THE FUTURE OF C–H FUNCTIONALIZATION

Workshop Details
07/29/2019 – 08/02/2019

Telluride Science Research Center
Telluride Intermediate School
725 W Colorado Ave.,
Telluride, CO 81435

THE FUTURE OF C–H FUNCTIONALIZATION

Workshop Details
07/29/2019 – 08/02/2019

Organizers: Huw Davies and Simon Blakey

Location: Telluride Intermediate School, 725 W Colorado Ave., Telluride, CO, 81435

Meeting Description:

Since the discovery that organic molecules could be synthesized in a lab, the teaching and practice of synthetic organic chemistry has revolved around the classification and reaction of compounds according to the functional groups they contain. A basic precept of all introductory organic chemistry texts is the contrast between the reactivity of functional groups and the "inert" C-H and C-C bonds that make up the skeleton of just about every organic molecule. C–H Functionalization offers an alternative to this mode of thinking, through the development and application of effective and robust catalysts capable of transformations that selectively convert a C-H bond into the functional group or structural motif of choice.

This strategy for constructing molecules has the potential to broadly impact not only synthetic organic chemistry, but also the disciplines that rely on this highly enabling field, such as the pharmaceutical, material and agrochemical sciences. The C–H functionalization approach embodies many of the drivers that motivate modern science and can be summarized as a truly sustainable strategy by four key statements; 1). As a primarily catalytic transformation only very small amounts of high value reagents (catalysts) are required to convert large amounts of feedstock chemicals into essential commodities. 2). Employing a C-H bond as the reaction partner removes the need for introduction or inter-conversion of functional groups, significantly expanding the scope of feedstock chemicals available for reaction and thus 3). considerably reducing the number of operations required to achieve a desired molecular change. 4). A meaningful reduction in the volume of hazardous waste generated by using the C–H bond as a reaction partner (typical byproducts include hydrogen and nitrogen gas or water).

This field is at a stage where expertise from across the chemical sciences is required to truly establish a main stream technology. The aim of this workshop is to bring together the leading and emerging practitioners of C–H functionalization to discuss the many exciting potential applications of this technology and how to accelerate adoption of this science. At this stage, one of the critical elements is to understand the mechanistic aspects of these reactions in order to develop a rational approach for how to achieve site- and enantioselective transformations. Computational and experimental physical organic chemists are playing a pivotal role in this field, informing and guiding catalyst and reaction design. A forum that brings together these perspectives will provide an enriching experience for the participants and hopefully the field more broadly.

Workshop Welcome Reception:

Before the workshop starts please join us on Sunday July 28th for a welcome reception. It will be held at the Oak between 5:00 – 6:30 PM. Oak offers counter service for food and drink. It is a great place to meet up before the workshop It is located at the base of the gondola at 250 W San Juan Ave (aka Gus's Way).

Monday, July 29th 2019

Morning

8:30 AM Breakfast – The food is excellent and a quintessential TSRC tradition!

9:00 AM Introductions & Background - Huw Davies

Presentations – Huw Davies presiding

9:45 AM **Sustainable C–H Activation: From Late-Stage Peptide Diversification to Metallaelectrocatalysis**
Lutz Ackerman (Georg-August-University Göttingen)

10:30 AM Coffee break

11:00 AM **Biocatalysis and complex molecule synthesis**
Alison Narayan (University of Michigan at Ann Arbor)

11:45 AM **Oxidative C-H Functionalization via π-Allyl Intermediates**
Simon Blakey (Emory University)

12:30 PM Lunch – arranged for this workshop

Afternoon

Presentations

1:30 PM **Opportunities for C–H Functionalization to Impact Drug Discovery**
Shane Krska (Merck &Co, Inc.)

2:15 PM **Unraveling the Mechanisms of Catalytic Decarboxylative C–H Arylation Reactions**
Jessica Hoover (University of West Virginia)

3:00 PM Coifee break

3:30 PM **α- and β-Amino C–H Functionalization by Frustrated Acid/Base Catalysts**
Masayuki Wasa (Boston College)

4:15 PM **Engineering Enzymes for Selective C–H Functionalization**
Jared Lewis (Indiana University)

5:00 PM **Discussion: Industrial Adoption of C–H Functionalization Technologies**

Discussion Leaders: Shane Krska, John Ellman and Eric Voight

What impact is C-H functionalization having on the pharmaceutical industry?

