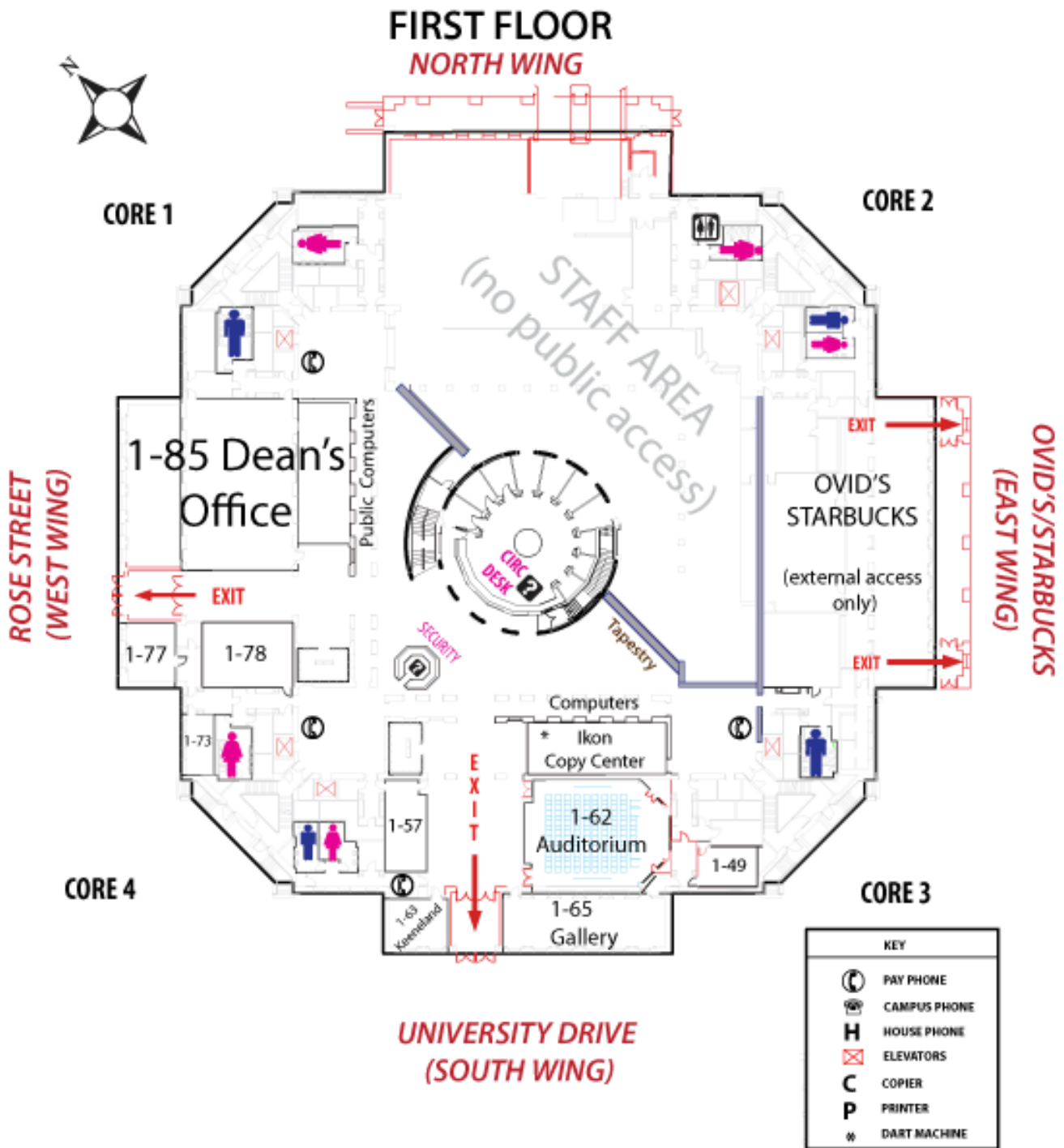




Expenses for the symposium are funded by the National Science Foundation under the ESPCoR
“Powering the Kentucky Bioeconomy for a Sustainable Future,” award number 1355438.
Poster prizes are sponsored by the UK Office of Graduate Studies.





