CHEMICAL SCIENCES ROUNDTABLE

Workshop Participant Biographies: Closing the Loop on the Plastics Dilemma
A Chemical Sciences Roundtable Workshop

Robert Allen is Senior Manager of Chemistry and Materials at IBM Almaden. His department focuses primarily on designing, building, and understanding materials (mostly polymers) for high performance applications. Their approach to innovation is to combine experiment with computation. His group works on enabling IBM's core technology through materials innovation. Their work on lithography materials and low-k dielectric materials and processes typifies this focus. Dr. Allen received his PhD in polymer chemistry from Virginia Tech.

Gregg T. Beckham* is a Senior Research Fellow at National Renewable Energy Laboratory (NREL) and an Affiliate Faculty member in Chemistry at Colorado State University. He currently leads and works with an interdisciplinary team of biologists, chemists, and engineers at NREL on conversion of biomass to chemicals and materials and plastics upcycling. Dr. Beckham received his PhD in chemical engineering from Massachusetts Institute of Technology.

Eric Beckman is the Bevier Professor of Engineering in the Chemical Engineering Department and Co-Director of the Mascaro Center for Sustainable Innovation at the University of Pittsburgh. Dr. Beckman's research interests include green molecular design, design of polymer systems for use in contact with tissue, and sustainable design of chemical products. He is involved in entrepreneurial activities and has acquired 37 U.S. patents associated with his work. Throughout his career, Dr. Beckman has been awarded numerous honors. Most recently, he was named the Stephen Berry Lecturer, Telluride, Colorado (2011) and received the Carnegie Science Award in Advanced Materials (2012). Dr. Beckman received his PhD in polymer science and engineering at University of Massachusetts.

Kathryn Beers* is Group Leader of the Polymers and Complex Fluids Group in the Materials Science and Engineering Division at the National Institute for Standards and Technology (NIST). Her research interests include microreactors and microfluidics, advances in polymer synthesis and reaction monitoring, macromolecular separations, integrated and high throughput measurements of polymeric materials, degradable and renewable polymeric materials, and sustainable materials. In 2007, she was awarded the Presidential Early Career Award for Scientists and Engineers. Before becoming a Group Leader at NIST, Dr. Beers was Assistant Director for Physical Sciences and Engineering in the Office of Science and Technology Policy in the Executive Office of the President. Dr. Beers received her PhD from Carnegie Mellon University in chemistry.

André Bénard is Associate Professor in the Department of Mechanical Engineering at Michigan State University. Dr. Bénard's research interests include sustainable manufacturing and materials processing, multiphase flow and heat transfer (liquid–liquid and solid–liquid mixtures), and the design and modeling of new separation and processing equipment. He works on developing technology that improves the sustainability of modern society, which includes separation and treatment processes for compromised waters, such as oil and water; improved sanitation systems; and technology for the identification, sorting, and reuse of products at their end of life (recycling and remanufacturing). Recently, Dr. Bénard's research program has developed a focus on the identification, sorting, and remanufacturing of materials, such as plastics, metals, and glass arising from products at their end-of-life. Dr. Bénard earned a a PhD in mechanical engineering from the University of Delaware.

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Eric Boyd is Associate Professor in the Department of Microbiology and Immunology at Montana State University. His research integrates laboratory and field studies through application of contemporary microbial physiology and next generation sequencing, geochemical, and bioinformatics approaches. Application of these techniques to microbial communities that inhabit a range of environment types including the hydrothermal systems in Yellowstone National Park, Wyoming, provides a unique new perspective on biodiversity and the reasons that it exists. Through such studies, Dr. Boyd is able to gain new insights that can be leveraged for biotechnological applications, including those focused on biofuel production, biopolymer production and degradation, and biosensor development. Dr. Boyd received his PhD from Montana State University-Bozeman.

Linda Broadbelt*ǂ is Sarah Rebecca Roland Professor in the Department of Chemical and Biological Engineering and the Associate Dean for Research of the McCormick School of Engineering and Applied Science at Northwestern University. Her research and teaching interests are in the areas of multiscale modeling, complex kinetics modeling, environmental catalysis, novel biochemical pathways, and polymerization–depolymerization kinetics. She served as the Past Chair, Chair, First Vice Chair and Second Vice Chair of the Catalysis and Reaction Engineering Division of American Institute of Chemical Engineers (AIChE) and served on the Executive Board of the National Program Committee of AIChE. She is currently an Associate Editor for *Industrial & Engineering Chemistry Research*. Her awards include the R.H. Wilhelm Award in Chemical Reaction Engineering from AIChE, the E.V. Murphree Award in Industrial Chemistry and Engineering from the American Chemical Society, the Dorothy Ann and Clarence Ver Steeg Award, a CAREER Award from the National Science Foundation, and an AIChE Women's Initiative Committee Mentorship Excellence Award. She also is a fellow of the American Association for the Advancement of Science, a fellow of AIChE, and a Fulbright Distinguished Scholar. Dr. Broadbelt also has been appointed to the Defense Science Study Group of the Institute for Defense Analyses and selected as the Su Distinguished Lecturer at University of Rochester, Ernest W. Thiele Lecturer at the University of Notre Dame, and the Allan P. Colburn Lecturer at the University of Delaware. She received her PhD in chemical engineering from the University of Delaware.

