optimize occupational potential and foster adaptive coping throughout and up to the end of life.

Health Sci Poster 14:

Changing transportation in Monongalia county

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There are many factors that contribute to an individual's health. These range from fundamental influences like the physical environment, to proximate factors such as stressors and behaviors. One of these distal factors is transportation. Transportation affects an individual's ability to access food, healthcare, employment, etc., and therefore impacts their health. Individuals who do not have access to private transportation are therefore more sensitive to faults in infrastructure and transportation systems, and these faults contribute to health issues. In order to investigate this, we are launching a pilot program in which forty low wealth individuals from throughout Monongalia County will participate in four workshops. Participants will be informed about the functions and processes of the Morgantown/Monongalia Metropolitan Planning Organization (MMMPO), as well as educated about policy, leadership, and how to participate in civic processes. Through the four workshops we will also collect data regarding where the participants live, what issues with transportation they have experiences, and what impact those issues have had on their lives. We expect that these workshops will give us a clearer understanding of how transportation impacts the wellbeing of low wealth individuals in Monongalia County, as well as empower those individuals to improve these systems so profoundly affect them.

Health Sciences Category

Health Sci Poster 15:

Redeveloping the pertussis toxin neutralization assay to identify protective antibodies

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Bordetella pertussis causes the disease whooping cough or pertussis. The protection induced by DTaP and tdap immunization only lasts a few years and we are focused on developing new vaccine formulations that will be long-term protective. *B. pertussis* uses its pertussis toxin to impair the innate and adaptive immune responses. Pertussis vaccines must induce production of antibodies that are capable of neutralizing the toxin. To determine the toxin neutralizing capacity of antibodies produced due to vaccination, we revisited the Chinese Hamster Ovary (CHO) cell toxin neutralization assay, which was historically used for this analysis. CHO cells clump when impaired by pertussis toxin and our goal was to refine this assay. We used high-density imaging to capture a non-biased representative set of images of pertussis toxin impaired CHO cells. Serum from immunized mice was able to block CHO cell clumping demonstrating proof of principle. In the near future, we will investigate gene expression of pertussis toxin impaired CHO cells to identify biomarkers to enhance the sensitivity of the assay.

Health Sci Poster 16:

Identification of a sulfonamide analog that reduces cell viability in acute lymphoblastic leukemia

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Survival of leukemic cells within the bone marrow (BM) microenvironment has been determined as a contributing factor for disease relapse in acute lymphoblastic leukemia (ALL). Identification of novel therapies that target the leukemic niches and sensitizes the resistant leukemic cells to chemotherapy resulting in its eradication remains an ongoing pursuit. Towards this goal, we utilized a library of 41 compounds that are member of a sulfonaminde chemical family in a cell viability screening assay. Our initial primary screen in REH and TOM1 ALL cells identified the sulfonamide analog, N-{4-[2-(3,4-dimethoxyphenyl)-2-oxoethyl]-2-[2-(2,5-dimethylphenyl)ethyl]phenyl}-N-methylmethanesulfonamide (B4) as a potential candidate. A secondary screen involving a concentration-dependent viability curve performed in 6 ALL cell lines validated the anti-leukemic activity of B4. Specifically, we found that B4 reduced cell viability in all the tested leukemic cells with RS4 cell line being the most sensitive with an IC_{50} of 238 nM and JM1 cell line being the most resistant with an IC_{50} of 667 nM. Taken together, our preliminary screening studies have identified B4 as a potential candidate for targeting and sensitizing leukemic cells.

Health Sciences Category

Health Sci Poster 17:

Discovery of a circular RNA from AIMP2 splicing in cervical cancer cells

Terezia Galikov [1], Alyson Stevens[2], Jamie Barr[3], Tayvia Brownmiller[3] and Ivan Martinez[3]
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Cervical cancer is a devastating disease that affects many Americans, with particularly high incidence in West Virginia. Pathogenesis is closely linked to human papillomavirus (HPV), with 99% of lesions containing the virus. Poor clinical outcomes of cervical cancer are associated with higher gene expression of AIMP2 (aminoacyl tRNA synthase complex-interacting multifunctional protein 2), a gene that codes for a protein first found to be necessary for the assembly of the aminoacyl tRNA synthase complex. Recently, AIMP2 has been found to act as a tumor suppressor through its effects on p53, preventing cancerous overgrowth by inducing apoptosis. AIMP2 DX2 is an oncogenic isoform of AIMP2 that lacks exon 2. This project focused on the expression of these splicing variants in cervical cancer cell lines and the identification of a circular RNA produced from the exon spliced out of AIMP2 DX2. Levels of AIMP2 and AIMP2 DX2 were higher in cervical cancer cell lines than in noncancerous cells and a circular RNA was found to be formed from exon 2 and part of intron 2.

Human Engagement Category

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Human Engagement Category

Human Engag Poster 1:

Resilience of enslaved Africans in the US

Kayla R. Tokar and Travis D. Stimeling
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Slaves that lived during the Colonial Era are often considered "resilient" because of their ability to adapt to the strict slave codes that governed them while still finding means for self-expression. This ability can be demonstrated through the progression of African American music. Though many colonies began prohibiting slaves from playing drums in 1740, slaves continued to produce percussive music through other methods. Scholars have researched the musical effects of these drum bans, celebrating the strength and creativity of the slaves who continued making music under controlling legislature. This narrative neglects to discuss the many slaves who were violently punished and killed for refusing to follow laws that forced them to live as property rather than as people. Our research focuses on the different ways these laws affected slaves and on why slaveholders found it so important to take culture away from slaves. The origins of white supremacy in America become evident when we shift our attention to the motives and actions of white colonists rather than the resistance and resilience of African Americans.

Human Engag Poster 2:

Latin America and the transition from authoritarianism to democracy

Sydney A. Beafore and James F. Siekmeier
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U.S. involvement in Latin American has largely been hidden, especially given the US economic aid to Europe and the growing powers of Asia threatening US global hegemonic power. This study is a collection of journal articles that highlight key events in the relations between the US and its neighbors to the south. By using the databases available to me as a WVU student I was able to put together a collection of articles that captures the scope of US involvement. What we found was that personal belief, fear of colonization, and domestic political battles forced the US to use its economic power in Latin America. This contradicts the US policy in Asia where the US became directly involved militarily in Korea and Vietnam. The struggle to escape the grasp of their authoritarian governments lead to large scale human rights issues that plagued Latin America for decades.

Human Engagement Category

Human Engag Poster 3:

An exploration of the cooperating teachers and their student interns in West Virginia

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West Virginia University has produced numerous secondary agricultural educators over the past 10 years. Unfortunately, there are still many agricultural education positions left unfilled across the country. The relationships developed between the student teacher and the cooperating teachers throughout the internship effect the number of student teachers entering the teaching field (Edgar, 2011). Most student teachers struggle with having a strong work ethic, lack of knowledge, and taking responsibility of the classroom. Based on public data, interviews will be conducted with Agriculture teachers who have served as cooperating teachers for many current WV Agriculture Teachers. This study expects to receive an insight to important techniques and perspectives of managing an agricultural program and teaching others about their program, in hopes that they will continue teaching. Focus groups will be conducted with their previous student teachers on their experiences during their student teaching internship. This study will assist to better prepare students entering a student teaching internship, cooperating teacher's methods of mentoring throughout the internships, and then the work force.