Presentations will be in the Auditorium, Room 1-62
Posters will be in the Gallery, Room 1-65

Keynote Speaker
UK's Interim Vice President of Research
Professor Lisa Cassis



Lisa Cassis, professor and chair of the Department of Molecular and Biomedical Pharmacology, serves as the University of Kentucky's interim Vice President for Research. She began her term June 2, 2014. "Dr. Cassis is an exceptional scholar and is a noted leader in her field with an extensive research portfolio, focusing primarily on metabolic, vascular and obesity-associated diseases," said UK President Eli Capilouto. Cassis is also a faculty member of the UK Graduate Center for Nutritional Sciences, the Saha Cardiovascular Research Center, the Barnstable Brown Diabetes and Obesity Center, and the College of Pharmacy. She is currently principal investigator on several, multi-million-dollar federal grants including serving as program director of an \$11.3 million National Institutes of Health grant that supports the Center of Biomedical Research Excellence (COBRE) focusing on obesity and cardiovascular diseases.

Cassis earned B.S. and Ph.D. degrees in pharmacology from West Virginia University and held postdoctoral positions at the University of Wurzburg in Wurzburg, Germany, and the University of Virginia. As interim VP for Research, she leads the university's research enterprise and oversees research proposal development, grants & contracts administration, federal relations, human subjects protection, 10 non-degree granting and multidisciplinary research centers, and an array of shared-use facilities that serve UK researchers.

--from University of Kentucky Research

Schedule of Events

9:00 AM *Registration Opens*

9:30 AM *Opening Remarks, Dr. Susan Odom, Faculty Mentor, University of Kentucky*

9:35 AM *Keynote Address, Dr. Lisa Cassis, UK's Interim Vice President of Research*

Health Related Post-Doc Presentations

Moderated by Caitlin Scott, Ph.D.

10:00 AM Kristin Morgan, University of Kentucky

Nyquist and Bode Stability Criteria Assessment of Dynamic Knee Stability in Healthy and Anterior Cruciate Ligament Reconstructed Individuals during Walking

10:15 AM Ralf Rempe, University of Kentucky

Matrix-Metalloproteinases in Blood-Brain Barrier Dysfunction in Epilepsy

10:30 AM Ashley Pumphrey, University of Kentucky

Cardiac Chemical Exchange Saturation Transfer (cardioCEST) - MRI for Cell Tracking and Myocardial Creatine Imaging

10:45 AM Nicolas Cifuentes, University of Kentucky

Insights into Hendra Virus (HeV) Assembly

11:00 AM A. Catalina Velez-Ortega, University of Kentucky

Imaging Stereocilia of Live Auditory Sensory Cells with High-Speed Hopping Probe Ion Conductance Microscopy

11:15 AM Sunil K. Nooti, University of Kentucky

Characterization of the Role of Spleen in the Growth of Adoptively Transferred Eμ-Tcl1 CLL Cells in Wild Type and Par-4 -/- Mice.

11:30 AM Lunch and Poster Sessions

1:00 PM *Networking 101, Moderated by Lindsay Boehme, Ph.D.*

Lee Skallerup Bessette, Ph.D., University of Kentucky

Faculty/Instructional Consultant

Center for the Advancement of Learning and Teaching (CELТ)

Kristen Brennan, Ph.D., Alltech

Research Project Manager, Animal Nutrigenomics and Equine Nutrition

Center for Animal Nutrigenomics & Applied Animal Nutrition

Caroline Francis, Ed.S., M.S. and B.B.A, University of Kentucky

Career Counselor, Alumni Career Services

James W. Stuckert Career Center

Nathan Vanderford, Ph.D., MBA, University of Kentucky

Assistant Professor, Department of Toxicology and Cancer Biology

Assistant Director for Research, Markey Cancer Center

Assistant Dean for Academic Development, College of Medicine

Biology, Chemistry, and Physics Related Post-Doc Presentations
Moderated by Sarah Edwards, Ph.D.

