Innovations in Catalysis to Address Modern Challenges - A Workshop

Speaker Biographies:

Melanie Buser is currently serving as the Assistant Director of Environmental Health for the White House Office of Science and Technology Policy (OSTP) Climate and Environment Team. She is an environmental health scientist and toxicologist by training and previously worked at the Centers for Disease Control and Prevention, Agency for Toxic Substances and Disease Registry (CDC/ATSDR) for nearly a decade. Dr. Buser chairs the National Science and Technology Council's Joint Subcommittee on Environment, Innovation and Public Health as well as three strategy teams on contaminants of emerging concern, per- and poly-fluoroalkyl substances, and sustainable chemistry. Her primary responsibilities are providing government-wide interagency leadership on science priorities of the Administration and ensuring the quality and utility of scientific information across the executive branch. Dr. Buser received her Masters of Public Health, in Environmental Health from Emory University and completed her PhD in Epidemiology from Georgia State University.

Susannah Scott is a Distinguished Professor in both Chemical Engineering, Chemistry & Biochemistry at the University of California, Santa Barbara. She founded the Mellichamp Academic Initiative in Sustainable Manufacturing and Product Design where she holds the Duncan and Suzanne Mellichamp Chair in Sustainable Catalysis. Dr. Scott is also Chair of the Santa Barbara Division of the University of California's Academic Senate. Additionally, she is an Executive Editor for ACS Catalysis, a member of the Board of Reviewing Editors for Science, and Chair of the 2022 Gordon Research Conference on Catalysis. Scott's research interests include the design of heterogeneous catalysts with well-defined active sites for the conversion of unconventional carbon-based feedstocks, as well as environmental catalysts to promote air and water quality. She received her Ph.D. in Inorganic Chemistry from Iowa State University, under the direction of Jim Espenson and Andreja Bakac, for her work on the activation of O_2 and transition metal-catalyzed oxidation mechanisms.

Bob Maughon is the executive vice president, Sustainability, Technology & Innovation and Chief Technology and Sustainability Officer at SABIC. He oversees a global organization with 20 research centers around the world and a talented team focused on driving process, product and application innovation to support SABIC's growth agenda. Additionally, Dr. Maughon has responsibility for Corporate Sustainability, Product Stewardship, Technology Licensing and Technology Ventures. Prior to joining SABIC in 2019, Dr. Maughon served as the Research& Development (R&D) vice president for Packaging & Specialty Plastics and Hydrocarbons at Dow. Early in his career with Dow, he worked in the Corporate R&D laboratories on a variety of programs ranging from heterogeneous hydrogenation catalysis, ring opening polymerization, homogeneous catalysis and alternative feedstocks. Over the course of his 21-years with Dow, Dr. Maughon moved from an individual contributor to eventually assuming leadership roles in Corporate R&D and subsequently Business R&D for Hydrocarbons and Energy, Dow Pharma & Food Solutions, and Packaging & Specialty Plastics and Hydrocarbons. Dr. Maughon serves as a

member for the University of Michigan Engineering Leadership Advisory Board, the AspenTech Executive Advisory Board, and the American Chemical Society Sustainable Development Advisory Council. He holds nine U.S. Patents and has numerous publications and presentations at external conferences. Dr. Maughon earned his BA degree in chemistry from Rice University and his PhD in organic chemistry from the California Institute of Technology.

Todd Hyster is currently an Associate Professor of Chemistry and Chemical Biology at Cornell University. Dr. Hyster's group has developed photochemical strategies to expand the synthetic utility of common enzymes, enabling them to address long-standing selectivity challenges in the chemical synthesis literature. After graduating, he joined the group of Frances Arnold at Caltech as an NIH Postdoctoral Fellow. In the Arnold group, Todd evolved P450s to catalyze nitrene transfer reactions. Dr. Hyster completed his undergraduate studies at the University of Minnesota. He received his Ph.D. from Colorado State University where he studied to develop Rhodium-catalyzed C–H activation reactions.