Human Engag Poster 4:

A case study of Alex: a student's development of a definition

Abby L. Sine, Brittany L. Vincent and Vicki L. Sealey
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Mathematics education research aims to figure out how students understand topics and to look for common misconceptions that should be addressed in classrooms. Definitions are a vital part of mathematics, but it is often difficult to determine students' individual understanding of these definitions and how they are indirectly developing this concept in different mathematical topics. This project was part of a pilot study on how students understanding of tangent lines changes throughout their first college calculus course. Students participated in four interviews throughout the semester. Each time they were given the same graphs to sketch and discuss tangent lines. Preliminary data analysis is being conducted using Vinner's theory of concept images and definitions. One student, Alex (pseudonym), stood out for his unique understanding of tangent lines and his changing definition throughout the interview. Data analysis is ongoing, but preliminary results indicate that different theories can explain different developments of Alex's definition and some developments have no explanation in current literature.

Human Engagement Category

Human Engag Poster 5:

Media coverage of firms' CSR actions: the role of signal framing

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Corporate social responsibility (CSR) describes firm "actions that appear to further some social good, beyond the interests of the firm and that required by law". While extant research has found that a firm's overall engagement in CSR is important because it influences both a firm's financial and social well-being, scholars have yet to understand why firms engage in different types of CSR actions and how these distinct CSR actions influence important organizations outcomes, namely media coverage. We address this gap by taking an event-oriented approach that individual CSR actions are unique signals that are characterized by their distinct levels of moral intensity. In doing so, we integrate signaling theory and framing theory to argue that firms can directly influence media coverage by strategically selecting morally intense CSR actions. Additionally, we argue that firms can alter how the media interprets and responds to each CSR action by strategically framing its CSR announcement. We test these propositions by analyzing over 1,500 unique CSR events conducted by the world's largest 25 oil companies between 2011 and 2016.

Human Engag Poster 6:

Correlations between maternal depression, breast feeding self-efficacy, and maternal literacy practices

Kenyane S. Simpson, Amy Root and Lucas Moore
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Maternal depression can have a negative influence on the development of children's mental and emotional growth. This study looked at the correlations between maternal depression, breast-feeding self-efficacy, and literacy practices to determine if maternal depression is a factor to the decrease in breast-feeding practices and maternal engagement with child. Pregnant women and new mothers across West Virginia were recruited and interviews were conducted and included questionnaires about their current living situation, relationships, mental state, confidence in breast-feeding, literacy practices, and the development of their child during and after the pregnancy. The results of the data show that maternal depression has a negative effect on maternal literacy practices and breast-feeding self-efficacy. As the rate of maternal depression went up, the engagement the mother has with their child has decreased.

Human Engagement Category

Human Engag Poster 7:

Life without choice: reproductive healthcare, abortion access, and spatial correlates

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American women used to have better access to reproductive healthcare services, starting with the long controversial 1973 Roe v. Wade decision. As national politics have shifted, there have been resulting closures of clinics that provide abortion services. Sociological studies have shown that women seeking these services tend to be members of lower socioeconomic statues, as well as other minority statuses. I constructed a nationwide county-level database on abortion providers and combined that database with sociodemographic, family and fertility-related county-level factors. I intend to conduct analyses to assess correlations between access to clinics and quality of life. Results will show average county characteristics in communities with and without access to reproductive healthcare. Study results will point to the relationship between access to reproductive healthcare and many social factors. Ultimately, identifying areas where reproductive health access is low should play a role in further understanding the effects of politicization of healthcare on the lives of women via access to care in their young adulthood, improving reproductive healthcare in the long run.

Human Engag Poster 8:

The role of intergroup anxiety and intergroup contact in prejudice

Eva M. MacFarland and Natalie J. Shook
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Despite important strides in the past few decades, racial prejudice continues to be an ongoing problem in the U.S. Two factors that influence prejudice are intergroup anxiety and intergroup contact. Greater intergroup anxiety is related to greater prejudice, whereas greater intergroup contact is associated with lesser prejudice. However, intergroup anxiety is inversely associated with intergroup contact. The present study evaluated the extent to which intergroup contact mediates the relation between intergroup anxiety and prejudice. White college freshmen (N = 239) completed surveys assessing intergroup anxiety, intergroup contact at WVU, and prejudice toward African Americans, Hispanics/Latinos, and Asians at the beginning and end of the fall semester. Greater intergroup anxiety at the beginning of the semester was related to less intergroup contact and less prejudice at the end of the semester. Importantly, there were significant indirect effects of intergroup anxiety on racial prejudice towards African Americans, Hispanics/Latinos, and Asians through intergroup contact. That is, greater intergroup anxiety predicted less intergroup contact at WVU, which in turn was associated with greater prejudice.

Human Engagement Category

Human Engag Poster 9:

Depressed mothers react to positive events differently than non-depressed mothers

Kayley E. Morrow and Amy L. Gentzler
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Depression is becoming increasingly prevalent in today's culture. Unfortunately, depressed mothers have difficulties regulating emotions, which can place children at risk of developing similar emotional problems. Most studies have investigated depression and negative affect but less is known about positive affect (PA). The current study examined mothers' depression (history of a diagnosis and current symptoms) and responses to their own and their child's positive events in terms of PA, savoring (strategies that upregulate PA), dampening (strategies that downregulate PA), and how they socialize these responses in their children. Mother-child dyads (N=96) completed questionnaires and a 5-minute task discussing a positive event the child experienced. Results indicated that mothers who had been diagnosed with depression reported savoring less than non-depressed mothers (p = .003). Mothers 'current depressive symptoms were linked to more dampening ($p < .001$), less PA (p = .003), less socialization of savoring (p = .03), and more ignoring responses to children's PA words during the discussion (p = .02). These findings suggest that prevention and intervention programs target PA regulation and emotion socialization.

Nanoscience Category

Nano Index:

Nanoscience Category

Nano Poster 1:

Characterization and exposure assessment of silver nanoparticles in sanitizer spray product

Sarah O'Boyle[1,2], Alycia Knepp[2], Lauren Bowers[2] and Aleksandr B. Stefaniak[2]
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Many consumer products advertise colloidal silver as a natural sanitizing ingredient. Previous studies have shown that when inhaled, silver nanoparticles (AgNP) can deposit throughout the respiratory system as well as on blood brain barrier where they can cross and accumulate in the brain. One silver sanitizer spray, chosen from over 20 products previously characterized, was the subject of this study. Scanning electron microscopy coupled with energy dispersive x-ray spectroscopy showed round AgNP with an average size of 36.8 ± 14.8 nm. Single particle inductively coupled plasma mass spectroscopy determined the product contained 6 ppm of particulate metallic silver. Preliminary spray tests show that spraying the product released liquid droplets with an average aerodynamic diameter of 0.95 μm (GSD = 1.77). Lung deposition simulations show that 69% of these droplets will deposit in the head airways. Previous studies report about 25% of those droplets will deposit in the nose and about 16% of AgNPs will translocate to the olfactory bulb in the brain.

