

# 45<sup>TH</sup> NAEFF SYMPOSIUM

## Small-Molecules and Biological Function

April 5, 2019

[chem.as.uky.edu/naeff-symposium](http://chem.as.uky.edu/naeff-symposium)

 University of  
Kentucky  
College of Arts and Sciences

### SCHEDULE OF EVENTS

**8:00 a.m.**

**Registration & Continental Breakfast**  
Alumni Gallery, Room 1-65, W.T. Young Library

**8:50 a.m.**

**Welcome**  
**President Eli Capilouto**  
UKAA Auditorium, room 1-62, W.T. Young Library

**9:00 a.m.**

**Prof. Christopher J. Chang**  
University of California  
UKAA Auditorium, room 1-62, W.T. Young Library

#### **"Activity-Based Sensing Approaches to Decipher Transition Metal Signaling"**

Traditional strategies for development of chemoselective imaging reagents rely on molecular recognition and static lock-and-key binding to achieve high specificity. We are advancing an alternative approach to chemical probe design, termed activity-based sensing (ABS), in which we exploit inherent differences in chemical reactivity as a foundation for distinguishing between chemical analytes that are similar in shape and size within complex biological systems. This presentation will focus on ABS approaches to develop new fluorescent probes for transition metals and reactive oxygen, sulfur, and carbon species and their signal/stress contributions to living systems, along with activity-based proteomics to identify novel targets and pathways that these emerging classes of chemical signals regulate.

**10:00 a.m.**

**Coffee Break & Refreshments**

**10:30 a.m.**

**Prof. Peter G. Shultz**  
Scripps Institute  
UKAA Auditorium, room 1-62, W.T. Young Library

#### **"Playing with the Molecules of Life"**

Our research program combines the tools and principles of chemistry with the molecules and processes of living cells to synthesize new molecules and molecular assemblies with novel physical, chemical and biological functions. By studying the structure and function of the resulting molecules, new insights can be gained into the mechanisms of complex biological and chemical systems. Examples of this synergistic chemical/biological approach to synthesis will be discussed including (1) the addition of amino acids with novel biological, chemical and physical properties to the genetic codes of prokaryotic and eukaryotic organisms, (2) recapitulating the evolution of mitochondria in a synthetic eukaryotic system, (3) characterizing organisms with chimeric RNA-DNA genomes, and (4) the identification of small molecules that control stem cell fate in vivo.

**11:30 a.m.**

**Lunch & Break**

**1:30 p.m.**

**Prof. Stephen V. Frye**  
University of North Carolina  
UKAA Auditorium, room 1-62, W.T. Young Library

#### **"Academic Drug Discovery and Chemical Biology"**

While academic science has always provided fundamental understanding of the biological and clinical basis of disease, the opportunity and imperative for academics to contribute more directly to the discovery of new medicines continues to grow. Embedding medicinal chemists with biologists in academia creates collaborative opportunities for drug discovery and the design and synthesis of chemical biology tool compounds (chemical probes) to better elucidate the role of specific proteins and pathways in biology and disease. Two case studies will be presented: 1) the discovery of inhibitors of mer tyrosine kinase to activate the innate immune system in cancer; and 2) discovery of chemical probes targeting epigenetic regulators. These case studies provide lessons in target selection strategies, the requirement for iterative optimization of lead compounds (useful drugs/probes rarely come directly from a screen), and the value of mutually dependent collaborations between medicinal chemists and disease-focused biologists.

**2:30 p.m.**

**Poster Session Set-Up**  
2nd & 3rd Floors, Don & Cathy Jacobs Science Building

**3:00 p.m.**

**Poster Session**  
2nd & 3rd Floors, Don & Cathy Jacobs Science Building

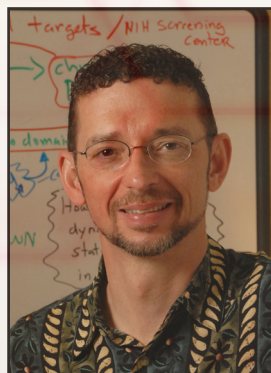
45<sup>th</sup> Naff Symposium

# Small-Molecules and Biological Function

April 5, 2019

## GUEST SPEAKERS

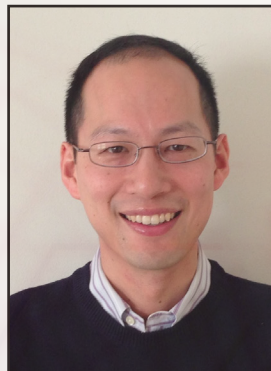
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### STEPHEN V. FRYE