Eugene Chen is the John K. Stille Endowed Chair in chemistry and Millennial Professor of Polymer Science and Sustainability at Colorado State University. His research interests include polymer science, green/sustainable chemistry, and catalysis. Currently his group is working on developing chemically recyclable polymers with closed-loop lifecycles; methods for metal-catalyzed precision (stereoselective, chemoselective & living) polymer synthesis; Lewis pair and organic polymerizations; and biomass conversion to renewable monomers & polymers. Dr. Chen's recent awards include the 2015 Presidential Green Chemistry Challenge Award by EPA and 2019 Arthur C. Cope Scholar Award by the American Chemical Society. Dr. Chen received his PhD from the University of Massachusetts, Amherst.

Geoffrey Coates is the Tisch University Professor in the Department of Chemistry and Chemical Biology at Cornell University. His teaching and research interests involve science at the interface of organic, inorganic, and materials chemistry. The broader impacts of his research include benign polymers and chemical synthesis, the utilization of renewable resources, and materials safe and economical energy storage and conversion. Dr. Coates was elected to the National Academy of Sciences in 2017. Dr. Coates received his PhD from Stanford University and pursued postdoctoral studies at the California Institute of Technology.

Paul Dauenhauer is Associate Professor at the University of Minnesota in the Department of Chemical Engineering and Materials Science. Previously, he was Assistant Professor at the University of

Massachusetts, Amherst. Before that appointment, Dr. Dauenhauer worked as a senior research engineer for the Dow Chemical Company within Core R&D Reaction Engineering in Midland, MI and the Hydrocarbons & Energy Department in Freeport, TX. His research interests include catalysis, separations, and reaction energy; energy; and transport and fluid mechanics. Dr. Dauenhauer received a Ph.D. in chemical engineering from the University of Minnesota, where he was awarded a University Doctoral Dissertation Fellowship.

Jeannette M. Garcia* is Manager and Global Lead for Quantum Applications in Quantum Chemistry and Science at IBM Research. Her team's research focuses on computational science applications for quantum computing. Her research interests have focused on the rational design of new polymers and materials, targeting recyclable materials with unique mechanical and thermal properties. Dr. Garcia has initiated programs in high-performance materials, energy storage, and polymer recycling. The team has discovered a new class of recyclable industrial polymers; developed methods to use discarded drink bottles or electronic waste to create high-performance polymers; and designed a low cost, portable system to detect and remove toxic heavy metals from drinking water. She is a Massachusetts Institute of Technology Tech Review 2015 35 Innovator Under 35, a Business Insider 17 IBM Research Rock Star, and the recipient of the Individual World Technology Award in Materials. In 2016, Dr. Garcia was named as one of Foreign Policy's Top 100 Global Thinkers. In 2017, she was the first recipient of the American Chemical Society POLY Division's Young Industrial Polymer Chemist Award and is an IBM Master Inventor. Dr. Garcia received a PhD in chemistry at Boston College.

Richard Gross is Professor and Constellation Chair at Rensselaer Polytechnic Institute. His research is motivated by the urgent need to develop sustainable chemicals and materials to meet the demands of a rapidly rising global population while mitigating risks of increased greenhouse gas emissions associated with climate change. Dr. Gross is focusing the group's inventiveness on research that has the potential to revolutionize the way we synthesize next-generation chemicals and materials and improve human health. Dr Gross received his PhD from 'Brooklyn Poly' (Polytechnic University) working on polymer stereochemistry.

David Hodge is Associate Professor of Chemical and Biological Engineering at Montana State University. Research in his group is focused on conversion technologies for the production of renewable fuels, chemicals, polymers, and materials from plant biomass. Before his appointment at Montana State, he was Associate Professor at Michigan State University. Dr. Hodge received his PhD in chemical engineering from Colorado State University.

Mary Kirchhoff*ǂ is the Executive Vice President for Scientific Advancement and the Director of the Green Chemistry Institute at American Chemical Society (ACS). Before her current role, she served as the Director of the ACS Education Division for 11 years. Dr. Kirchhoff taught at Trinity College in Washington, DC for 9 years and served as Chair of the Division of Natural Sciences and Mathematics. She began working in green chemistry as an American Association for the Advancement of Science (AAAS) Environmental Fellow and Visiting Scientist with the US Environmental Protection Agency green chemistry program. She is a member of the National Academies Chemical Sciences Roundtable and was elected an AAAS Fellow in 2006. Dr. Kirchhoff received a PhD in organic chemistry from the University of New Hampshire.

Jennifer Le Roy is head of product development at BioCellection Inc., a startup that is developing advanced technologies to transform unrecyclable plastics into virgin-quality chemicals for sustainable supply chains. She is also a Junior Research Fellow in the Materials Department at Corpus Christi College Oxford, where the research program focuses on building molecular-scale electronics devices. Her

research interests span synthetic chemistry, magnetism, physics, and electronics. Dr. Le Roy received her PhD from the University of Ottawa for her contributions to the field of organometallic synthesis and nanomagnetism.