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Nano Poster 2:

Combining graphene with plasmonic surfaces for use in fluorescence spectroscopy – optimization of lattice parameters

Andrew N. Charway[1], Casey A. Norville[2], Kyle Z. Smith[2], Catherine G. O'Hearn[2] and Jeremy M. Dawson[2]
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Recent growth in the biosensor market can be attributed to an increase in fluorescence spectroscopy research geared toward highly sensitive and cost-effective sub-micron optical biosensors capable of reducing the limit of detection (LOD). The goal of this work is to explore graphene as a passive substrate for improved labeled fluorescence enhancement biosensors. Finite Difference Time Domain (FDTD) software was utilized in this work in conjunction with the development of an optimized device fabrication process. Parametric simulations were performed using FDTD to extract the critical lattice dimensions of gold triangular nanopillars on both multilayered graphene and silicon substrates resulting in peak surface electric (*E*) field enhancement. These surface *E*-field enhancements ranged from 307.91 V/m to 28,295.90 V/m for gold-patterned graphene while the *E*-field amplitude for gold-patterned silicon ranged from 35.12 V/m to 140.28 V/m. Based on preliminary simulation results, the surface plasmon resonance (SPR) of gold nanoparticles (NPs) patterned atop multilayered graphene exhibited higher *E*-field enhancement than those patterned atop silicon.

Nanoscience Category

Nano Poster 3:

Reducing PLGA nanoparticle and MnO core size to enhance MRI breast cancer detection

Jasmine Grossman, Celia Martinez De La Torre, Huy Pham, Cathy Li, Macy Carder, Hunter Snoderly and Margaret Bennewitz
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Magnetic resonance imaging (MRI) can detect more breast cancer than mammography, but produces a very high false positive rate of up to 25% due to the gadolinium contrast agent, which nonspecifically highlights all vascularized tissue in the body. Poly(lactic-co-glycolic acid) (PLGA) nanoparticles containing manganese oxide (MnO) cores have been previously introduced as innovative pH-sensitive contrast agents, and can be activated in the acidic tumor environment to provide selective MRI contrast at the cancer site through Mn^{2+} generation. In this study, PLGA nanoparticles and MnO cores were fabricated with altered reactant constituents to minimize their diameter. Higher percentages of polymer stabilizer reduced PLGA nanoparticle size to 146±71.8 nm, and the combination of different reactant components and experimental conditions reduced MnO core size to 33.9±14.0 nm. Smaller MnO cores will exhibit enhanced packing volume, and the increased surface area will generate more Mn^{2+} in cancerous environments to strengthen MRI signal intensity. Smaller PLGA nanoparticles will release Mn^{2+} contrast faster and enter tumors more efficiently, resulting in improved diagnostic accuracy and earlier detection of breast cancer.

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Nano Poster 4:

Improving calcium cobaltite's thermoelectric performance using praseodymium doping and addition of gold nanoparticles

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Calcium cobaltite, $Ca_3Co_4O_9$ (CCO), possesses the potential to be used in thermoelectric devices. However, for practical applications, the pristine CCO has a low thermoelectric energy conversion efficiency that is characterized using dimensionless figure of merit. State of the art thermoelectric materials are expected to possess figures of merit greater than 1 for their application in the devices, but the pristine CCO has a figure of merit of ~0.2. The present work is aimed to improve the energy conversion efficiency of CCO ceramics using Pr substitution of Ca in the CCO lattice. The precursors for CCO ceramics were synthesized using the sol-gel method. The samples were prepared with the designed nominal composition of $Ca_{3-x}Co_4O_9Pr_x$ (x = 0, 0.05, 0.10, 0.15, 0.2, and 0.3). The praseodymium dopant was found to increase the electric power factor of the CCO. To further decrease the thermal conductivity of the CCO ceramics, and therefore increase their figure of merit, gold nanoparticles were added to the pristine and the Pr-doped CCO. The impacts of Pr-doping and the addition of nano-inclusions were discussed.

Nanoscience Category

Nano Poster 5:

Evaluation of cellular behavior when exposed to metallic organic frameworks

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Metallic organic frameworks (MOFs) are a type of nanoparticle made up of metal ions and linked with an organic ligand. MOFs have many beneficial features such as a high surface area, mobility, and porosity, as well as, thermal and chemical stability. Their physical-chemical characteristics make them suitable candidates for various industrial and medical sectors. However, their implementation could lead to toxic effects and understanding them can help determine if they are safe to use for their intended applications. Model lung cells were used to examine the toxicity of the lab-synthesized MOFs, by conducting a variety of *in vitro* single time point and high-throughput real time cellular assays (e.g. cellular viability, metabolic activity, and cellular behavior assays). Our results show there is a dose dependent toxic effect caused by the MOFs with cells exhibiting changes in activity, behavior, and viability. Understanding the MOFs' mechanism of toxicity will aid in the future work in minimizing their deleterious effects and potentially lead to safe-by-design strategies for such material development.

Nano Poster 6:

Development of a plasmon-enhanced near-infrared fluorescent nanoprobe for detection of disease biomarkers

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Biosensors are tools used to provide faster diagnosis in medical and environmental testing. Greater device performance is possible through the use of nanostructures due to their impressive optical properties. Specifically, noble metal nanoparticles exhibit an interesting property known as localized surface plasmon resonance (LSPR). In LSPR, a uniform plasmon occurs at the surface of the particle upon excitation causing a highly intense electromagnetic field. This property can be used for sensing applications. When a plasmon and fluorophore are within an optimal distance, the quantum yield of the fluorophore is increased by a phenomenon known as plasmon-enhanced fluorescence (PEF). In this study, a gold nanostar—silica spacer—fluorescence probe has been fabricated using chemical techniques. A near-infrared dye has been selected to operate in the biological transparency window and therefore eliminate washing steps necessary to other biosensors such as the ELISA Kit. UV-vis, SEM, and fluorescence spectroscopy has been used to characterize the probe. The resulting nanostructure will be deployed onto a low cost, paper-based biosensor to improve its performance and lower its limit of detection.

Nanoscience Category

Nano Poster 7:

Effect of additives on capillary nanogel electrophoresis

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Slab gel electrophoresis is a standard technology for size-based separations of biomolecules. Capillary gel electrophoresis is a more powerful tool for biopolymer sieving because the use of a small inner diameter capillary enables the application of higher electric fields with lower current. This reduces band broadening caused by convective motion from heating. Although capillary electrophoresis is an improvement over slab gels, two major drawbacks are the difficulty in introducing highly viscous polymer gels into the capillary and that electrically generated fluid flow is created by the negative surface charge of the silica capillary. These problems are overcome by using nanogels with thermally responsive viscosity. Viscosity can be altered to easily load and expel nanogels from the capillary. Once the nanogel is in the capillary, increasing temperature creates a gel that has an apparent viscosity three orders of magnitude larger. These nanogels serve as sieving agents and suppress the electroosmotic flow. Nanogels are compatible with a wide range of pH, background electrolytes, and amphiphilic molecules. The effects of these additives on separation performance will be demonstrated.