Ive Hermans is currently a John and Dorothy Vozza Professor & Evan P. and Marion Helfaer Professor in the Department of Chemistry & Department of Chemical and Biological Engineering at the University of Wisconsin-Madison. After post-doctoral research on in situ spectroscopy and reaction engineering, he became assistant professor for heterogeneous catalysis (spring 2008) at ETH Zurich in Switzerland. January 2014, Dr. Hermans moved to the University of Wisconsin-Madison, holding a dual appointment in the Department of Chemistry and the Department of Chemical and Biological Engineering. His group focuses on the mechanistic understanding of catalytic technology using a variety of techniques. In 2009 he received the ExxonMobil Chemical European Science and Engineering Award, in 2014 the Emerging Researcher Award by the ACS Division of Energy and Fuels, the 2016 Postdoc Mentoring Award by the UW Postdoc Association, the 2017 Inaugural Robert Augustine award by the Organic Reaction Catalysis Society, the 2019 Ipatieff Price by the American Chemical Society and was selected as a 2021 Alexander von Humboldt Professor. Dr. Hermans holds an M.Sc. (2002) Leuven University (KU Leuven) and a Ph.D. (2006) from Leuven University (KU Leuven).

Anita Mattson is currently a professor and the department head of the chemistry & biochemistry departments at Worchester Polytechnic University. Dr. Mattson's research group focuses on a combination of catalyst design, methodology development, and complex molecule synthesis. Their catalyst design program is focused on the synthesis and study of new families of non-covalent catalysts, including boronate ureas and silanediols, that are able to promote new reactivity patterns. The catalyst design and associated reaction development programs are currently geared toward the synthesis of enantioenriched nitrogen and oxygen heterocycles that frequently appear in naturally occurring bioactive compounds. Their long-term vision includes applying our non-covalent catalysis toward the synthesis and study of naturally-inspired medicinal agents. Dr. Mattson completed her Postdoc at the University of North Carolina at Chapel Hill and received her PhD from Northwestern University.

Paula Diaconescu joined the UCLA Chemistry & Biochemistry department in 2005, after spending two years as a postdoctoral fellow in the group of Professor Robert Grubbs at the California Institute of Technology, working on the transformation of methanol to triptane. At UCLA, the Diaconescu Group is interested in developing fundamental concepts and applying them to catalysis. Current research efforts focus on redox switchable catalysts. This new area of chemistry is inspired by nature's sensory processes and uses external agents as switches in order to control the catalytic activity of multiple species with different reactivity. The findings from this research project have been applied to the controlled synthesis of multiblock copolymers. In September 2020, Paula became the director of NSF's Center for Integrated Catalysis (CIC). CIC is particularly interested in integrating molecular catalysis and materials science to achieve streamlined chemical synthesis from abundant feedstocks. Dr. Diaconescu is an Alfred P. Sloan Fellow (2009), a Guggenheim Fellow (2015), and an American Association for the Advancement of Science Fellow (2019), and received the National Science Foundation CAREER Award (2009) and the Friedrich Wilhelm Bessel Research Award from the Alexander von Humboldt Foundation (2014). Her earlier education was completed in Romania, where she obtained her B.S. from the University of Bucharest and worked on coordination complexes of transition metals and lanthanides at the University Politehnica of Bucharest. She obtained her Ph.D. degree at Massachusetts Institute of Technology by studying uranium organometallic chemistry.

Jeffrey Johnson is currently an A. Ronald Gallant Distinguished Professor at the University of North Carolina at Chapel Hill where from January 1, 2016 to June 30, 2020, he was the Department Chairperson. His research interests include Synthetic Organic Chemistry and Asymmetric Catalysis. Dr. Johnson was a standing member of the National Institutes of Health Synthetic and Biological Chemistry Study Section from 2013-2018, serving as chairperson from 2016-2018. Dr. Johnson earned his B.S. at the University of Kansas in 1994, graduating with Highest Distinction and Honors in Chemistry. He performed graduate research as an NSF Graduate Fellow in the laboratories of Professor David Evans at Harvard University from 1994-1999. After receiving his Ph.D. in 1999, he was an NIH Postdoctoral Fellow Bergman at the University of California at Berkeley.

Carsten Sievers is currently a professor at the Georgia Institute of Technology. Dr. Sievers' research interests are in heterogeneous catalysis, reactor design, applied spectroscopy, and characterization and synthesis of solid materials. Combining these interests he seeks to develop processes for the production of fuels and chemicals. His research program combines fundamental and applied research. Dr. Sievers earned his Diploma in 2003 from Technical University of Munich, Germany and his D.Sc. 2006 from Technical University of Munich, Germany.

Ramesh Giri is a Professor of Chemistry at the Pennsylvania State University. He earned his MSc in 1998 from Tribhuvan University, Nepal, M.Phil. in 2003 from Cambridge University, UK, and Ph.D. in 2009 from the Scripps Research Institute, La Jolla with Prof. Jin-Quan Yu. He then completed postdoctoral studies with Prof. John Hartwig at UC Berkeley/UIUC. In 2012, he joined the faculty at the University of New Mexico where he was promoted to an Associate Professor in 2018 before moving to the Pennsylvania State University in 2019. His research is focused on

developing sustainable catalytic organic transformations, alkene difunctionalization in particular, with earth-abundant metals. His research efforts have been supported by the NSF and the NIH.