Jill Martin is a Fellow in The Dow Chemical Company's packaging and specialty plastics business. For the past 24 years, her responsibilities have included new product development and technology exploration, focusing on flexible and rigid packaging. Dr. Martin is currently responsible for initiatives related to creating solutions for a circular economy focused on designing for recyclability, enhanced performance of polymers containing recycled content and new materials. Dr. Martin received her MS and PhD in macromolecular science and engineering from Case Western Reserve University.

Timothy E. Patten*ǂ is the Deputy Division Director for the Chemical, Bioengineering, Environmental and Transport Systems (CBET) Division of the National Science Foundation (NSF) Directorate for Engineering. Previously, he served as NSF Program Director in the Division of Chemistry. Before joining NSF, he was a professor of chemistry at the University of California (UC), Davis. His areas of expertise are in polymer science and engineering, chemical catalysis, and inorganic chemistry. Some of his awards include the UC Davis Mathematics and Physical Sciences Division Research Award, an National Institutes of Health Ruth Kirschstein Senior Research Fellowship, and an NSF CAREER Award. He served as a Department of State Embassy Science Fellow and worked at Embassy Santiago, Chile. There he collaborated with CONICYT, the Chilean national science funding agency, on a project to assess the agency's merit review processes. Dr. Patten received his PhD in chemistry from the University of California, Berkeley.

Brian Riise is a Project Manager at the REMADE Institute, which works in partnership with industry, academia, and national laboratories to enable early stage applied research and development of technologies that could dramatically reduce the embodied energy and carbon emissions associated with industrial-scale materials production and processing. Before joining REMADE, Dr. Riise spent nearly 20 years with MBA Polymers, developing processes and formulations necessary to produce high value plastics from complex streams, such as shredded end-of-life electronics and automobiles. He was also closely involved in the design, construction, operations, product development and technical sales for MBA Polymers' facilities in the United States, China, Austria and England. Dr. Riise received his PhD in chemical engineering from the University of California, Santa Barbara.

Megan Robertson is Associate Professor of Chemical and Biomolecular Engineering at the University of Houston. The objective of her research program is to develop polymeric materials with enhanced physical properties and function. Her group specializes in polymer synthetic techniques, structural characterization (small-angle neutron, x-ray, and light scattering), thermodynamics and self-assembly, and development of structure–property relationships. Dr. Robertson received her PhD in chemical engineering from the University of California, Berkeley.

Susannah Scott is Distinguished Professor of Chemical Engineering and of Chemistry and Biochemistry, at the University of California, Santa Barbara. She leads the Mellichamp Academic Initiative in Sustainable Materials and Product Design and holds the Mellichamp Chair Sustainable Catalytic Processing. Her research team investigates and designs catalysts for energy-efficient chemical transformations, including routes to chemical building blocks and synthetic polymers, biomass-derived renewable feedstocks, and the remediation of environmental contaminants. Dr. Scott received her PhD in inorganic chemistry from Iowa State University.

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Michael Wang is an Argonne National Laboratory Distinguished Fellow, Senior Scientist, and Director of the Systems Assessments Department of the Energy Systems Division. He has been with Argonne since 1993. Dr. Wang's research includes evaluation of energy and environmental impacts of vehicle technologies, transportation fuels, and energy systems; assessment of the market potential of new vehicle and fuel technologies; and examination of transportation development in emerging economies. Dr. Wang has led the development and applications of Argonne's GREET (Greenhouse gases, Regulated Emissions, and Energy use in Transportation) model for life-cycle analysis of advanced vehicle technologies, transportation fuels, and other energy systems. He is a fellow of the Society of Automotive Engineers. Jointly, Dr. Wang is a faculty associate in the Energy Policy Institute at the University of Chicago. He is a senior fellow at the Northwestern Argonne Institute of Science and Engineering at Northwestern University. He is a guest professor in China's Shanghai Jiaotong University. He is an associate editor of Biotechnology for Biofuels and on the editorial boards of Automotive Innovation, Frontiers of Energy and Power Engineering in China, and Mitigation and Adaptation Strategies for Global Changes.

Ming Xu is Associate Professor in the School for Environment and Sustainability and in the Department of Civil and Environmental Engineering at the University of Michigan, Ann Arbor. His research focuses on sustainable engineering and industrial ecology. At the University of Michigan, he is a core faculty member in the Center for Sustainable Systems, co-directs the Graduate Certificate Program in Industrial Ecology, and currently serves as the Director of China Programs in School for Environment and Sustainability. He received the Robert A. Laudise Medal from International Society for Industrial Ecology for "outstanding achievement in industrial ecology by a researcher under the age of 36" in 2015 and the US National Science Foundation Faculty Early Career Development (CAREER) Award in 2016. Currently he serves as the Editor-in-Chief of the journal *Resources, Conservation & Recycling*. He was elected to Chair the 2022 Gordon Research Conference on Industrial Ecology. He received his PhD in environmental engineering from Arizona State University.

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