Nano Poster 8:

High-quality growth and characterization of thin-film iron silicate

Sebastian Hodge[1], Navid Mottaghi[2], Shalini Kumari[2], Chih-Yeh Huang[2], Robbyn Trappen[2] and Micky Holcomb[2]
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Fe_2SiO_4 (called iron silicate or fayalite) is one of the most abundant materials on Earth. Perhaps due to its abundance, little effort has been put into growing it in a high-quality manner similar to procedures for making high-purity semiconductors. As with semiconductors, the properties of materials in general can be dramatically affected by their purity and growth quality (which is taken advantage of in transistors and other technologies). Should Fe_2SiO_4 or similar systems exhibit valuable material properties, their abundance would allow them to be cheap to produce, thus any useful applications that arise from research into the properties of Fe_2SiO_4 thin-films should be easily economically pursuable. In this investigation Fe_2SiO_4 thin-films were grown using pulsed laser deposition at various temperatures. The surface morphologies and crystalline phase contents of the grown samples were characterized using atomic force microscopy and X-Ray diffractometry respectively. The long-term goal of this project is to optimize the growth parameters with a focus on achieving Fe_2SiO_4 thin-films with minimal presence of secondary crystalline phases and with low surface roughness. Once optimal growth conditions for Fe_2SiO_4 have been identified, the magnetic and optical properties of the optimized Fe_2SiO_4 thin-films will then be studied. In this way the elucidation of a variety of potential applications of this material may be made possible once the foundation for the material growth process has been established.

Nanoscience Category

Nano Poster 9:

Spectroscopic characterization of delafossite alloy $CuAl_{1-x}Fe_xO_2$

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Complex oxides are multifunctional materials that are finding a wide range of photonic and electronic applications. The delafossite oxide system ($A^{1+}B^{3+}O^{2-}{}_2$) has a wide range of possible alloy combinations that may have properties leading to novel applications. By using two site-B elements, quaternary alloys ($AB^1B^2O_2$) result. Not only does this increase the number of possible material combinations, but it can introduce strain into the crystal, breaking the symmetry and altering its optical properties. In this study, we explore the quaternary alloy $CuAl_{1-x}Fe_xO_2$, with x= 0.0 to 0.1. Powder samples are synthesized by solid-state reactions of mixtures of Fe_2O_3, Cu_2O, and Al_2O_3, in a furnace at ~1,100ºC. Earlier, we determined x using x-ray diffraction (XRD) and magnetic measurements. Here we confirmed the presence of iron in these alloys using x-ray photoelectron spectroscopy (XPS) and energy-dispersive (x-ray) spectroscopy (EDS). Finally, we will show results from UV-Vis measurements that allow us to determine band-gap properties via Tauc plots, and from THz measurements that measure the photoconductivity of these powder samples.

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Nano Poster 10:

Characterizing environmental noise in a semiconductor quantum dot using second order correlation

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The optical properties of semiconductor quantum dots (QDs) make them promising candidates for future use in quantum computing. However, the behavior of the QD is determined by its intrinsic properties, such as defects in the sample that can act as charge traps. When populated, these charge traps cause small fluctuations in the electric and magnetic field environments. Spectral diffusion, variation in fluorescence over time, occurs as a result of these field fluctuations and can be observed by recording decays in photon emissions. We use a Hanbury Brown-Twiss interferometer to record the arrival times of photons emitted from a resonantly excited QD, from which we construct the second-order correlation, $g^{(2)}(\tau)$.The $g^{(2)}(\tau)$ data show two exponential decays in intensity over time, which we can conclude to be caused by spectral diffusion from the environment. We continue to model the observed spectral diffusion using the random telegraph noise theory.

Nanoscience Category

Nano Poster 11:

Contribution of nanomaterial chemical nature and surface properties in inhalation toxicity

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Engineered nanomaterials have significant industrial and consumer product applications but their impacts on biological systems are poorly understood. We aimed at understanding the relative contribution of chemical nature and surface chemical composition on the inhalation toxicity of the two most important environmental and occupational exposure relevant nanoparticles (NP) i.e., Carbon Black (CB) and Titanium Dioxide (TiO_2) NP. We studied commercial CB (Printex 90®) and TiO_2 P25 NPs (either pristine (P) or extracted (Ex)). Human Bronchial epithelial cells (BEAS-2B and small airway epithelial cells were exposed to 0-20 $\mu g/cm^2$ of NPs for 24hours. Gene and protein expression were analyzed PCR and ELISA. Lactate dehydrogenase (LDH) assay was performed to measure cytotoxicity. NPs induce significant increase in antioxidant gene expression and inflammatory protein secretion in a cell type dependent manner. We found CB and TiO_2 induced toxicity in a cell type, NP dose as well as chemical nature dependent manner. In conclusion, NP have significant toxic impact on human lung cells and further studies underway to understand the molecular mechanisms of the observed responses.

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Nano Poster 12:

Computational modeling of ultrathin-film photonic structures

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Ultrathin-film nanostructured materials can be used as an optical filter to observe objects in outer space emitting energy in the form of electromagnetic (EM) radiation. Experimentally making and characterizing nanostructured materials is time consuming and expensive, however, the process can be improved by coupling experimental and computational techniques. The proposed computational method uses the program Comsol Multiphysics to model ultrathin film structures, so the nanostructured morphology can be optimized. The thin-film morphology is altered by introducing holes into the material and when multiple films are properly arranged unwanted radiation can be filtered and signals can be amplified or dampened to optimize detection. By modeling both rays and waves the EM spectrum can be properly simulated to predict radiation behavior interacting with the device and thin film morphology can be optimized to make a multilayered device. The monitoring of waves and rays interacting with ultrathin-film materials was successfully demonstrated. Future work with the program includes monitoring wave interaction with ultrathin-film materials in 3-D and verifying the program by comparing it to experimental results.

Neuroscience Category

Neuro Index:

Neuroscience Category

Neuro Poster 1:

Pathology of the intestine and gut microbiota in Alzheimer's disease

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Though increasingly studied and recognized for its role in health and disease, the microbiota-gut-brain axis and underlying mechanisms of its bidirectional communication and regulation are not fully understood. One such disease of interest is Alzheimer's disease (AD), a chronic neurodegenerative disorder that generates systemic and persistent inflammation throughout the body, including the gut. To assess the effects of AD, age, and sex on the gut microbiome and intestine morphology, the duodenum and jejunum of the small intestine were collected from male and female AD transgenic mice (CVN-AD) mice at 3, 6, 9, and 12 months of age for qualitative and quantitative histological analysis. Concurrent analysis of the gut microbiome (fecal samples) was performed using 16s rRNA sequencing. Expected histological results are predicted to demonstrate alterations in villi length and mucosal thickness, indicating increasing disorder with AD disease progression; preliminary microbiome analysis suggests decreased microbial diversity and increased numbers of Firmicutes in AD transgenic mice over time. Integrating these results with brain histology will yield comprehensive understanding of the microbiota-gut-brain axis in neurodegenerative diseases.

