Building Access to Tomorrow’s Medicines: bringing together humans, robots, and artificial intelligence - A Workshop

Committee

Martin D. Burke

Co-Chair

Martin Burke is the May and Ving Lee Professor for Chemical Innovation at University of Illinois at Urbana-Champaign. The Burke research group is pioneering automatable modular small molecule synthesis to broadly enable and expand access to the discovery of medicines, materials, and other types of functional small molecules that favorably impact society. The Burke group has harnessed this modular synthesis platform to advance into clinical trials molecular prosthetics for treating cystic fibrosis and a new class of nontoxic fungicidal agents. The group has also integrated its automated modular synthesis approach with AI in a closed-loop workflow to discover general reaction conditions for (hetero)aryl C-C bond formation, top-in-class organic lasers, and photostable organophotovoltaic candidates. Dr. Burke also helped launch the Carle Illinois College of Medicine and served as the inaugural associate dean of research. Dr. Burke received the American Chemical Society Nobel Laureate Signature Award for Graduate Education in Chemistry and is a founder of five biotechnology companies that have collectively advanced seven drug candidates into the clinic. He received his PhD from Harvard University and an MD from Harvard Medical School and the Massachusetts Institute of Technology.

Nicola Pohl

Co-Chair

Nicola Pohl is professor of chemistry, the Joan and Marvin Carmack Chair in Bioorganic Chemistry, director of the STEALTHub for smart automated experiments, and former Associate Dean of Natural and Mathematical Sciences and Research for the College of Arts and Sciences at Indiana University Bloomington. She was a professor of chemistry and of chemical and biological engineering and held the Wilkinson Professor of Interdisciplinary Engineering at Iowa State University before moving to Indiana University. The Pohl research group works to find new ways to make and analyze sugars and glycopeptides to dissect their important roles in plant, animal, and human biology and to design therapeutics. Her research group created the first automated solution-phase method to synthesize oligosaccharides using fluorous tags, the first automated method to make building blocks to feed automated oligosaccharide synthesis machines, and the first method to distinguish all 24 isomers of glucose using mass spectrometry. Dr. Pohl received her AB from Harvard-Radcliffe Colleges, her PhD in chemistry from the University of Wisconsin-Madison, and an MS in Strategic Management from the Kelley School of Business. She completed a National Institutes of Health Postdoctoral Fellowship in the Department of Chemical Engineering at Stanford University. She currently consults for CEVG and Flagship. Her work has been recognized by numerous awards, including the US National Science Foundation CAREER Award, a Kavli Frontiers of Science Fellow, Alfred P. Sloan Foundation Research Fellow, a US Fulbright Fellowship, and election as an American Association for the Advancement of Science Fellow.

Milad Abolhasani

Member

Milad Abolhasani, Ph.D., is the ALCOA Professor and a University Faculty Scholar in the Department of Chemical and Biomolecular Engineering at North Carolina State University (NCSU). He also serves as Director of Accelerated Technologies under NC State’s Integrative Sciences Initiative. Prior to joining NCSU, Dr. Abolhasani was an NSERC Postdoctoral Fellow in the Department of Chemical Engineering at the Massachusetts Institute of Technology (2014–2016). At NCSU, Dr. Abolhasani leads a multidisciplinary research program centered on the creation of advanced flow chemistry platforms to enable accelerated development and manufacturing of high-value functional materials and molecules. His lab integrates automated reactor technologies with real-time characterization and machine learning algorithms to establish “Self-Driving Labs” for closed-loop optimization and discovery. Dr. Abolhasani has been recognized with numerous honors, including the NSF CAREER Award, the AIChE 35 Under 35 distinction, the Dreyfus Award for Machine Learning in the Chemical Sciences & Engineering, the AIChE CRE Early Career Investigator Award, a Scialog Fellowship, the AIChE NSEF Young Investigator Award, selection as an I&EC Research “Class of Influential Researchers,” the AIChE Futures Scholar award, the ALCOA Research Achievement Award, the ACS-PRF Doctoral New Investigator Award, and multiple Emerging Investigator distinctions from journals such as Nanoscale, Lab on a Chip, Digital Discovery, and Reaction Chemistry & Engineering. Dr. Abolhasani received his Ph.D. in Mechanical Engineering from the University of Toronto, an M.S. in Mechanical Engineering from the University of British Columbia, and a B.S. in Mechanical Engineering from Sharif University of Technology.