**Fred Eshelman Distinguished Professor  
Director, Center for Integrative Chemical Biology and Drug Discovery  
Division of Chemical Biology and Medicinal Chemistry  
Eshelman School of Pharmacy**

Stephen Frye is a Fred Eshelman Distinguished Professor, Director of the Center for Integrative Chemical Biology and Drug Discovery, and Co-leader of the Molecular Therapeutics Program, Lineberger Comprehensive Cancer Center at the University of North Carolina in Chapel Hill. Frye is also the lead principal investigator for the North Carolina Comprehensive Chemical Biology Center, a UNC-based, NCI designated center that engages in oncology drug discovery. His laboratory's research focuses on chemical biology of chromatin regulation with an emphasis on proteins that bind methylated lysine, and oncology drug discovery.



### CHRISTOPHER J. CHANG

**Departments of Chemistry and Molecular and Cell Biology and the  
Howard Hughes Medical Institute, University of California, Berkeley**

Christopher J. Chang is a Class of 1942 Chair Professor in the Departments of Chemistry and Molecular and Cell Biology at University of California, Berkeley. He is a Howard Hughes Medical Institute investigator and a member of the Helen Wills Neuroscience Institute at University of California, Berkeley. Chris is a Faculty Scientist, Chemical Sciences Division, Lawrence Berkeley National Laboratory. He is a recipient of numerous awards including the NSF CAREER, ACS Cope Scholar, etc. Chris did his undergraduate and MS work at California Institute of Technology. He moved to MIT where he did his doctoral work with Prof. Daniel Nocera, now at Harvard University and his postdoctoral work with Stephen J. Lippard at MIT.



### PETER SCHULTZ

**Scripps Institute  
Scripps Family Chair Professor  
President and CEO  
Department of Chemistry  
California Campus**

Peter G. Schultz did his undergraduate and graduate work at the California Institute of Technology. In 1985, after postdoctoral studies at the Massachusetts Institute of Technology, he joined the faculty of the University of California at Berkeley, where he was Professor of Chemistry, Principal Investigator at Lawrence Berkeley National Laboratory and an Investigator of the Howard Hughes Medical Institute. Schultz joined the faculty of Scripps in 1999 where he is currently the Scripps Family Professor of Chemistry and President of Scripps. He founded and was the Institute Director of the Genomics Institute of the Novartis Research Foundation (GNF) in San Diego, CA from 1999 to 2010 and more recently (2012) the California Institute for Biomedical Research (CALIBR), a not-for-profit institute focused on early stage translational research. In addition, Schultz is a founder of Affymax Research Institute, Syrrx, Kalypsys, Phenomix, Symyx Therapeutics, Ilypsa, Ambrx, Ardelyx, and Wildcat Technologies, pioneers in the application of diversity based approaches to problems in chemistry, materials science and medicine. His awards include the Waterman Award of the National Science Foundation, membership in the National Academy of Sciences and National Institute of Medicine, the Wolf Prize in Chemistry, the Paul Ehrlich Prize, the Arthur C. Cope Award of the American Chemical Society, the Solvay Prize, and Wieland Prize. He has coauthored 600 scientific publications and trained over 300 graduate students and postdoctoral fellows, many of whom are on the faculties of major research institutions around the world.

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#### 2019 NAFF Committee Members:

Dr. Samuel Awuah (Chemistry, Committee Chair), awuah@uky.edu  
Professor Phoebe Glazer (Chemistry)  
Professor Jason DeRouchey (Chemistry)  
Professor Doo Young (Chemistry)

For more information, contact Dr. Samuel Awuah at awuah@uky.edu.