- 2:00 PM** Selcuk Atalay, University of Kentucky
Influence of the intracellular environment on ligand-modulated membrane-bound ion channels
- 2:15 PM** Douglas Ferreira Parreira, University of Kentucky
Effector Diversity in Colletotrichum graminicola looking for races characterization
- 2:30 PM** Vladimir Timoshevskiy, Biology, University of Kentucky
Cellular and Molecular Features of Developmentally Programed Genome Rearrangement in a Vertebrate (Sea Lamprey: Petromyzon marinus)
- 2:45 PM** Erin Peters, University of Kentucky
Nuclear Photography

3:00 PM ***Coffee Break***

Energy and Engineering Related Post-Doc Presentations
Moderated by Matt Casselman, Ph.D.

- 3:15 PM** Jonathan Bryant, Caer, University of Kentucky
Using Additives To Enhance Amine-Based Carbon Capture
- 3:30 PM** Moushumi Sarma, University of Kentucky
CO2 Hydration Enhancement Using Homogenous Catalysts in Primary Amine Solution
- 3:45 PM** Xing Huang, University of Kentucky
Engineering Ceria Nanoparticles For Controlled Application In Complex Environments: A Combined Computational And Experimental Study
- 4:00 PM** Ananthkrishnan Soundaram Jeevarathinam, Western Kentucky University
Carbon-Based Semiconducting Polymers for Flexible Solar Cells
- 4:15 PM** Nick Holubowitch, University of Kentucky
Converting Heat To Electricity With Low-Cost Thermocells
- 4:30 PM** ***Closing Remarks and Poster Awards, Pat Bond, Senior Assistant Dean of the University of Kentucky Graduate School***

Thank you for attending!

For more information and current events, please visit our website:

sops.as.uky.edu

or, feel free to contact us at:

uk.sops@gmail.com

Health Related Post-Doc Presentations

Kristin Morgan, University of Kentucky

Nyquist and Bode Stability Criteria Assessment of Dynamic Knee Stability in Healthy and Anterior Cruciate Ligament Reconstructed Individuals during Walking

Anterior cruciate ligament (ACL) injuries are one of the most frequently injured knee ligaments annually. Despite reconstruction of the ligament, many individuals report difficulty returning to high level activities that requires greater dynamic stability. However, few methods have been tested to assess dynamic knee stability post ACL reconstruction. Therefore, the purpose of this study was to classify and quantify intra-limb and between group dynamic knee stability in control and ACL reconstructed individuals using Nyquist and Bode stability criteria. These criteria can help standardize how we evaluate dynamic knee stability to better enable clinicians to track patient knee stability throughout rehabilitation.

Ralf Rempe, University of Kentucky

Matrix-Metalloproteinases in Blood-Brain Barrier Dysfunction in Epilepsy

The blood-brain barrier (BBB) is dysfunctional in epilepsy and contributes to seizure genesis and anti-seizure drug resistance. Studies show that increased brain glutamate levels during seizures lead to barrier dysfunction including BBB leakage. One factor involved in BBB leakage is an increase in protein and activity levels of matrix-metalloproteinases (MMP). We exposed isolated rat capillaries to glutamate to mimic seizure conditions, and used isolated capillaries from seizure models to study MMP expression and activity. Exposing capillaries to glutamate increased MMP protein and activity levels and caused BBB leakage. These findings were confirmed in capillaries from seizure rats.

Ashley Pumphrey, University of Kentucky

Cardiac Chemical Exchange Saturation Transfer (cardioCEST) - MRI for Cell Tracking and Myocardial Creatine Imaging

A recently developed cardiac chemical exchange saturation transfer (CEST) pulse sequence is validated and used to track paraCEST labeled cells in the mouse heart. Furthermore, changes in myocardial creatine in diet-induced obese mice are identified. CardioCEST imaging enabled the selective visualization of cell survival without disturbing underlying image contrast, and can be multiplexed with measurements of ventricular structure and function in cell therapy models. In a mouse model of diet-induced obesity, significantly reduced myocardial creatine was measured in the absence of structural or functional changes, reflecting early metabolic failure before overt heart failure.

