

The National Academies of **SCIENCES • ENGINEERING • MEDICINE**

MEETING OF THE BOARD ON CHEMICAL SCIENCES AND TECHNOLOGY

Virtual Meeting

March 3-4, 2021

SPEAKER BIOGRAPHIES

Diversity, Equity, Inclusion, Justice, and Belonging in Chemistry and Chemical Engineering

Christine Grant is a Professor of Chemical and Biomolecular Engineering at NC State and served for 12 years as the inaugural Associate Dean of Faculty Advancement, responsible for faculty development, promotion and tenure in the College of Engineering. She's conducted research in surface/interfacial science and developed a green chemical engineering curriculum. Grant is a Fellow, Life Member and 2021 President-elect of the American Institute of Chemical Engineers (AIChE) (a global organization of 60,000+ members in 110 countries); she's also a Life Member of SWE, NSBE and AISES. Grant's been recognized for broadening the participation, promotion and retention of underrepresented minorities and women in STEM as a recipient of the: 2015 AAAS Mentor Award, 2003 NSF Presidential Award for Excellence in Science, Math and Engineering Mentoring (PAESMEM); 2019 William W. Grimes Award for Excellence in Chemical Engineering (AIChE Minority Affairs Committee); 2019 Dr. Joseph N. Cannon Award for Excellence in Chemical Engineering from the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE); 2017 Women in Engineering Pro-Active Network (WEPAN) Beville A. Watford Inclusive Excellence Award, American Chemical Society Stan Israel Award for Diversity: SERMACS (2012); Sigma Xi Scientific Research Society (2010), and the 2009 Council for Chemical Research (CCR) National Diversity Award. She's been a Visiting Senior Scholar at AAAS and a Grant Expert at NSF. A change agent, she's also been active as a PI on multiple NSF ADVANCE grants and served on the advisory board (or consulted with) several ADVANCE schools including Texas A&M, Cornell, Lehigh, U of New Hampshire and the University of Cincinnati promoting institutional transformation in STEM fields. She co-edited the book, "Success Strategies from Women in STEM: A Portable Mentor" by Elsevier/ Academic Press and contributed chapters to "Growing Diverse STEM Communities: Methodologies, Impact and Evidence" (2019) and "Overcoming Barriers for Women of Color in STEM Fields" (2020). From 2004-2005 she was a Boeing Senior Fellow of the National Academy of Engineering's Center for the Advancement of Scholarship on Engineering Education (CASEE). She was selected to participate in (i) the National Academies: Keck Futures Conference "The Future of Human Healthspan: Demography, Evolution, Medicine, and Bioengineering" (2007) and (ii) the 12th Annual NAE U.S. Frontiers of Engineering Symposium (2006). In 2012, she contributed an ASEE position paper and served as a reviewer for the National Academies Conference, "Seeking Solutions: Maximizing American Talent by Advancing Women of Color in Academia" (2012). She has served as a reviewer for the following National Academies Reports: "The Science of Effective Mentoring in STEM" (2020) and a member of the National Research Council Committee to Review Chemical Agent Secondary Waste Disposal and Regulatory Requirements (2007-08). Soon after tenure she was a member of in a Chemical Sciences "Women in the Chemical Workforce" Roundtable workshop (2000). She obtained her degrees in

Chemical Engineering from Brown University (Sc.B.) and Georgia Institute of Technology (M.S. and Ph.D.).