James Mack is a professor of Chemistry and Associate Dean for the Division of Natural Sciences in the College of Arts and Science at the University of Cincinnati. Professor Mack has an interest in the development of environmentally benign chemical reactions. His research has been featured in the New York Times, Chemical and Engineering News and Chemistry and Industry. In addition to his research accomplishments, he received recognition for his mentorship and service by both graduate and undergraduate students. After completing his Bachelor's degree at Middlebury College (1995), he was awarded a New England Board of Higher Education Scholarship and earned his doctoral degree at the University of New Hampshire, studying the derivations of fullerenes under the supervision of Glen P. Miller (2000).

LaShanda T. J. Korley is a Distinguished Professor in the Departments of Materials Science & Engineering and Chemical & Biomolecular Engineering at the University of Delaware (UD). Previously, she held the Climo Associate Professorship of Macromolecular Science and Engineering at Case Western Reserve University, where she started her independent career in 2007. Dr. Korley is the Director of an Energy Frontier Research Center – Center for Plastics Innovation (CPI) funded by the Department of Energy and also the Co-Director of a Materials Research Science and Center – UD Center for Hybrid, Active, and Responsive Materials (UD CHARM). She is also the Principal Investigator for the National Science Foundation Partnershipsfor International Research and Education (PIRE): Bio-inspired Materials and Systems and the codirector of the Center for Research in Soft matter & Polymers (CRiSP) at the University of Delaware. She was awarded the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) Lloyd N. Ferguson Young Scientist Award for Excellence in Research and the American Institute for Chemical Engineers (AIChE) Minority Affairs Committee Gerry Lessells Award. She received a B.S. in both Chemistry & Engineering from Clark Atlanta University as well as a B.S. in Chemical Engineering from the Georgia Institute of Technology in 1999. Prof. Korley completed her doctoral studies at MIT in Chemical Engineering and the Program in Polymer Science and Technology in 2005, and she was the recipient of the Provost's Academic Diversity Postdoctoral Fellowship at Cornell University in 2005.

William Tarpeh is an assistant professor of chemical engineering at Stanford University. The Tarpeh Lab develops and evaluates selective separations in "waste" waters at several synergistic scales: molecular mechanisms of chemical transport and transformation; novel unit processes that increase resource efficiency; and systems-level assessments that identify optimization opportunities. Will completed his B.S. in chemical engineering at Stanford, his M.S. and Ph.D. in environmental engineering at UC Berkeley, and postdoctoral training at the University of Michigan in environmental engineering. Will has been honored as a Dreyfus Teacher-Scholar, 3M Non-Tenured Faculty Awardee, Forbes' "30 Under 30" 2019 Science List, Gulf Research Program Early Career Fellow, and a member of Chemical and Engineering News Talented 12.

Planning Committee Biographies

Christopher Bradley currently serves as a Program Manager in the Catalysis Science Program within Basic Energy Sciences at the U.S. Department of Energy (DOE). While at DOE, he has co-managed a portfolio of 100+ projects in catalysis annually while also providing co-oversight for 8 Energy Frontier Research Centers related to catalysis. Prior to DOE, he was an Associate Professor of Chemistry at Mount St. Mary's University and an Assistant Professor at Texas Tech University. Dr. Bradley's background is in organometallic chemistry and nanoparticle catalysis, having received a Ph.D. (2006) at Cornell University and hg served as a post-doctoral scholar at UC Berkeley/LBNL.

Karen Goldberg, NAS, is a Vagelos Professor of Energy Research at the University of Pennsylvania and the Director of the Vagelos Institute for Energy Science and Technology. Her previous faculty appointments were at Illinois State University, a primarily undergraduate institution, and the University of Washington. She served as Director of the first National Science Foundation Phase II Center for Chemical Innovation (CCI), the Center for Enabling New Technologies through Catalysis (CENTC) from 2007-18. Her research is focused on the mechanistic study of organometallic reactions and the development of new catalytic systems to efficiently produce chemicals and fuels from a range of available feedstocks. Dr. Goldberg was elected a Fellow of the American Association for the Advancement of Science and a member of the Washington State Academy of Science in 2012. In 2015, she received the Carol Tyler Award from the International Precious Metal Institute and in 2016, the ACS Award for Organometallic Chemistry. She was elected to the American Academy of Arts and Sciences in 2017 and to the National Academy of Sciences in 2018. She received her A.B. degree from Barnard College of Columbia University and her Ph.D. in Chemistry from the University of California at Berkeley. Goldberg has served on BCST since 2019.

