



Erich Bloch

MDI SYMPOSIUM

Presented by the

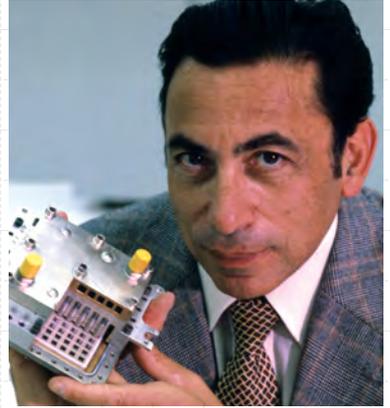
Department of Materials Design and Innovation

DAVIS HALL, UNIVERSITY AT BUFFALO

May 31 – June 1, 2017

[About Erich Bloch]

Erich Bloch (January 9, 1925 – November 25, 2016) was a German-born American electrical engineer and administrator. He was involved with developing IBM's first transistorized supercomputer, 7030 Stretch, and mainframe computer, System/360. He served as director of the National Science Foundation from 1984 to 1990.



Bloch, the son of a Jewish businessman and housewife, lost his parents in the Holocaust, survived the war in a refugee camp in Switzerland and immigrated in 1948 to the United States. He studied electrical engineering at ETH Zurich and received his bachelor of science in electrical engineering from the University of Buffalo.

Bloch joined IBM after graduating in 1952. He was engineering manager of IBM's STRETCH supercomputer system and director of several research sites during his career. In June 1984, Ronald Reagan nominated Bloch to succeed Edward Alan Knapp as director of the National Science Foundation. The same year, he was elected a foreign member of the Royal Swedish Academy of Engineering Sciences. In 1985, Bloch was awarded one of the first National Medals of Technology and Innovation along with Bob O. Evans and Fred Brooks for their work on the IBM System/360.

After stepping down as director of the National Science Foundation, Bloch joined the Council on Competitiveness as its first distinguished fellow. The IEEE Computer Society awarded him the Computer Pioneer Award in 1993 for high speed computing. In 2002, the National Science Board honored Bloch with the Vannevar Bush Award. He was made a Fellow of the Computer History Museum in 2004 "for engineering management of the IBM Stretch supercomputer, and of the Solid Logic Technology used in the IBM System/360, which revolutionized the computer industry."

In 2014, Bloch donated \$1.5 million to the University at Buffalo to establish the Erich Bloch Endowed Chair for the new Department of Materials Design and Innovation.

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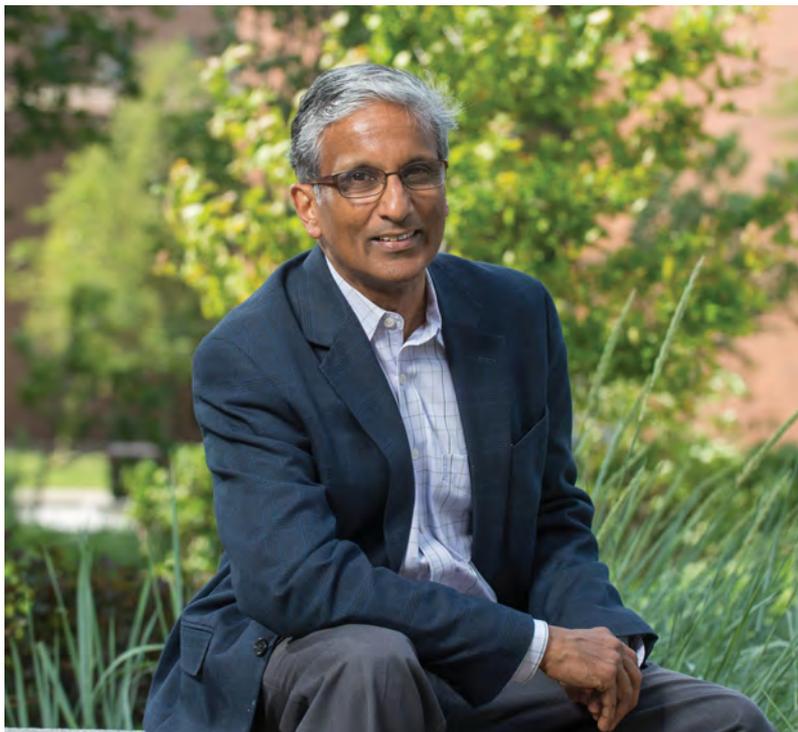
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[Acknowledgements]

The Erich Bloch Symposium has received generous financial support from the **University at Buffalo** and the **New York State Center of Excellence in Materials Informatics**. Numerous individuals have helped with the organization of the meeting, but special thanks goes to:

- The Symposium Advisory Committee: **Dr. Joseph Danek**, Senior Vice President, The Implementation Group (TIG); **Alexandra McPherson**, Principal, Niagara Share; **Dr. Grace Wang**, SUNY Vice Chancellor of Research and Economic Development; and **Dr. Liesl Folks**, Dean, School of Engineering and Applied Sciences.
- Symposium Staff: **Margie Poniatowski**, Assistant to the Chair, Department of Materials Design and Innovation; **Jennifer Giegel**, Director of Strategic Initiatives, School of Engineering and Applied Sciences, **Valerie Celenza**, Strategic Initiatives Coordinator, School of Engineering and Applied Sciences and **Jane Stoyke Welch**, Director of Communications, School of Engineering and Applied Sciences.