What are the best models for enhancing research interactions between academia an industry?

How can academia contribute to enhancing innovation in the pharmaceutical industry and how can the industry communicate the importance of innovation in academic organic synthesis research?

Evening

7:30 PM Conference Reception
Sideworks Restaurant, 225 S Pine St unit f, Telluride, CO 81435

Tuesday, July 30th 2019

Morning

8:30 AM Breakfast

Presentations – Lutz Ackerman presiding

9:00 AM **Development of Direct C-H Amination Reactions: Inner- versus Outer-Sphere Pathways**
Sukbok Chang (KAIST)

9:45 AM **Biocatalytic C–H Oxidation as an Enabling Tool for Complex Molecule Synthesis**
Hans Renata (TSRI)

10:30 AM Coffee break

11:00 AM **New Strategies for the C–H Functionalization of Amines**
Daniel Seidel (University of Florida)

11:45 AM **Mechanistic Details of the mono-*N*-protected Amino Acid mediated Pd-catalyzed selective C–H bond functionalization**
Jamal Musaev (Emory University)

12:30 PM Lunch – arranged for this workshop

Afternoon

Presentations – John Montgomery presiding

1:30 PM **C–H Bonds as Functional Groups: a Paradigm Shift at AbbVie**
Eric Voight (AbbVie)

2:15 PM **Alcohol and Amine Derivatives Guide Position-Selective C–H Functionalization Reactions**
Jennifer Roizen (Duke University)

3;00 PM Coffee Break

3:30 PM **Ni-catalyzed Functionalization of Remote sp^3 C–H Bonds**
Rubén Martin Romo (ICIQ)

4:15 PM **Discussion: Bio-Catalytic C–H Functionalization**

Discussion Leaders: Jared Lewis, Alison Narayan and Hans Renata

What are the major challenges and opportunities in bio-catalytic C-H functionalization?

What are the practical limitations and how can they be overcome?

What ere the opportunities to blend small catalyst C-H functionalization with bio-catalytic approaches?

Evening

6:30 PM **TSRC Town Talk: What flies can teach us about our kidneys**
Aylin Rodan (University of Utah)
Telluride Conference Center. Bar opens at 6:00 PM.

Wednesday, July 31st 2019

Morning

8:30 AM Breakfast

Presentations – Jonathan Ellman presiding

9:00 AM **Development of Nickel-Catalyzed and Biocatalytic Synthetic Methods**
John Montgomery (University of Michigan at Ann Arbor)

9:45AM **Kinetic Analysis of Catalytic Organic Reactions Using a Temperature Scanning Protocol**
Donna Blackmond (TSRI)

10:30 AM Coffee break

11:00 AM **Deconstruction of Cyclopropanone Equivalents Enables the C–H Fluoroethylation of Heterocycles**
Vincent Lindsay (North Carolina State University)

11:45 AM **Innovating C–H Functionalization by Directed Evolution**
Xiongyi Huang (Caltech)

12:30 PM Lunch – arranged for this workshop

Afternoon

Presentations – Shane Krska presiding

1:30 PM **Stereoselective Functionalization of Unsaturated Hydrocarbons**
Uttam Tambar (UT Southwestern)

2:15 PM **Tantalum-Based Metallocenes for Activation of Hydrocarbons**
Sharon Neufeldt (Montana State University)

3;00 PM Coffee break

3:30 PM **New Strategies for Hydrocarbon Functionalization**
Erik Alexanian (University of North Carolina at Chapel Hill)

4:15 PM **Simple Catalysts For the Arylation, Vinylation, and Alkylation of C–H Bonds**
Hosea Nelson (UCLA)

5:00 PM **Discussion: Development of a community to advance C–H Functionalization**

Discussion Leaders: Donna Blackmond, Huw Davies and Brian Stoltz

How could the CCHF engage more broadly with the whole C-H functionalization community?

CCHF has developed a collaborative community to study C-H functionalization. Is this a collaborative model that is worth continuing beyond the CCHF?

Does the organic community need to work collectively to demonstrate the value of organic synthesis or is it better to focus on individual efforts?