Nicolas Cifuentes, University of Kentucky

Insights into Hendra virus (HeV) assembly

HeV is a zoonotic paramyxovirus that causes respiratory disease and encephalitis in humans, with mortality rates reaching up to 90%. In contrast to most paramyxoviruses, the HeV life cycle involves complex intracellular trafficking of the viral F glycoprotein to allow proteolytic activation. To determine if this unique trafficking pathway is important for subsequent virus assembly, we developed a virus-like particle system which has allowed us to determine that cleavage of the F protein is not a prerequisite for viral assembly. Furthermore, our data reveals the involvement of Rab11 endosomes as putative platforms where viral components are assembled.

A. Catalina Velez-Ortega, University of Kentucky

Imaging Stereocilia of Live Auditory Sensory Cells with High-Speed Hopping Probe Ion Conductance Microscopy

In order to study live auditory sensory cells we needed to increase the speed of imaging of our hopping probe ion conductance microscopy (HPICM) system (Novak et al. Nat Methods, 2009). To do so, we used a piezo assembly with higher resonant frequency for Z-movement (~18kHz), increased the speed of approach (~5-8 times) and adjusted the proportional-integral-derivative controller of the Z-scanner (~50 μ s delay). With our improved HPICM system we have successfully visualized the extremely convoluted surface of mouse and rat stereocilia in live auditory sensory cells at a speed 4 times faster and with ~5nm vertical and ~11nm lateral resolution.

Sunil K. Nooti, University of Kentucky

Characterization of the role of spleen in the growth of adoptively transferred E μ -Tcl1 CLL cells in wild type and Par-4 -/- mice.

An adoptive transplant model system has been established in our laboratory where intravenous or intraperitoneal injection of primary CD5+ and CD19+ Chronic Lymphocytic Leukemia (CLL) cells from a E μ -Tcl1 CLL transgenic mice into recipient syngeneic mice leads to the development of a CLL like disease within 3-5 weeks of transfer. We have monitored the growth of CLL cells in these mice by periodic submandibular bleeding, ultrasonography of abdomen and flow cytometry. We show that injection of even 1000 cells can result in full-blown CLL like disease in this model and that the predominant site of growth is the spleen.

Biology, Chemistry, and Physics Related Post-Doc Presentations

Selcuk Atalay, University of Kentucky

Influence of the intracellular environment on ligand-modulated membrane-bound ion channels

Nearly all living organisms rely on cell membrane-bound ion channels to communicate and thrive. Many of these channels are controlled by freely-diffusing small intracellular ligands including nucleotides, hormones, and amino acids. The apparent kinetics of ligand diffusion are controlled by intracellular factors that include the expression, distribution and activity of enzymes as well as off-target proteins or organelles (crowders), yet we lack a quantitative appreciation of how they conspire to control ion channel activity. In this study, we introduce a model system to explore ligand-modulated ion channels, which consists of an adenosine triphosphate (ATP)-dependent potassium channel (KATP) that is embedded in a lipid bilayer system and immersed in a crowded solution. We describe diffusion within this mock cellular environment by solving the ionic transport Poisson-Nernst-Planck equations. Our results show that both crowders and also solution conditions influence the efficiency of KATP coupling with ATP transport. By quantifying the influence of intracellular milieu on diffusion ion channel-inhibiting nucleotides, we will gain deep insight into cellular mechanisms that couple small-molecule diffusion with cellular electrophysiology.

Douglas Ferreira Parreira, University of Kentucky

Effector Diversity in Colletotrichum graminicola looking for races characterization

The phytopathogenic fungus Colletotrichum graminicola is the causal agent of maize leaf and stalk anthracnose, resulting in significant economic losses in North and South America, and worldwide. Anthracnose is primarily managed by the use of quantitative resistance, however this

type of resistance, particularly against stalk anthracnose, is unreliable since it becomes less effective in mature tissues. It is estimated that stalk anthracnose causes losses of 5-10 percent of potential yield annually. Five races of *C. graminicola* were identified occurring in Brazil but not about effectors diversity were made in this isolates. In this work we used 60 different genes 54 for putative effectors and 6 from transposases and 100 *C. graminicola* isolates, finding polymorphism in our population and some cases of presence and absence of these genes.