Dr. Hoby Wedler, a chemist and entrepreneur, is an insightful, disarming, and passionate thinker who loves to bring people together to help them see new possibilities. With the heart of a teacher, Dr. Hoby Wedler helps turn your dreams into realities. Dr. Wedler has been completely blind since birth. He is a scientist, an entrepreneur, a sensory expert, and is driven by his passion for innovative, creative, and insightful thinking. He is remarkably tuned into his surroundings and has frequently chosen to walk the unbeaten paths in life over known territories. In 2011, he founded a non-profit organization to lead annual chemistry camps for blind and visually impaired students throughout North America. In the same year, he began opening doors to the world of wine aromas by developing Tasting in the Dark, a truly blindfolded wine experience, in collaboration with the Francis Ford Coppola Winery. He has since expanded the program to a global market in a variety of industries and special projects. Over the years, Dr. Wedler has become a motivational speaker, a mentor, and an educator. He is also committed to making the world an inclusive, equitable, and accessible place for everyone. In his work, you will find a unique trilogy between sensory awareness, scientific knowledge, and a love for sharing his insights. Numerous people and organizations have recognized Dr. Wedler's work over the years. To name a few, President Barack Obama recognized Dr. Wedler by naming him a Champion of Change for enhancing employment and education opportunities for people with disabilities. Also, Forbes Media named him as a leader in food and drink in their 30 under 30 annual publication. Dr. Wedler is dedicated to impacting everyone he works with by unlocking doors, overcoming challenges, increasing awareness, and expanding their horizons. In 2016, Dr. Wedler earned his Ph.D. in organic chemistry from UC Davis. His fearlessness is infectious, and he has actively paved the way for others to join him in his quest to follow passions regardless of the challenges that lie ahead.

Identifying and Accounting for Vulnerabilities in U.S. Chemical Weapons Detection, Identification, and Tracing Capabilities

Dr. Carlos G. Fraga is a Senior Research Scientist at Pacific Northwest National Laboratory (PNNL). Dr. Fraga joined PNNL in 2005 after serving as an Air Force officer for twelve years. Dr. Fraga retired from the United States Air Force Reserve as a lieutenant colonel in 2014. While in the Air Force, Dr. Fraga managed and performed research dealing with the sampling, detection, and fate of chemical-weapon and nuclear-weapon related materials. He also taught chemistry at the Air Force Academy, including a course on chemical weapons (CW). He was also a United Nations inspector in Iraq, during which time he served as laboratory chief for the Baghdad Monitoring and Verification Center. He has extensive knowledge and experience in the development of chemometric and two-dimensional chromatographic methods for the analysis of trace organic compounds in complex mixtures. Since 2006, Dr. Fraga has focused his efforts on using chemical forensics to source CW agents and explosives. He has edited a special issue on chemical forensics in the journal *Talanta* and has published over a dozen peer-reviewed papers in chemical forensics, including a paper demonstrating the first-ever use of chemical forensics on a CW agent. Dr. Fraga is a strong advocate for making chemical forensics a legitimate scientific discipline so that it can be employed to help prevent and deter future chemical attacks or used in court in the unfortunate event that such analysis is needed. He has presented his chemical forensics work as an invited speaker at several international scientific conferences and has been featured by National Public Radio, PBS Nova-online, NBC, and other news-media outlets. Since 2011, Dr. Fraga has co-hosted six symposia on chemical forensics at the American Chemical Society's national meetings. Dr.

Fraga has recently started cooperative engagements in Africa to help in the strengthening of domestic investigative capabilities for responding to chemical attacks. From 2017 to 2019, he was a member of the Organisation for the Prohibition of Chemical Weapons Scientific Advisory Board Temporary Working Group on Investigative Science & Technology. Dr. Fraga is also a founder and chair of the Chemical Forensics International Technical Working Group (CFITWG). The CFITWG has members from over a dozen countries who work to improve the fundamental understanding and develop capabilities in chemical forensics for toxic agents. Dr. Fraga is on the editorial boards for *Talanta* and *Chemistry Africa*. He has a BS degree in chemistry from the United States Air Force Academy, a M.S. degree in chemistry from the University of Illinois, Urbana-Champaign, and a Ph.D. in analytical chemistry from the University of Washington.