Evening

6:00 PM Telluride Picnic

Thursday, August 1st 2019

Morning

Free time for hiking and other activities (will be swapped with Wednesday if the weather is bad)

Lunch will not be provided

Afternoon

Presentations – Eric Voight presiding

2:00 PM **C–H Functionalization for the Rapid, Modular Synthesis of Drug Relevant Compounds**
Jonathan Ellman (Yale University)

2:45 PM **Remote C–H Functionalization via Radical Chaperones**
David Nagib (The Ohio State University)

3:30 PM Coffee break

4:00 PM **Organocatalytic Approaches to C–H Functionalization**
Michael Hilinski (University of Virginia)

4:45 PM **Catalyst-Controlled C–H Functionalization: Future Challenges and Opportunities**
Huw Davies (Emory University)

5:30 PM **Discussion: Future Big Challenges / Opportunities for C–H Functionalization**

Discussion Leaders:
Lutz Ackerman, Sukbok Chang and John Montgomery

Have all the most significant advances in C-H functionalization already been achieved?

C-H Functionalization has been a high-profile research area for the last decade. What is needed for this to continue?

C-H functionalization is of broad international interest. How do we maximize the global engagement?

Evening

Open

Friday, August 2nd 2019

Morning

8:30 AM	Breakfast
9:00 AM	Closing Remarks – Huw Davies
10:00 AM	Departure

Lutz Ackermann

Institute for Organic and Biomolecular Chemistry, Georg-August-University Göttingen

Lutz Ackermann studied Chemistry at the University Kiel (Germany), and performed his PhD with Prof. Alois Fürstner at the Max-Plank-Institut für Kohlenforschung (Mülheim/Ruhr, 2001). After a postdoctoral stay at UC Berkeley with Prof. Robert G. Bergman, he initiated his independent research career in 2003 at the Ludwig Maximilians-University München. In 2007, he became Full Professor (W3) at the Georg-August-University Göttingen. His recent awards and distinctions include an AstraZeneca Excellence in Chemistry Award (2011), an ERC Grant (2012) and a Gottfried-Wilhelm-Leibniz-Preis (2017). The development and application of novel concepts for sustainable catalysis constitutes his major current research interests, with a topical focus on C-H activation.

Erik Alexanian

University of North Carolina at Chapel Hill

Erik received his A. B. degree from Harvard University in 2001. During his undergraduate education, he performed research with Prof. Amir Hoveyda at Boston College focusing on enantioselective alkene metathesis. Erik continued his studies at The Scripps Research Institute in the laboratory of Prof. Erik Sorensen, moving to Princeton University before receiving his Ph. D. degree in 2006. His doctoral training involved the total synthesis of the furanosteroid viridin and the development of a palladium-catalyzed alkene aminoacetoxylation. Erik's postdoctoral work with Prof. John Hartwig at the University of Illinois centered on synthetic and mechanistic studies of transition metal enolates. Erik enthusiastically joined the Chemistry Department faculty at UNC Chapel Hill in 2008 and was promoted to Professor of Chemistry in 2019. The Alexanian group currently focuses on the development of new manifolds for intermolecular aliphatic C–H functionalization and catalytic approaches to C–C bond construction.

Donna G. Blackmond

Scripps Research

Donna G Blackmond received a PhD in Chemical Engineering from Carnegie-Mellon University. She has held professorships in chemistry and in chemical engineering in the US, Germany, and the UK, and she has worked in the pharmaceutical industry at Merck & Co., Inc. She is Professor of Chemistry and Department Chair at Scripps Research in La Jolla, California. She holds joint US/UK citizenship.

Prof. Blackmond has been recognized internationally for her research including awards from the Royal Society, the Max-Planck-Gesellschaft and the American

Chemical Society. She is an elected member of the US National Academy of Engineering and the American Academy of Arts and Sciences. She has been a Woodward Visiting Scholar at Harvard, a Miller Institute Research Fellow at Berkeley, an NSF Visiting Professor at Princeton, the Givaudan-Karrer Lecturer at University of Zürich, and the Gordon Lecturer at the University of Toronto.

Prof. Blackmond is an Associate Editor of the *Journal of Organic Chemistry* and serves on the Editorial Board of *Reaction Engineering and Chemistry* as well as the Editorial Advisory Boards of *ACS Central Science*, *Organic Letters*, and *Advanced Synthesis and Catalysis*. She serves as a consultant to several major pharmaceutical companies.

Prof. Blackmond's research focuses on mechanistic studies of organic reactions, including asymmetric catalysis. She is a Simons Investigator in the Simons Foundation Collaboration on the Origins of Life where she studies prebiotic chemistry and the origin of biological homochirality.