Vladimir Timoshevskiy, University of Kentucky

*Cellular and Molecular Features of Developmentally Programmed Genome Rearrangement in a Vertebrate (Sea Lamprey: *Petromyzon marinus*)*

The sea lamprey represents one of the few vertebrate species, known to undergo large-scale programmed genome rearrangement (PGR) over the course of its normal development. We describe epigenetic correlates of PGR and the spatiotemporal dynamics DNA elimination in lamprey. In situ analyses reveal that epigenetic events are targeted to micronuclei that contain DNA eliminated by PGR. Expelled chromatin does not migrate with retained chromosomes in anaphase, and is superficially similar to lagging chromosomes observed in altered cell divisions of some cancer subtypes. Subsequent examination of lagging chromatin also reveals important mechanistic aspects related to the programmed loss of these segments.

Erin Peters, University of Kentucky

Nuclear Photography

The atomic nucleus, composed of protons and neutrons, is about 100,000,000,000 times smaller than is visible by the human eye. Because we cannot take an ordinary photograph to investigate its shape and structure, other methods must be employed to develop a picture of the nucleus. Some nuclei are spherical in shape, while others are deformed in oblate (like a Frisbee) or prolate (like a football) shapes. One tool to investigate such nuclear shapes is inelastic neutron scattering. Unique experiments utilizing this technique coupled with gamma-ray spectroscopy are performed at the University of Kentucky Accelerator Laboratory and will be discussed.

Energy and Engineering Related Post-Doc Presentations

Jonathan Bryant, University of Kentucky

Using additives to enhance amine-based carbon capture

Absorption of CO₂ by an amine solvent is the leading technology for reducing CO₂ emissions from coal-fired power plants. In this work, we studied the CO₂ absorption properties of a typical amine, monoethanolamine (MEA), with a surfactant-type additive. The additive influences the surface properties of the solution, and improves the carbon capture efficiency. The results were seen to be dependent on the gas–liquid contacting method.

Moushumi Sarma, University of Kentucky

CO₂ Hydration Enhancement Using Homogenous Catalysts in Primary Amine Solution

Carbon Capture and Storage (CCS) is a technology gaining a lot of attention recently due to increased levels of CO₂ in the atmosphere and increasing proposed legislation on such emissions by electric utilities. Using amine-based solutions for CO₂ capture in power plants is the most common method utilized industrially and studied in the laboratory environment. However, this process is associated with a significant increase to the levelized cost of electricity. In order to meet the DOE's goal of <\$40/ton CO₂ captured, a ~ 50% reduction in both capital

and operating costs is required. In this context, we have prepared zinc(II) and cobalt(III) CO₂ hydration catalysts. These complexes remain active in concentrated amine-based capture solvents thereby increasing the mass transfer of the system. These catalysts are robust and stable under the harsh operating conditions of carbon capture from coal-fired power plants such as elevated temperatures and flue gas contaminants. We anticipate our complexes to be a starting point for more sophisticated catalyst design for industrial carbon capture systems.

Xing Huang, University of Kentucky

Engineering ceria nanoparticles for controlled application in complex environments: a combined computational and experimental study

Ceria nanoparticles (CNPs) are excellent redox catalysts widely used in energy and biomedical applications. Their catalytic properties are intrinsically determined by atomic scale details of their surface structures. To achieve desired catalytic properties for specific applications, it is essential to obtain and maintain appropriate surface structures. Through combined computational and experimental study of the structure-property relationships governing CNPs, we have shown that surface structures of sufficiently-small CNPs are dependent on their ambient environment. Furthermore, rational exploiting these relationships yields CNPs whose surface structures are engineered to produce desired catalytic properties that meets the needs of important applications.