Neuro Poster 2:

Methylphenidate on risk-based decision-making following TBI in rats

Trinity K. Shaver, Christopher O'Hearn, Caitlyn E. Cabral, Binxing I. Zhu, Cory Whirtley, Anastasios D. Lake, Robelle B. Dalida, Kris M. Martens and Cole Vonder Haar
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Traumatic brain injuries are increasingly associated with long-term cognitive deficits such as impairments in decision-making and impulse-control. With little research investigating cognitive dysfunction in models of TBI, this study focuses on psychiatric-like symptoms associated with TBI and potential pharmacological avenues. In two experiments, one-half of the rats were given a bilateral, frontal controlled cortical impact injury. To assess dopaminergic effects on task performance, one-half of rats were administered Methylphenidate (MPH) through Jell-O tablets. In experiment #1, rats were behaviorally assessed on the Rodent Gambling Task (RGT) where rats chose among low-risk options, with a high probability of receiving a small reward, and risky options, with a large reward, but low-probability. MPH-treated rats displayed a significant decrease in choice of the optimal option, but there was no significant difference in impulsivity. To further analyze dopamine's role in potential treatment options, experiment #2 investigated risk preference after TBI and its interaction with MPH treatment on the Risk Preference Task, a variation of the RGT where rats chose among reinforcer-rate-matched options with varied probabilities of receiving a reward.

Neuroscience Category

Neuro Poster 3:

Comparison of LEAP and Phasespace motion capturing systems for upper limb kinematics

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Motion capture technology quantifies movements, or kinematics, to assess motor performance, which can improve current rehabilitation methods. However, they are not widely used due to the technological costs and expertise needed to run these systems. We compared two motion capture systems, Phasespace Impulse system (expensive) and the LEAP system (low-cost). Phasepace is very accurate, but is costly, has a long set up time, and requires a specialized expertise to operate the system. The LEAP however, is a cheaper system that is easily used with a low setup time and greater mobility making it a more clinically-feasible device. To test the accuracy of the devices, motion as well as stationary trials were performed. Data trials requiring subjects to perform a pinching motion as well as stationary arm location was attained. Spatial accuracy of the data, visual dropout, and differences in signal consistency between the two will be analyzed and compared. Low-cost motion capture, such as the LEAP system, could provide a more clinically feasible and quantitative assessment to better diagnose and treat motor impairments.

Neuro Poster 4:

Humoral (B cell) immune system imbalance is associated with development of depressive-like phenotype

Liza Grossman[1,3], Brishti White[1,3], Jessica Povroznik[2,3], Deborah Corbin[2,3], Eleana Cook[1,3], Xeufang Ren[1,3], James Simpkins[2,3] and Elizabeth Engler-Chiurazzi[1,3]
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Major Depressive Disorder (MDD) is a widely prevalent, pervasive mood disorder. Traditionally, monoamine-targeted antidepressants are the preferred treatment for MDD. However, the limited responsivity in some patients has challenged the efficacy of these medications. Demand for more effective MDD interventions has driven investigation of novel therapeutic targets, including the immune system. Indeed, B cell knockout (BKO) mice have a depressive-like phenotype; B cell transfer, but not antidepressant treatment, ameliorated this. Therefore, we hypothesize that B cells may influence mood. We investigated the behavioral and immunological differences of BKO mice given B cells harvested from aged donors. These tend to be more pro-inflammatory, noteworthy considering that MDD is associated with a proinflammatory state. Serum cytokines involved in B cell proliferation/function or altered in depressed patients were assessed. Results suggest that B cell administration to BKO mice did not ameliorate the depressive-like phenotype. Surprisingly, aged wild type control mice were less depressive-like than younger counterparts. In sum, the success of B cell adoptive transfer as an antidepressant intervention may depend on the age of the donor.

Neuroscience Category

Neuro Poster 5:

Crystal structure of the mitochondrial drug target mitoNEET in stroke

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MitoNEET is a 2Fe-2S cluster protein located on the outer surface of mitochondria and may regulate mitochondrial function. Recently it has been shown that mitoNEET is a potential drug target for the treatment of ischemic stroke. A gap in the literature has been the lack of a mitoNEET crystal structure for use in structure-based drug discovery (SBDD). Here we show the first-ever solved structure of mitoNEET with a ligand, furosemide. The crystal structure indicates a hydrogen-bonding network between the HIS87 and LYS55 with the ketone group of furosemide. Additionally, molecular dynamics simulations indicated that the LYS55 might also be flexible enough to interact with the amino group in furosemide. Taken together, this crystal structure is useful for SBDD.

Neuro Poster 6:

MATLAB analysis of electroencephalograms to distinguish unique human vocal features for hearing-aid design

Molly L. Layne[1] and James W. Lewis[2]

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Humans with normal hearing develop an exceptional ability to pick out human voices in a natural acoustic environment. We hypothesized that when hearing an animal vocalization and a corresponding human mimic of that particular animal vocalization, humans would have a greater processing advantage for the human mimic. Thirty-four subjects completed six experiments, three passive and three with a task, each with a random presentation of 81 animal vocalizations and of the corresponding human mimics. Electroencephalogram (EEG) recordings were acquired simultaneously. MATLAB based data analysis of the EEG's were completed on a sound by sound basis and assessed for previously established early evoked response potentials (ERPs) and their peak amplitude correlations with various acoustic signal attributes that might distinguish "human voiceness". We revealed an ERP component (N1b) that showed a significantly greater magnitude in response to human mimics. The results supported our hypothesis and further revealed specific signal attributes that may be useful for guiding the design of neuromimetic algorithms to be used in intelligent hearing aid design and development.

Neuroscience Category

Neuro Poster 7:

Examining dopaminergic neuron differentiation in the hypothalamus of *genomic screen homeobox-1* mutant zebrafish

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Homeobox genes encode transcription factors with crucial roles in neurodevelopment. G*enomic screen homeobox-1* (*gsx1*) is expressed in the hypothalamus, where it could potentially regulate *tyrosine hydroxylase-1* (*th1*), an indicator of dopamine expression, and *Orthopedia a* (*otpa*), which mediates development of dopaminergic neurons and photoreceptors in the hypothalamus. Both *otpa* and *gsx1* mutant zebrafish show reduced hyperactivity during the visual motor response, a phenotype that suggests loss of photoreceptive capabilities in the hypothalamus. In mice, *gsx1* mutants also display reduced prepulse inhibition, a disorder in which dopaminergic neuron dysfunction has been reported. To test whether Gsx1 regulates *th1*, *otpa*, or both, we used *in situ* hybridization in embryonic *gsx1Δ11* mutant zebrafish compared to their wild type and heterozygous siblings. We found a significant decrease in the number of cells expressing *th1* in *gsx1Δ11-/-* at 72 hours post fertilization (hpf), and an intermediate decrease in *gsx1Δ11+/-* compared to *gsx1Δ11+/+*. No significant changes in *th1* expression were found at 30 hpf. Prior preliminary studies found no significant difference in *otpa* expression between *gsx1Δ11-/- and gsx1Δ11+/+*, but additional work is needed to confirm this finding. These results will help us better understand the role of *gsx1* in development of hypothalamic photoreceptors and dopaminergic neurons.