Simon Blakey

Emory University

Simon Blakey was born in Auckland, New Zealand in 1975. Having spent time growing up in both New Zealand and Singapore, he received his B.Sc. degree in Chemistry and Biochemistry at the University of Auckland in 1997. He then moved to the U.K. and completed his Ph.D. studying the synthesis of the aplyronine family of natural products under the direction of Professor Ian Paterson at the University of Cambridge. After three years as a postdoctoral fellow investigating nickel catalyzed cross-coupling reactions and organocatalytic approaches to diazonamide A with Professor David MacMillan at the California Institute of Technology, Simon joined the faculty at Emory University in the fall of 2005. Today his research interests revolve around the development of new synthetic technology and its implementation to impact both drug discovery and materials science.

Sukbok Chang

Department of Chemistry, Korea Advanced Institute Science and Technology (KAIST) and Institute for Basic Science (IBS)

• 1996/06, Ph.D. Organic Chemistry, Harvard University (Advisor: Prof. Eric. N. Jacobsen)
• 1998/03-2002/02, Assistant Professor, Ewha Womans University
• 2002/03-present, Professor, KAIST (2008/02-2011/08, Chair, Department of Chemistry)
• 2012/12-present, Director, Center for Catalytic Hydrocarbon Functionalizations (IBS)
• 2018/09-present, Distinguished Professor, KAIST

Huw M. L. Davies

Emory University

Huw's research emphasizes the development of new enantioselective synthetic methods and their applications in total synthesis and drug discovery. A major current theme of his program is catalytic asymmetric C–H functionalization by means of rhodium-carbene induced C–H insertion. He is currently the Director of the NSF Center for Chemical Innovation for Selective C–H Functionalization, which brings together 22 faculty members from 15 universities.

Jonathan Ellman

Yale University

Jonathan Ellman is the Eugene Higgins Professor of Chemistry and Professor of Pharmacology at Yale University. He earned his B.S. degree from MIT, his Ph.D. degree from Harvard University, and carried out postdoctoral research at UC Berkeley. Prior to moving to Yale in 2010, he was a member of the faculty at UC Berkeley where he held the rank of Professor of Chemistry from 1999 to 2010 and concurrently was a Professor of Cellular and Molecular Pharmacology at UC San Francisco.

Michael Hilinski

University of Virginia

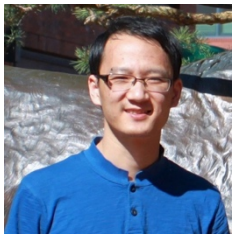
Michael Hilinski earned his B.S. degree in Chemistry at Tufts University, performing research under the direction of Prof. Marc d'Alarcao. After a brief period of employment as a medicinal chemist at AMRI in Albany, NY, he continued his studies as a graduate student in the laboratory of Professor Paul Wender at Stanford University. While at Stanford, he completed total syntheses of several structurally simplified analogs of bryostatin and laulimalide that retain the biological activity of the parent natural products. After receiving his Ph.D. in 2007, he worked as a medicinal chemist in several early-stage pharmaceutical companies before moving to the University of Virginia School of Medicine as a DOD Breast Cancer Research Program Postdoctoral Fellow in the laboratory of Professor Deborah Lannigan. Since 2013, he has been a tenure-track assistant professor in the Department of Chemistry at the University of Virginia. His current research is focused in three main areas: (i) organocatalysis of selective C–H functionalization; (ii) synthetic methods broadly applicable to pharmaceutical and natural product synthesis; and (iii) anticancer drug discovery. In his independent career, he has received several awards including an NSF CAREER award (2019) and a Thieme Chemistry Journals award (2019).

Jessica Hoover

West Virginia University

Jessica Hoover completed her Ph.D. in 2009 at the University of Washington in Seattle under the direction of Professors Jim Mayer and Forrest Michael. She completed postdoctoral work with Shannon Stahl at the University of Wisconsin, developing practical copper-catalyzed aerobic alcohol oxidation reactions and studying the corresponding reaction mechanisms. Jessica's independent academic career began at West Virginia University in 2012 as Assistant Professor, and she was promoted to Associate Professor in 2018. The Hoover research group at WVU focuses on developing and understanding new catalytic reactions, particularly C-C and C-heteroatom bond forming redox reactions, employing first-row transition metal catalysts.