Ananthkrishnan Soundaram Jeevarathinam, Western Kentucky University

Carbon-Based Semiconducting Polymers for Flexible Solar Cells

Carbon-based semiconducting polymers promise the possibility of competing with silicon-based inorganic semiconducting materials for solar cells due to the unique properties of lightweight, flexibility and cost effective processing techniques. Polymer based organic solar cells (OSCs) have reached power conversion efficiencies over 10 % and are quickly towards attaining parity with their inorganic counterparts. Among such polymers, poly(3-hexylthiophene-2,5-diyl); P3HT has been a promising material that widely used to attain high efficiency through structural modifications and various processing techniques, including the work describes here. Introducing a poly-aromatic moiety of anthracene as an additional block to P3HT, we were able to design a promising polymer (PANT-b-P3HT), which absorbs broad wavelength of solar spectrum for harvesting solar energy. Optimization of device processing and fabrication processes, we were able to achieve power conversion efficiency up to 2.18% with the maximum fill factor of 43.8% for the test devices of the polymer blended with an acceptor, fullerene C60.

Nick Holubowitch, University of Kentucky

Converting heat to electricity with low-cost thermocells

There is an abundance of thermal energy (heat) available in the environment from solar, geothermal, and industrial sources. This talk will introduce a low-cost electrochemical technology, the thermocell, for harnessing ambient or waste heat and converting it directly to electricity, much like a solar cell converts light to electricity. I will highlight recent achievements in the field and present work from our lab that identified spray-coated carbon nanotube composites as promising electrodes for next-generation thermocells.

Poster Titles

1 Ashley Pumphrey, University of Kentucky

Cardiac Chemical Exchange Saturation Transfer (cardioCEST) - MRI for Cell Tracking and Myocardial Creatine Imaging

2 Douglas Ferreira Parreira, University of Kentucky

*Effector Diversity in *Colletotrichum graminicola* looking for races characterization*

3 Aman Preet Kaur, University of Kentucky

A Highly Soluble Organic Catholyte for Non-Aqueous Redox Flow Batteries

4 Hannah Henson, University of Kentucky

Progress Towards Generating Zebrafish Models Of Retinitis Pigmentosa

5 Rohit Bhandari, University of Kentucky

Synthesis and Characterization of Polyphenolic Nanocomposites for Rapid Removal of Organic Pollutants.

6 Allan Pang, University of Kentucky

Structural characterization of halogenase PltA from the pyoluteorin biosynthetic pathway

7 Nick Holubowitch, University of Kentucky

Converting heat to electricity with low-cost thermocells

8 A. Catalina Velez-Ortega, University of Kentucky

Imaging Stereocilia of Live Auditory Sensory Cells with High-Speed Hopping Probe Ion Conductance Microscopy

9 Aimable Kalume, University Of Kentucky

Laboratory characterization of a potential interstellar molecule: aluminum carbide (AlC)

10 Sunil K. Nooti, University of Kentucky

Characterization of the role of spleen in the growth of adoptively transferred E μ -Tcl1 CLL cells in wild type and Par-4 $-/-$ mice.

11 Matthew Casselman, University of Kentucky

Probing the Reactivity of Organic Materials in Energy Storage Applications

12 Selcuk Atalay, University of Kentucky

Electroosmotic Flow in a pH-Regulated Membrane

13 Ralf Rempe, University of Kentucky

Matrix-Metalloproteinases in Blood-Brain Barrier Dysfunction in Epilepsy

14 Francesca Condemi, University of Kentucky

Development of small wearable one piece artificial heart-lung Device

15 Maggie Murphy, University of Kentucky

Early Life Stress Enhances the Risk to Develop Obesity and Metabolic Syndrome in Female Mice

16 Ananthakrishnan Soundaram Jeevarathinam, Western Kentucky University

Carbon-Based Semiconducting Polymers for Flexible Solar Cells

17 Aditi Jain, University of Kentucky

BRAF-V600E Binds and Activates c-Abl and Arg, and Once Activated, c-Abl and Arg Cooperate with PI3K/Akt to Promote Melanoma Survival