Lynda Chin

Member

Dr. Lynda Chin, M.D. is a physician, scientist, and entrepreneur, currently serving as CEO of Apricity Health, a company she founded to harness dynamic patient data to enhance care and accelerate precision drug discovery. Previously, she was the Chief Innovation Officer for Health at the UT System and the founding Chair of Department of Genomic Medicine at MD Anderson Cancer Center, following a distinguished research career at Dana-Farber/Harvard and the Broad Institute. Dr. Chin has a proven track record of building innovative models that bridge research and patient care, integrating science, technology, and data to accelerate therapeutic development. She pioneered the Applied Cancer Science model, bringing industry-seasoned drug developers into academia, first at Dana-Farber and later at MD Anderson, to create innovative partnerships with biopharma in drug discovery. This work laid the foundation for Apricity Health's platform that connects care delivery and drug discovery verticals to unlock the value of dynamic data from every patient in precision drug discovery. An elected member of the National Academy of Medicine, Dr. Chin has received numerous honors for her contributions to precision medicine. She earned her M.D. from Albert Einstein College of Medicine, with clinical training at Columbia Presbyterian and Montefiore Medical Centers.

Carlos Gonzalez

Member

Carlos Gonzalez has been the Chief of the Chemical Sciences Division of the National Institute of Standards and Technology (NIST) since 2012. Dr. Gonzalez joined NIST in 1997 as a member of the Computational Chemistry Group within the Physical and Chemical Properties Division. He was appointed to the position of Chief, Chemical and Biochemical Reference Data Division in 2008. Previously, Dr. Gonzalez was a Postdoctoral Scholar at Carnegie Melon University under the mentorship of Prof. John A. Pople, a 1998 Nobel Laureate in Chemistry. Dr. Gonzalez received his Ph.D. in Chemistry from Wayne State University.

Sanmi Koyejo

Member

Sanmi Koyejo is an assistant professor in the Department of Computer Science at Stanford University. Koyejo leads the Stanford Trustworthy Artificial Intelligence (STAIR) lab, which works to develop the principles and practice of trustworthy machine learning, focusing on applications to science and healthcare. Koyejo has been the recipient of several awards, including a Skip Ellis Early Career Award, a Sloan Fellowship, a Terman faculty fellowship, an NSF CAREER award, a Kavli Fellowship, and an IJCAI early career spotlight. Koyejo serves on the Neural Information Processing Systems Foundation Board, the Association for Health Learning and Inference Board, and as president of the Black in AI organization.

Laurel Royer

Member

Laurel Royer, PhD, is the Founder and Chief Scientific Officer of Carinalis Consulting and Research. Dr. Royer has more than 15 years of combined research, scientific, technical advising expertise. She has developed and built an inter- and trans-disciplinary consultancy focused on evaluating the balance between innovation and detrimental impact. She applies the fundamentals of the chemical and related sciences to evaluate manufacturing/production and application, disposal, contamination, and exposure issues via the use cycle to support stakeholders in achieving an overall positive impact. To that cause, she supports clients and partners across a myriad of sectors addressing both proactive and reactive responses at the intersection of the built and natural environments. Dr. Royer is keenly aware that the consequences of chemical contamination and exposure unequally impact communities across the globe. To that end, she works with these communities in technical advisory roles and is an ardent advocate of addressing the disproportionate burdens and consequences of our anthropogenic footprint. She holds a PhD in Environmental Organic Chemistry and a MS in Medicinal Chemistry and Molecular Pharmacology from Purdue University, a BS in Chemistry from the University of the Virgin Islands.

Michael Janicke

Staff Officer

Michael T. Janicke, Ph.D. joined the National Academies of Sciences, Engineering, and Medicine in November 2021 as a Senior Program Officer for the Nuclear and Radiation Studies Board (NRSB). Prior to joining the National Academies, Michael worked at Los Alamos National Laboratory where he most recently headed REFOCUS, the Resonance Center for Chemical Signatures. In this role he spearheaded new methods to detect chemical threat agents and synthetic opioids using nuclear magnetic resonance techniques, meriting two R&D 100 Awards for this work. Also at Los Alamos, he participated in several Enhanced Surveillance Campaigns and Lifetime Extension Programs for the weapons community, collaborated with research programs on the fate and transport of radionuclides in the environment, supported Basic Energy Sciences heavy element programs, and assisted in medical isotope research. In 2013 he was a lead engineer on a LANL team that demonstrated 99Mo production from irradiated low enriched uranium solutions. Michael has also been a member of the Scientific Advisory Panel at LANL for Engineering and Complex Systems assisting projects ranging from nuclear power plant design to muon tomography. Michael has over 50 published articles cited 6,000 times in peer reviewed journals including Science, Nature, the Journal of the American Chemical Society, and Angewandte Chemie. He received a B.S. cum laude in chemical engineering from Rice University and a Ph.D. in chemical engineering from the University of California Santa Barbara. He was an Alexander von Humboldt postdoctoral fellow at the Max Planck Institut für Kohlenforschung in Mülheim an der Ruhr, Germany and a Directors postdoctoral fellow at Los Alamos National Laboratory.