Xiongyi Huang



California Institute of Technology

Xiongyi completed his graduate studies with Prof. John T. Groves at Princeton University as an HHMI International Predoctoral Fellow. During his PhD, Xiongyi has developed a series of Mn-catalyzed biomimetic C–H functionalization reactions and collaborated with scientists at Merck and Mass General Hospital to develop new radiolabeling methods for positron emission tomography. Since May 2016, Xiongyi has been conducting research with Prof. Frances Arnold at Caltech, first as an NIH NRSA Postdoctoral Fellow (F32) and later as an NIH Pathway to Independence Postdoctoral Fellow (K99). In the Arnold group, Xiongyi uses directed evolution to engineer enzymes to catalyze reactions not previously present in biology. In August 2019, Xiongyi will start his own group at the Johns Hopkins University, focusing on new enzyme development by bridging synthetic chemistry and biology.

Shane W. Krska

High-Throughput Experimentation & Lead Discovery Capabilities, Merck & Co., Inc., Kenilworth, NJ

Dr. Krska completed his B.S. in chemistry at the South Dakota School of Mines and Technology and his Ph.D. in inorganic chemistry from MIT under the direction of Prof. Dietmar Seyferth. After conducting postdoctoral research with Prof. Robert Bergman at U.C. Berkeley, he began his career at Merck Research Laboratories in 1999. In 2002, he helped found the Merck Catalysis Laboratory, an early pioneer in the use of high-throughput experimentation (HTE) techniques to enable applications of homogeneous catalysis in pharmaceutical synthesis. In 2012, he helped Merck establish an enabling chemistries group in medicinal chemistry focused on utilizing HTE and cutting-edge chemistries such as C-H functionalization to

accelerate drug discovery, where he currently serves as Senior Principal Scientist.

Jared C. Lewis

Indiana University

Jared C. Lewis was born and raised in Effingham, IL. He obtained his B.S. in chemistry from the University of Illinois (2002, Prof. Eric Oldfield), earned his Ph.D. in chemistry from the University of California, Berkeley (2007, Profs. Jonathan Ellman and Robert Bergman), and conducted postdoctoral studies at Caltech (2010, Prof. Frances Arnold). He started his independent career at the University of Chicago in 2011 and moved to Indiana University as an Associate Professor in 2018.

Vincent N. G. Lindsay

North Carolina State University

Vince was born and raised in Montreal, Canada. He received his B.Sc. at Université de Montréal in 2007 where he worked as an undergraduate researcher on the enantioselective Cu-catalyzed addition of diorganozinc reagents to nitroalkenes. With a newly found interest for asymmetric catalysis, he decided to pursue his doctoral studies with Prof. André B. Charette (Université de Montréal) and received his Ph.D. in 2012, working on Rh-catalyzed asymmetric cyclopropanation reactions using acceptor-acceptor carbene precursors. In 2013, he moved to Berkeley, California to work as a FRQNT Postdoctoral Fellow with Prof. Richmond Sarpong (UC Berkeley) on modern synthetic strategies to synthesize alkaloids and other *N*-heterocycles. He began his independent career in July 2016 at NCSU, working on the development of novel synthetic methods.

Ruben Martin

Institute of Chemical Research of Catalonia (ICIQ)

Ruben Martin received his PhD in 2003 (University of Barcelona, Prof. Antoni Riera). During the next 4 years (2004-2008) he conducted postdoctoral studies at the Max-Planck Institut für Kohlenforschung as a Humboldt fellow (Prof. Alois Fürstner) and at MIT (Prof. Stephen Buchwald). In September 2008 he initiated his independent career as an assistant professor at ICIQ. In July 2013 he was promoted to associate professor and subsequently to ICREA Research Professor. His interests concern the discovery and development of synthetically useful organometallic methodologies via metal-catalyzed functionalization of strong sigma bonds.

John Montgomery

University of Michigan at Ann Arbor

John Montgomery grew up in Albemarle, N.C. and studied chemistry at the University of North Carolina at Chapel Hill, graduating in 1987. While at UNC, he conducted research under the direction of Profs. Joe Templeton and Maurice Brookhart where his experience sparked his interest in organometallic chemistry. He then went on to receive his Ph.D. at Colorado State University in 1991 under the direction of Prof. Louis Hegedus, and he was an American Cancer Society Postdoctoral Fellow at the University of California at Irvine from 1991 – 1993 with Prof. Larry Overman.