18 Vikas Dukhande, University of Kentucky

Ubiquitination of Glycogen Phosphorylase by the Malin-Laforin Complex Regulates Glycogen Catabolism

19 Rupam Sarma, University of Kentucky

Biomolecule Immobilized Electrode System Towards Biosensors And Energy Generation

20 Chun-Chun Hsu, University of Kentucky

Role of Calcium Ions in the Positive Interaction between TRPA1 and TRPV1 Channels in Bronchopulmonary Sensory Neurons.

21 Lindsay Boehme, University of Kentucky

Liquid Phase Electron Beam Induced Etching of Copper with Environmental Scanning Electron Microscopy

22 Caitlin Scott, University of Kentucky

Molecular dynamics simulations of the human S100A1 protein to determine the impact of bound calcium ions on the open conformation

23 Dmytro Havrylyuk, University of Kentucky

Synthesis of new Ru(II) complexes with pyrazole-pyridine ligands and their antitumor activity

24 Reetu Sharma, Pandit Ravishankar Shukla University

Contamination of pond water and sediment

25 Ellen Crocker, University of Kentucky

Overwintering seeds are reservoirs for seedling pathogens of wetland plant species

26 Marina Fosso Yatchang, University of Kentucky

Synthesis and antibacterial activity of novel 6"-aromatic thioether tobramycin derivatives

27 Farid Yaghouby, University of Kentucky

Piezoelectric Sensor: a Novel Tool to Segment Sleep in Rodents

28 Sujita Khanal, University of Louisville

Human Papillomavirus Detection In Histological Samples Of Multifocal Epithelial Hyperplasia: A Novel Demographic Presentation

- 29 Chris Shidal, University of Louisville and Indiana University**
Lunasin has Potential Therapeutic Utility Against Malignant Melanoma
- 30 Zachariah Sellers, University of Louisville**
DNA methylation profiling of very small embryonic-like stem cells (VSELs) and human embryonal carcinoma Ntera2: insight into methods of unlocking the quiescent genome
- 31 Amir Kucharski, University of Kentucky**
Molecular Dynamics Studies of Calcium Binding to Beta Parvalbumin
- 32 Farah El Najjar, University of Kentucky**
Role of the actin cytoskeleton in Human metapneumovirusinfection: Insights into particle assembly and transmission
- 33 Syed Islam, University of Kentucky**
Hydrogen Production By Water Splitting Under Visible Light Using N₂/Ar Plasma Induced Doped Ordered Mesoporous TiO₂ Thin Films
- 34 Sadakatali Gori, University of Louisville**
Isolation of C5-Sugars from the Hemicellulose-Rich Hydrolyzate of Dried Distiller's Grains
- 35 Bethany Hudak, University of Kentucky**
Direct observation of structural phase transformations in individual hafnia nanorods
- 36 Wen Wen, University of Kentucky**
Sox4 regulates choroid fissure closure by limiting Hedgehog signaling during ocular morphogenesis
- 37 Michelle Pitts, University of Kentucky**
Innate immunity to foodborne Listeria monocytogenes is not impeded by Type I interferon signaling
- 38 Xingye Zhang, University of Kentucky**
To understand human motor control and human learning by subsystem identification
- 39 Dharmesh Patel, University of Kentucky**
Innovative Nanomaterials for Energy Harvesting Applications
- 40 Merryn Cole, University of Kentucky**
Linking Students' Spatial-Scientific Reasoning and Moon Journaling
- 41 Ishita Bhavsar, University of Kentucky**
Biomarkers Associated with Peri-implantitis and Response to Surgical Therapy
- 42 Shayan Mohammadmoradi, University of Kentucky**
Comparing the effect of ultra-filtered feta cheese and yoghurt as probiotic carriers on lipid profile: A double blinded randomized controlled trial
- 43 Jarrad Gollihue, University of Kentucky**
Bourbon Maturation effects on Cell Wall Composition