Neuro Poster 8:

Optimal laser-cutting techniques for intracranial depth electrodes

Michael Ream[1], Trenton Bailey[2], Joonhee Lee[2] and Shuo Wang[1]
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Current methods for cutting intracranial depth electrodes during implantation utilize common surgical instruments, such as scissors or scalpels, after the exact measurements of the microwires for each specific patient have been taken; however, because the metal microwire and the polymer encapsulation differ significantly from a material standpoint (*i.e.* the mechanical properties), these protocols cause non-uniform shapes and variation in electrical property. This greatly reduces chance of successful multichannel neural recording, and the resulting loss of efficacy can lead to increased cost for a patient or loss of human quality of life. In this project, by using a sub-nanosecond, high-energy Nd:YAG UV/VIS laser, it is expected that microelectrode can be cut quickly and cleanly in a simple and reproducible manner. The finished devices will be analyzed via a scanning electron microscope and electrical impedance spectroscopy, and the expected results are a controllable cleanly cut, microelectrode that can reliably and accurately monitor neural signals.

Physical Sciences Category

Phys Sci Index:

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Physical Sciences Category

Poster 16: Distance determination of firearm discharge: challenges of color tests and benefits of laser induced breakdown spectroscopy. **Oriana Ovide**, Courtney Vander Pyl, Bayram Yuksel, Korina Menking-Hoggatt and Tatiana Trejos.

Poster 17: Kinetic investigations of the gas phase reaction between the CH radical and cyclopentadiene. **Zachery N. Donnellan**, Kacee L. Caster, Talitha Selby and Fabien Goulay.

Poster 18: Aerobic cobalt-catalyzed oxidative cyclization of *o*-phenylenediamines and isonitriles. **Sarah E. Morgan**, Jiaqi Liu and Jessica M. Hoover.

Physical Sciences Category

Phys Sci Poster 1:

Mechanistic insight of deboronofluorination of boracarboxylated vinyl arenes

Tiffany R. Taylor, Trina M. Perrone and Brian V. Popp
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Fluorine has become increasingly relevant in pharmaceuticals, agrochemicals, and the medical imaging industry due to its unique properties. For example, the introduction of fluorine aids in the bioavailability and lipophilicity of molecules. Additionally, millions of PET scans, using the ^{18}F isotope, are performed every year for imaging in oncology. Our group has recently developed a methodology in which we can achieve selective deboronofluorination of boracarboxylated substrates. Although some substrates exhibit exceptional selectivity and yields, other substrates have shown limitations regarding the site selectivity of fluorination. These observations have inspired our group to study the mechanism of this transformation. Boracarboxylated *trans*- β-methyl styrene is an interesting substrate to monitor the mechanism due to the two chiral centers in this molecule. The diastereomeric ratios of the two conformations before and after fluorination can be compared to help gain insight into the mechanism of this reaction. The loss of selectivity of the fluorination reaction suggest that it is a radical pathway. Recent experimental studies of the mechanism reveal that it will limit its usefulness in the synthesis of drug-like molecules.

Phys Sci Poster 2:

Influence of second coordination sphere boranes on rhodium(I) oxidative addition of aldehydes

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The hydroacylation of alkenes and alkynes represents a synthetically valuable method for the conversion of aldehyde substrates to ketone products. The first step of catalytic hydroacylation involves the C-H activation of aldehydes to generate acyl-rhodium(III)-hydrides. We hypothesized that decarbonylation, a common side reaction occurring from these acyl-rhodium(III)-hydrides intermediates, could be prevented by using complexes bearing pendant Lewis acids. In order to study the C-H activation step with these ligand scaffolds, we utilized chelating aldehydes as substrates. Chelating aldehydes, such as 8-quinolinecarbaldehyde, can undergo oxidative addition to generate stable rhodium(III)-metallacycles that are capable of being isolated. While 8-quinolinecarbaldehyde oxidatively adds to generate the desired rhodium(III)-hydride product, 2-pyridinecarboxaldehyde exhibited rarely observed reactivity resulting in C(sp^3)-H bond cleavage and C-C bond formation in the 9-borabicyclo[3.3.1]nonane Lewis acid ring. In an effort to expand the generality of this reaction and understand the reaction pathway, mechanistic studies using substituted pyridine aldehyde are currently being conducted.

Physical Sciences Category

Phys Sci Poster 3:

Synthesis of indoles through catalytic reduction of epoxides and Bartoli-indole synthesis

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Indoles are an important family of molecules for pharmaceuticals. They are biologically active and useful in drug synthesis. New mechanisms for indole formation can help in this synthesis. The method of forming indoles by reducing epoxides was first used in 1972, but little is known about the mechanism. We successfully ran this reaction with two different starting materials. Although yield is low, results show that this may be developed into a useful synthesis. We plan to continue these experiments with varying reducing agents, pressure conditions, and reaction time. We also attempted a cyclization to test the mechanism of the Bartoli-indole synthesis. We ran the reaction with one or two substituents *ortho* to the nitro group on the starting material, with the expectation that the nitro group would cyclize with a preexisting *ortho* group. In reactions with one *ortho* vinyl group present, the nitro group cyclized away from the preexisting *ortho* substituent. In reactions with two substituents *ortho* to the nitro group, no reaction occurred. Results raise some doubt about the mechanism of the Bartoli-indole synthesis.

Phys Sci Poster 4:

Oxidative metalation of a dimeric azanickelacycle by a silver aryl

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Many biologically relevant compounds possess biaryl (sub)structures, making bond formation between aryl groups a highly important transformation. Recently, oxidative decarboxylative coupling has received attention as a synthetic route to biaryls due to the advantages of using carboxylic acid starting materials and the reactions' associated chemoselectivity. In 2017, the Hoover group reported a nickel-catalyzed oxidative decarboxylative (hetero)arylation reaction. Their proposed mechanism involves a new oxidative metalation step, in which an azanickelacycle undergoes oxidation following the controlled delivery of an aryl group via silver aryl. The mechanistic study discussed here examines the azanickelacycle formed and its interactions with the silver aryl to yield the desired biaryl product. A benzotriazine was used to access the azanickelacycle. Literature shows this step occurring with the loss of elemental dinitrogen. However, experimental results indicate that the extrusion of N_2, oxidative metalation, and subsequent biaryl formation is taking place upon addition of the silver aryl, suggesting silver plays more than just one vital role in the reaction. Future work will explore new routes to synthesize the desired azanickelacycle.