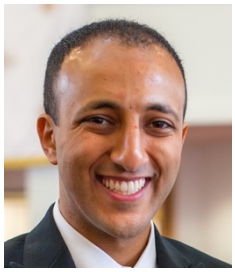
In 1993, he began his independent career at Wayne State University, he moved to the University of Michigan at Ann Arbor in 2005, and in 2013 he was appointed as the Margaret and Herman Sokol Professor in the Department of Chemistry. He currently serves as the Director of the Michigan Chemistry-Biology Interface Training Program funded by NIGMS, and he is a member of the Interdepartmental Program in Medicinal Chemistry and the Program in Chemical Biology. The Montgomery group is currently part of the NSF Center for Selective C-H Functionalization (CCHF) and the NIH Common Fund Program in Glycoscience.

Djamaladdin Musaev

Emory University

Djamaladdin (Jamal) Musaev is a Director of the Emerson Center of Emory University. He has obtained his BS and MS degrees from Azerbaijan State University (Baku), and Ph.D. from USSR Academy of Science (Moscow, Russia). His research interests are (a) understanding of fundamental principles of transition metal-catalyzed nitrogen fixation, hydrocarbon oxidation, σ-bond (C-H, C-C, etc) functionalization, alkene/alkyne boration, and olefin polymerization; (b) Designing of Solar energy-driven robust multi-electron-transfer catalysts for water splitting, and (c) the development of hybrid computational methods applicable to nano-scaled processes. Jamal has published more than 360 scientific papers, several books, and book chapters.

David Nagib



The Ohio State University

David grew up near Philadelphia, PA as the eldest of four siblings in an Egyptian family with a strong love for teaching and education. He earned his B.Sc. with honors at Boston College in 2006, studying peptide-catalyzed desymmetrization with Prof. Scott Miller. In 2011, he earned his PhD at Princeton University, developing medicinally relevant trifluoromethylations via photoredox catalysis with Prof. David MacMillan. As an NIH Postdoctoral Fellow at the University of California, Berkeley, he studied C-H activation via

oxidative gold mechanisms with Prof. F. Dean Toste, while also collaborating with Prof. Omar Yaghi on promoting catalysis within MOF materials. Since 2014, David has been an Assistant Professor in the Department of Chemistry and Biochemistry at The Ohio State University, where his team's research on radical-mediated C-H and C-O functionalization has been recognized by the ACS, NIH, NSF, and Sloan Foundation. When not working alongside his awesome labmates, David enjoys running along the Scioto River, checking out Columbus' vibrant foodie scene, and planning future world travels.

Alison Narayan

University of Michigan at Ann Arbor

Alison Narayan's main research interest is identifying enzymes from secondary metabolite pathways with potential synthetic utility and developing methods based on these biocatalysts to enable access to biologically active target molecules.
Narayan holds a Ph.D. in organic chemistry from the University of California, Berkeley. She completed her undergradaute studies in chemistry at the University of Michigan, where she later returned as a postdoctoral research fellow in the lab of David Sherman.
She started an Assistant Professor in the Department of Chemistry and the Life Sciences Institute at Michigan in 2015. Since this time Alison and her research group have been recognized as a part of C&ENs Talented 12, an Alfred P. Sloan Fellow, a Cottrell Scholar and as the inaugural recipient of the Life Sciences Institute Outreach award.

Hosea M. Nelson

UCLA

Hosea obtained a B.S. in Chemistry from University of California Berkeley and a Ph.D. from the California Institute of Technology in 2012 under the mentorship of Brian Stoltz. After postdoctoral training at University of California Berkeley with F. Dean Toste, Hosea joined the UCLA faculty in 2015. His group currently focuses on catalysis, chemical synthesis, and structural chemistry.

Sharon Neufeldt

Montana State University

Sharon Neufeldt earned her B.S. from Northern Arizona University followed by her Ph.D. from the University of Michigan in 2013. In Michigan, she worked with Melanie Sanford on the development of Pd-catalyzed C—H functionalization reactions. She then became the Cram Teacher-Scholar at UCLA, where she undertook postdoctoral research with Ken Houk using DFT to study the mechanism and selectivity of Rh-catalyzed C—H activation of heterocycles. She began her independent career in Fall 2016 at Montana

State University. Her current research focuses on controlling the site selectivity of Pd- and Ni-catalyzed cross-coupling reactions, as well as exploring the use of early transition metals for converting hydrocarbons into nucleophilic carbon sources.