Carlos Gonzalez is currently the Chief of the Chemical Sciences Division at NIST, one of the largest Divisions at NIST (with over 170 staff members) in charge of providing the Chemical Function within the National Institute of Standards and Technology. Before joining NIST in 1997, Dr. Gonzalez worked as a Quantum Chemistry expert at the Pittsburgh Supercomputing Center. Dr. Gonzalez's research interests focus on the development and implementation of reliable and efficient quantum chemistry methodologies in the study of physical and chemical properties of a wide variety of chemical systems. His work leading to the development of an efficient methodology to compute minimum energy reaction paths within the Intrinsic Reaction Coordinate formalism has been widely cited in the open literature (over 3,000 citations, according to the Citation Index). Dr. Gonzalez is the recipient of the 2005 Department of Commerce Brown Medal, the 2007 Science Spectrum Magazine's Minorities in Research Science Emerald Honor "for his exemplary performance in the area of research leadership" and more recently, he was awarded the 2013 Professional Achievement Level II Award from the Hispanic Engineer National Achievement Award Corporation (HENAAC). Dr. Gonzalez received his Ph.D in Theoretical Chemistry at Wayne State University, in 1990. He then moved in 1991 to Pittsburgh where he worked as a postdoctoral associate in Carnegie Mellon University under the supervision of Prof. John A. Pople, Nobel Laureate in Chemistry, 1998.

Mark Jones is an independent consultant at MJPhD, llc. Mark retired after a >30 year career with Dow Chemical, ending his Dow career after serving over a decade as the executive external strategy and communications fellow, on the staff of the chief technology officer, where he assisted with technical assessments and development of external communications. He joined Dow in 1990 following a graduate career studying gas-phase ion molecule chemistry. He was introduced to catalysis during a post-doc. He spent his early career in heterogeneous catalysis where he participated in a number of catalyst scale-ups, process improvements, and commercializations. Work included alkane activation and partial oxidation, including the production of vinyl chloride directly from ethane, ethylene from methane, and oxidative carbonylation. He joined basic plastics and chemical/hydrocarbons and energy R&D. where he worked on a variety of alternative feedstock and sustainability issues. He then spent 2 years focusing on lithium ion batteries, developing processes for the production of battery materials. He has over 16 issued U.S. patents and numerous publications. He holds a B.S. in chemistry from Randolph-Macon College and a Ph.D. in physical chemistry from the University of Colorado, Boulder. He is a Fellow of the American Chemical Society.

Audrey Moores is a Full Professor of Chemistry, co-lead of the Materials group of the McGill Sustainable Systems Initiative and associate director of the Facility for Electron Microscopy Research at McGill University. She serves as an associate editor for the American Chemical Society Sustainable Chemistry & Engineering. With her group, she focuses on sustainable solutions for nanoparticles and biopolymer synthesis as well as catalyzed reactions, with an interest in waste biomass valorization, earth abundant starting materials and high atom economy. Her activity in catalysis includes studies of magnetically active nanocatalysts, photocatalytic systems, including plasmonic systems, and catalysis in confined nanospaces. In 2020 she became a member of the College of New Scholars, Artists and Scientists of the Royal Society of Canada, which is the junior body of the equivalent to a Canadian Academy of Science. She was later elected as a council member there. In 2021 she received the Canadian Chemistry and Chemical Engineering Award for Green Chemistry. She completed her PhD from the Ecole Polytechnique, France in 2005, under the supervision of Prof. Pascal Le Floch and received the Best Thesis award of the Ecole Polytechnique that year.

Jake Yeston currently serves as editor at Science, beginning in 2004, where he oversees research content in the physical sciences. Prior to arriving at Science, he conducted postdoctoral research in ultrafast spectroscopy at the Max Planck Institute for Quantum Optics in Garching, Germany on the Humboldt fellowship, and then worked as a National Research Council fellow at the National Institute of Standards and Technology in Gaithersburg, Maryland. Jake earned an AB in chemistry from Harvard University in 1996 and a PhD in chemistry from the University of California-Berkeley in 2001, with a focus at the interface of synthetic organometallic chemistry and vibrational spectroscopy.