Physical Sciences Category

Phys Sci Poster 5:

Zirconium complexes as photosensitizers for solar energy conversion

Rachel Gantzer, Yu Zhang and Carsten Milsmann
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Photosensitizers are compounds that use the energy of light to effect chemical changes in other molecules. They are used in many applications such as solar cells and photocatalysis. Currently photosensitizers are made using precious heavy metals that are low in abundance such as ruthenium and iridium. Recently, there has been increased interest in designing photosensitizers with more earth-abundant and cheap metals. The purpose of the research presented here is to investigate design principles that enable the use of zirconium and titanium compounds as photosensitizers. Two different potential photosensitizers were synthesized. One using $H_2(^{Ph}PDP^{Ph})$ as a ligand and one using $H_2(^{Me}PDP^{Me})$. The ligands were reacted with $ZrCl_2Ns_2(OEt_2)_2$ in toluene. $(^{Ph}PDP^{Ph})ZrCl_2(OEt_2)$ was recrystallized using pentane giving an 85% yield. $(^{Me}PDP^{Me})ZrCl_2(OEt_2)$ was precipitated using a mixture of benzene and pentane having a 34% yield. In conclusion the compounds were successfully synthesized and analyzed using NMR. The optical properties were investigated using steady-state and time-resolved UV/vis absorption and emission spectroscopy.

Phys Sci Poster 6:

Investigating transmetalation in nickel-catalyzed oxidative decarboxylative coupling reactions

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Oxidative decarboxylative coupling (ODC) reactions have broad applications in synthetic and medicinal chemistry. These coupling reactions are effective at generating C–S, C–C, C–N, and C–X bonds but have been limited to pentafluorobenzoic and *o*-nitrobenzoic acids as starting materials. While copper and palladium catalyzed ODC reactions have been well studied, nickel catalysis has become a growing area of interest. Current work in our group has shown nickel to be an effective catalyst for ODC reactions of unactivated C-H bonds with (hetero)aromatic acid starting materials; however, the arylated product is only formed in the presence of a silver salt oxidant. To better understand the roles of nickel and silver in these ODC reactions, the synthesis and reactivity studies of relevant organometallic intermediates have been performed.

Physical Sciences Category

Phys Sci Poster 7:

Probing oxidative transmetalation between a silver aryl and an azanickelacycle

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(Hetero)biaryls are important structures found in many common substances such as the materials in jeans, blue-green algae 25, pharmaceuticals, and other biologically active compounds. These (hetero)biaryl structures can be made from redox-neutral or oxidative cross-couplings. Recently, oxidative decarboxylative coupling (ODC) reactions have gained more attention as more environmentally benign reactions compared to traditional biaryl syntheses. Most proposed mechanisms for ODC reactions include silver aryls as key reaction intermediates. The Hoover group recently proposed a mechanism for oxidative decarboxylative coupling with unactivated C-H bonds that includes an oxidative transmetalation step. This new reaction step involves a transfer of an aryl group from a silver aryl to an azanickelacycle. In order to probe this new transformation, different silver aryls were synthesized from silver(I) fluoride and the corresponding arylboronic esters. Dimeric azanickelacycles were synthesized from benzotriazines. When silver aryl is added to the dimeric azanickelacycle, a biaryl is formed with the extrusion of N_2. Future work will focus on testing different methods to form the monomeric azanickelacycle.

Phys Sci Poster 8:

Mechanism of azanickelacycle metalation with silver aryls

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Transition-metal-catalyzed cross-coupling reactions have gained considerable attention over the past thirty years for the formation of biaryls in pharmaceutically relevant compounds such as Xalkoir and Claritin. Alternatively, the direct biaryl formation from an oxidative decarboxylative coupling (ODC) would generate less waste, require fewer steps, and eliminate the need for prefunctionalized starting materials. The Hoover group has recently proposed a new oxidative transmetalation step, in which a nickel(II) metalacycle is oxidaized to nickel(III) by a silver aryl with subsequent biaryl formation. This new metalation process has the potential to become a new fundamental step in organometallic chemistry. In order to explore this new reactivity, we have synthesized dimeric azanickelacycles from their corresponding benzotriazines. In addition, silver aryls were synthesized from silver(I) fluoride and arylboronic esters. Future work will consist of synthesizing new boronic esters to form silver aryls in order to probe the newly proposed oxidative transmetalation.

Physical Sciences Category

Phys Sci Poster 9:

Optimization of neoprofen synthesis using novel methodology

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Neoprofen is an analogue of ibuprofen, a well-known commercially available drug that is used for treating pain, fever, and inflammation. The neopentylene tether present in neoprofen provides a rigid, topologically unique and hydrophobic structural feature that highlights its role in drug discovery and potential pharmacological significance. Producing neoprofen, more specifically the neopentylene ring fusion, is important for the investigation of substrates analogous to known drugs as well as natural products and organic molecules which have previously been challenging targets for total synthesis. The goal of this project is to develop methodology to enable a shorter synthesis of neoprofen while still obtaining reasonable yields. Optimizing the neoprofen synthesis opens the door for further reaction discovery thus making the production of neoprofen more efficient and beneficial to medicinal chemistry in the future.

Phys Sci Poster 10:

Selective microwave heating of organic reaction systems

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Selective microwave heating of organic reaction systems will improve the fields of fine-chemical synthesis, catalysts, green chemistry, and flow chemistry by justifying that microwave heating is advantageous compared to conventional heating at the same temperature. The "chaperone" effect is described as chemically reactive molecules that are poor absorbers of microwave radiation that can be selectively heated by the microwave and can experience chemical-rate enhancement if they are associated in solution with non-reactive polar molecules that are strong microwave absorbers. This study is focused on using the "chaperone" effect to dissolve the Dudley reagent (BnOPT) using the thermal Friedel-Crafts benzylation with microwave-absorbing and ionic dimethyl sulfoxide in a non-polar and microwave transparent solvent, toluene. The target of inquiry is to prove that the rate of reaction is greater in the microwave than that in conventional heating without decomposition of the product while the reaction proceeds with the exact same conditions. This research will provide new paradigms for microwave chemistry.

Physical Sciences Category

Phys Sci Poster 11:

Investigating the evolution of binary supermassive black holes in ongoing galaxy merger 1015+364

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Over a century ago, Einstein predicted the existence of gravitational waves, disturbances in the fabric of spacetime itself. In 2015, scientists confirmed this prediction by detecting the collision of two small, stellar mass black holes. This event ushered in a new era of astronomy. The next step in this journey is to detect longer period gravitational waves from binary supermassive black holes (SMBH) in the cores of galaxy merger remnants. According to the currently accepted model of galaxy formation, many such sources should exist. Here, we investigate the properties of a candidate binary SMBH in the ongoing galaxy merger 1015+364. Using optical and radio-wavelength observations, we constrain the possible properties of this system. Then, using these constraints, we run a targeted search of the 11-year dataset from the North American Nanohertz Observatory for Gravitational Waves (NANOGrav) in an attempt to place limits on the continuous gravitational waves from this object. Preliminary results reveal that the upper limit on the chirp mass of this binary is approximately 3.8×10^9 solar masses.