Hans Renata

The Scripps Research Institute

Hans Renata received his B.A. from Columbia University in 2008, conducting research under the supervision of Prof. Tristan H. Lambert. He earned his Ph.D. in chemistry from The Scripps Research Institute in 2013 under the guidance of Prof. Phil S. Baran. Following postdoctoral studies in the laboratory of Prof. Frances H. Arnold at Caltech, Hans started his independent career at The Scripps Research Institute Florida in the fall of 2016. His research interest focuses on the development of new biocatalytic tools to streamline access to complex molecules.

Jennifer L. Roizen

Duke University

Jennifer L. Roizen is an Assistant Professor at Duke University and a 2017 Thieme Chemistry Journals Award recipient. She had her first taste of synthetic research with J. Hodge Markgraf and Tom Smith as a Williams College undergraduate, where she advanced syntheses of benzoisocanthenones and contributed to publications on the total synthesis of hennoxazole A (a marine natural product). She moved to the California Institute of Technology to earn a Ph.D. with Brian Stoltz, researching approaches to access the ineleganolide core. These Cope-centric approaches remain the only published strategies to access the all carbon framework of ineleganolide, a small molecule that continues to elude synthetic campaigns. Upon graduation, Dr. Roizen became an NIH postdoctoral researcher and CMAD fellow with Justin Du Bois at Stanford University, where they extended intermolecular amination technologies. Dr. Roizen's laboratory researches total synthesis and the development of cross-coupling and C–H functionalization processes.

Daniel Seidel

University of Florida

Daniel received his Diplom from the Friedrich-Schiller Universität at Jena, Germany in 1998, after having completed his fifth and final year of the program at the University of Texas at Austin as a fellow of the Trans Atlantic Student Exchange Program. He returned to Austin to perform his graduate studies in the lab of Prof. Jonathan L. Sessler, obtaining his Ph.D. in 2002 for the development of new methods for the synthesis of expanded porphyrin analogues. From 2002–2005, Daniel was an Ernst Schering Postdoctoral Fellow in the group of Prof. David A. Evans at Harvard University, focusing on

the development of new metal catalysts for catalytic enantioselective transformations. He started his independent career at Rutgers University in 2005, was promoted to Associate Professor in 2011, and to Professor in 2014. In 2017, his group moved to the University of Florida.

Uttam Tambar

The University of Texas Southwestern Medical Center

Uttam K. Tambar moved from India to the United States in 1982. He received his A.B. degree from Harvard University in 2000 and his Ph.D. from the California Institute of Technology in 2006 with Professor Brian Stoltz. After he completed his NIH Postdoctoral Fellowship at Columbia University with Professor James Leighton in 2009, he began his independent research career at UT Southwestern Medical Center in Dallas. He is currently an Associate Professor in the Biochemistry Department and a W. W. Caruth, Jr. Scholar in Biomedical Research. The Tambar lab is interested in asymmetric catalysis, natural product synthesis, and medicinal chemistry.

Homepage: http://www.utsouthwestern.edu/labs/tambar/
Twitter: @TambarLab

Eric Voight

AbbVie

Eric studied Organic Chemistry at the University of WI – Madison, obtaining his PhD in 2004 with Steve Burke. After spending 4 years as a process chemist at Merck and GSK, Eric joined Abbott Neuroscience Discovery in 2008. n 2012, Eric started the AbbVie Centralized Organic Synthesis group, with impactful synthesis solutions to help advance more than 10 clinical candidates across neuroscience, immunology, virology, oncology, and cystic fibrosis. He received an AbbVie president's award for contributions to the discovery of ABBV-951 for Parkinson's Disease. Eric joined the CCHF External Advisory Board in 2016 and was the first speaker from industry at the 10th CCHF Virtual Symposium in 2018.

Masayuki Wasa

Boston College

Masayuki Wasa received his Ph.D. from the Scripps Research Institute in 2013 under the direction of Prof. Jin-Quan Yu before conducting postdoctoral studies with Prof. Eric N. Jacobsen at Harvard University as the JSPS postdoctoral fellow. In the fall of 2015, he joined Boston College as an assistant professor. His research interests include development of enantioselective synthetic methods using frustrated acid/base pair catalysts.