Dr. Audrey Williams is the Director of the Forensic Science Center (FSC) at Lawrence Livermore National Laboratory (LLNL). The FSC is a national security community asset whose twin missions are to conduct innovative research and provide real-world operational support across a broad range of forensic science. As the Director of the FSC, Dr. Williams leads a team of scientists with a variety of technical backgrounds to understand, prepare for, characterize, and respond to threat events ranging across the full WMD spectrum—including chemical, biological, radiological, nuclear, and explosive scenarios. The FSC is a designated Organisation for the Prohibition of Chemical Weapons laboratory (one of four in the United States), providing treaty support capability for the Chemical Weapons Convention. The FSC has also played a key role in multiple high-profile international investigations. Dr. Williams is an analytical and forensic chemist whose research focus areas are the characterization of the chemical signatures of chemical warfare agents and opioids, development and applications of biomarkers of chemical exposure, and multidisciplinary questioned sample exploitation. Her honors include several Gold and Silver awards from LLNL, Xavier University's Women of Excellence's honor as Chemist of the Decade, a U.S. Department of Energy Secretary's Honor Award, and the American Academy of Forensic Sciences (AAFS)'s Outstanding Early Career Achievement in Forensic Science Award. Dr. Williams holds a Ph.D. in Analytical Chemistry and an M.S. in Forensic Science from Michigan State University and B.S. degrees in Chemistry and Criminal Justice from Xavier University.

Revisioning Undergraduate Chemistry Curriculums

Anne Baranger is faculty in the Department of Chemistry and serves as Associate Dean of Diversity, Equity, and Inclusion in the College of Chemistry at the University of California, Berkeley. Dr. Baranger began her independent career at Wesleyan University and subsequently moved to the University of Illinois. She joined the University of California, Berkeley, in 2011 and served as Director of Undergraduate Chemistry until 2020. She is a faculty member of the Graduate Group in Science and Mathematics Education (SESAME) and also serves as Faculty Assistant for Teaching and Learning in the Vice Chancellor for Education's office. Dr. Baranger's research is in the area of chemical education, focusing on developing curricular materials for green chemistry, assessing learning in undergraduate research experiences, developing methods to facilitate learning of problem solving in organic chemistry courses, and investigating sense of belonging of graduate students. She received a B.S. in Chemistry from the Massachusetts Institute of Technology and a Ph.D. in Chemistry from the University of California, Berkeley.

Nick Kingsley is an associate professor in the Department of Chemistry and Biochemistry at the University of Michigan-Flint. His research is focused on the development of group 13 metal complexes as catalysts for organic transformations, specifically hydroamination and polymerization of renewable

feedstocks. He has pedagogical interests in the incorporation of green and sustainable chemistry across the chemistry curriculum along with focus on social inequalities and environmental justice. He has received the Rosen Junior Faculty Award for Teaching and Dr. Matthew Hilton-Watson Distinguished Professor Award in recognition of outstanding teaching at UM-Flint. In 2018 he led the creation and implementation of the first Bachelor of Science degree in Green Chemistry in the nation. He has served in various roles for green chemistry initiatives including a focus group for Beyond Benign's strategic planning process, general chemistry coordinator for the development of Greener General/Inorganic Resource Guide and Assessment Consultant for the Green & Sustainable Chemistry Education Module Development project through the American Chemical Society. He received his PhD in Chemistry from the University of Toledo.

Tracy McGill is a Professor of Pedagogy in the Department of Chemistry at Emory University. She is an award-winning instructor dedicated to pedagogical and curricular reform in the traditional undergraduate program. She has been a key leader in an HHMI-funded effort at Emory to develop a new 4-year curriculum called "Chemistry Unbound." In 2016, she piloted the first year of this curriculum and in the spring of 2021, the first cohort of students will graduate under this program. Dr. McGill has also worked with an interdisciplinary group of colleagues to design training programs for undergraduate Learning Assistants and a fellowship for graduate students to promote evidence-based pedagogical methods and inclusive excellence in the classroom. She also serves as her department's Director of Diversity, Equity, and Inclusion. She received her PhD in Chemistry from McMaster University.