Phys Sci Poster 12:

MiSS interactive simulation: empowering future mountaineers' interest in space science

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The need for strengthening interests in science, technology, engineering, and mathematics (STEM) education in West Virginia is at a paramount stage. As a percentage of inhabitants with an undergraduate degree, West Virginia ranks 50th. U.S. leadership in science and technology is achieved and sustained through its national and international workforce members' strong STEM education. One of West Virginia's most encompassing problems is a lack of access to educational resources. As part of an ongoing effort by West Virginia Science Public Outreach Team (SPOT), our team is developing an interactive Java simulation-applet for the MiSS (Magnetospheres in the Solar System) interactive learning module. MiSS consists of three interactive learning approaches: presentation, hands-on activities, and simulation. The simulation will render models of the solar planets' magnetospheres and the behaviors of charged particles that become trapped within their magnetospheres, as well as allowing the user to interact with the rendered models. This will have the effect of enhancing SPOT's endeavor to inspire student interest in areas of STEM, particularly the space sciences.

Physical Sciences Category

Phys Sci Poster 13:

Development of a more selective mass spectral identification algorithm

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In crime labs, unknown substances are identified using gas chromatography-mass spectrometry (GC-MS) as part of an analytical scheme. Each substance produces a unique mass spectrum; however, the spectra of certain substances, for example isomers, are often extremely difficult to distinguish. This issue is particularly noticeable in opioids, such as fentanyl, and the many fentanyl analogs, which are currently on the rise in the United States. Without a more selective algorithm for the differentiation and identification of mass spectra, prosecution for the possession of these substances can be extremely difficult. The end goal of this project is to develop an algorithm that can distinguish between compounds with similar mass spectra. My contribution to this research is the creation of the mass spectral database required for the development of the algorithm. The library consists of spectra collected using both GC-MS, and direct analysis in real-time (DART)-tandem mass spectrometry.

Phys Sci Poster 14:

Development of a flexible algorithm for substance identification using mass spectrometry

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Current methods of mass-spectrometric identification use algorithms that compare the heights of each peak within a measured spectrum to those of a reference spectrum. Generally, uncertainties for such comparisons are 20% of each peak height, and such large error bars can result in false positives and a lack of confidence in identifications, which can lead to legal issues in court when contesting the presence of a substance. We demonstrate that peaks within spectra can have correlations or anti-correlations with $R^2 \geq 0.8$, and the correlations can be used in a new algorithm to predict dynamic peak heights in measured spectra. General linear models were constructed in SPSS Statistics using two databases; one consisting of five illicit drugs and the other of eight n-alkanes. The models were constructed using 90% of the databases' samples and tested against the remaining 10%. So far, the models can provide a high degree of confidence ($p>99\%$) that the 'true' compound is the best spectral match, even for compounds that are indistinguishable to the human eye, but further work is required.

Physical Sciences Category

Phys Sci Poster 15:

LC-MS methods development for metabolomics analysis by VSSI-MS

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Liquid chromatography mass spectroscopy (LC-MS) is widely used for metabolomic studies. Electrospray Ionization (ESI) is the standard ionization method in LC-MS due to its compatibility with the continuous flow of LC. However, ESI methods require external high voltage supplies, which are not suitable for chemicals sensitive to high voltage. To resolve these issues the Li group of West Virginia University has developed a new ionization technique called Vibrating Sharp-Edge Spray Ionization (VSSI). Since VSSI has been newly developed, this research project focuses on the development of methodology for the LC-MS system that will accommodate VSSI. The project involves optimizing the mobile phase, gradient, and flow rate for LC separation using a reverse phase (RP) C18 column. It was hypothesized that the addition of formic acid (FA) to the mobile phase would optimize the RPLC-VSSI-MS technique based on published research. The resulting data indicated that the FA additive was effective at optimizing the RPLC separation for the metabolites used to test the system. The preliminary RPLC-VSSI-MS data indicated an optimal effect resulting from the FA additive.

Phys Sci Poster 16:

Distance determination of firearm discharge: challenges of color tests and benefits of laser induced breakdown spectroscopy

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Crimes involving guns often include robbery, homicide, suicides and assaults. In firearm related investigations, the estimation of the firing distance assists with the reconstruction of the events. Current methods for distance determination include the Griess color test that turns orange in the presence of nitrites, and the sodium rhodizonate test that turns blue-violet in the presence of lead. Although these tests are practical, they lack selectivity and are highly subjective. Laser-Induced Breakdown Spectroscopy (LIBS) provides superior selectivity and sensitivity than color tests, enhancing the reliability of shooting distance analysis. In this study, a Springfield handgun with Remington primer was fired onto colored, and patterned fabrics at known distances (contact, 6 inches, 12 inches, 24 inches, and 36 inches), and distances that were unknown to the examiners. The fabrics were first tested using LIBS analysis followed by the color tests. Results show that LIBS can identify more elements used in modern ammunition and generate 3D-chemical images of the spatial distribution of FDR for more objective estimations of shooting distance

Physical Sciences Category

Phys Sci Poster 17:

Kinetic investigations of the gas phase reaction between the CH radical and cyclopentadiene

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In complete combustion processes, the products are considered to only be carbon dioxide and water, however in practice many other compounds can be produced, lowering the energy efficiency or yield of the process and possibly leading to harmful side products. Some of these side products are polycyclic aromatic hydrocarbons (PAHs) that can further react to form soot. This study seeks to investigate the reaction rate for one of the possible reactions for benzene formation – CH radical with cyclopentadiene (c5h6) – a building block in soot formation processes. To accomplish this, laser induced fluorescence is used to measure the kinetic decay of the radical under pseudo first order kinetics at temperatures ranging from 300–450 K and pressures 2–10 Torr. From experimentation, an approximate reaction rate of $k = 2.4 \times 10^{-10}$ ($\pm 3 \times 10^{-11}$) $cm^3\ s^{-1}$ was found with benzene being the major product – found using photoionization mass spectrometry. In the future, chemical models may be composed combining these data along with other side reactions to get a clearer picture into incomplete combustion processes.

Phys Sci Poster 18:

Aerobic cobalt-catalyzed oxidative cyclization of *o*-phenylenediamines and isonitriles

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Many biological molecules such as astemizole and vitamin B12 contain a benzimidazole substructure. Additionally, past research has indicated benzimidazoles possess anti-inflammatory, anti-anxiety, and antimicrobial properties. It has been shown that 2-aminobenzimadazoles can be produced by catalytic cyclization of phenylenediamines with isontriles. Traditional catalyst/oxidant systems include O_2/Pd and K_2SO_3/Co. This research seeks to investigate a new aerobic cobalt catalyst system for the production of 2-aminobenzimadazoles by combining the more readily available components of the literature systems. The specific goals of this research are to optimize the reaction parameters, and to explore the effects of *o*-phenylenediamine and isonitrile substituents on the reaction yield. Various solvents, bases, cobalt precatalysts, and temperatures were screened to determine the ideal reaction conditions. Preliminary substrate scope investigations suggest compatibility with a large variety of isonitrile and phenylenediamine coupling partners. This work represents a novel protocol for the cobalt catalyzed oxidative aerobic cyclization of *o*-phenylenediamines and isonitriles with promising substrate scope applicability.