[A Message from the Chair]



It is with great pleasure that I welcome you to the **Erich Bloch Symposium in Materials Design and Innovation** at the University at Buffalo (UB), May 31st–June 1st 2017. This symposium is dedicated to the late Erich Bloch, former director of the National Science Foundation, who helped endow the new Department of Materials Design and Innovation at UB. The conference will focus on innovative strategies for research and education in the field of materials and related sciences, with the overarching goal of identifying accelerated solutions to address a broad range of societal needs. This event will honor Erich Bloch's legacy and embody the essence of his philosophy that *"...science is changing, the tools of science are changing, and that requires different approaches."*

The Department of Materials Design and Innovation (MDI) at the University at Buffalo is a forward-leaning, interdisciplinary initiative, with a new paradigm for materials science research and education. MDI harnesses information and data science tools to

advance knowledge discovery in materials science. It addresses societal needs for significant acceleration of new materials design and discovery, emergent properties and processing strategies. MDI trains materials scientists and engineers using advanced computational tools, in conjunction with bench science, to reduce the cost and time it takes to discover and commercialize new materials critical to the economic security of the region, nation and world. The department forges critical partnerships between government, industry and academic enterprises, and pushes the boundaries of traditional materials science research to establish new paradigms for materials design and innovation.

Erich Bloch's commitment to the promotion of an inclusive workforce by providing opportunities for women and other underrepresented groups, serves as a guiding principal for the MDI. The Department also emphasizes the importance of forging critical partnerships with community groups and non-governmental organizations to ensure that our research and educational activities have the greatest impact on a broad range of areas such as health, climate change, and energy sustainability. We are fortunate to have some of the most innovative thinkers at the Erich Bloch Symposium who will challenge us to push the boundaries of conventional thinking as we explore some of today's most pressing societal challenges.

On behalf of the faculty, staff and students of the Department of Materials Design and Innovation, welcome!

A handwritten signature in black ink, appearing to read 'Krishna Rajan', with a long horizontal stroke extending from the end of the signature.

Dr. Krishna Rajan

Erich Bloch Endowed Chair and
Empire Innovation Professor,
University at Buffalo Department of
Materials Design and Innovation

[Department of Materials Design and Innovation Faculty]



Krishna Rajan, Erich Bloch Chair and Empire Innovation Professor

ScD, Materials Science, Massachusetts Institute of Technology

Research Interests: Materials informatics, quantitative high-resolution imaging, and atom probe tomography



Scott Broderick, Research Assistant Professor

PhD, Materials Science and Engineering, Iowa State University

Research Interests: Statistical learning for materials design and high throughput characterization



David Eason, Research Assistant Professor

PhD, Physics, North Carolina State University

Research Interests: Thin film deposition



Erik Einarsson, Assistant Professor, Joint appointment with the Department of Electrical Engineering

PhD, Electrical Engineering, University of Tokyo

Research Interests: Synthesis of low dimensional materials, and Raman and time domain Terahertz spectroscopy



Alan Friedman, Research Associate Professor

PhD, Chemistry, University of California, Santa Barbara

Research Interests: Analytical chemistry, organometallic chemistry and photochemistry



Thomas Grant, Research Assistant Professor

PhD, Structural Biology, University at Buffalo
 Research Interests: Protein crystallography and X-ray diffraction studies



Quanxi Jia, Empire Innovation Professor and National Grid Professor of Materials Research; also Scientific Director, New York State Center of Excellence in Materials Informatics

PhD, Electrical and Computer Engineering, University at Buffalo
 Research Interests: Thin film nanostructured multifunctional materials



Eaton Lattman, Professor; also Professor, Department of Structural Biology, Jacobs School of Medicine and Biomedical Sciences; Principal Research Scientist, Hauptman-Woodward Institute; Director BioXFEL

PhD, Biophysics, Johns Hopkins University
 Research Interests: Protein crystallography and x-ray laser science



Baishakhi Mazumder, Assistant Professor

PhD, Physics and Materials Science, University of Rouen, France
 Research Interests: Chemical imaging through atom probe tomography



Prathima Nalam, Assistant Professor

PhD, Materials Science, ETH Zurich
 Research Interests: Tribology, soft mechanics, surface and interfacial forces, and atomic force microscopy



E. Bruce Pitman, Professor

PhD, Mathematics, Duke University
 Research Interests: Applied mathematics and statistics for materials design



Kristofer Reyes, Assistant Professor

PhD, Applied Mathematics, University of Michigan

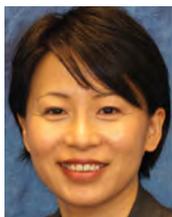
Research Interests: Statistical modeling and simulation



Jung-Hun Seo, Assistant Professor

PhD, Electrical and Computer Engineering, University of Wisconsin-Madison

Research Interests: Materials design for flexible electronics



Grace Wang, SUNY Vice Chancellor for Research and Economic Development and Professor

PhD, Materials Science and Engineering, Northwestern University

Research Interests: Development of materials for microelectronics



Olga Wodo, Assistant Professor

PhD, Mechanical Engineering and Computer Sciences, Czestochowa University of Technology, Poland

Research Interests: Informatics and high performance computing for materials design and manufacturing



Fei Yao, Research Assistant Professor

PhD, Energy Science, Sungkyunkwan University, Korea; Physics, Ecole Polytechnique, France

Research Interests: Nanomaterials and nanostructures for energy storage and conversion



Xian Zhang, Assistant Professor

PhD, Mechanical Engineering, Columbia University

Research Interests: Numerical methods, theory and modeling of nano-mechanical systems



Symposium Agenda

Agenda

[Wednesday, May 31st]

>> 7:30 – 9:00 — Registration and Continental Breakfast

>> 9:00 – 9:30 — Welcome and Introductory Remarks

CHAIR:

Krishna Rajan, Erich Bloch Endowed Chair & Empire Innovation Professor, Department of Materials Design and Innovation, University at Buffalo

WELCOME:

Satish Tripathi, President, University at Buffalo

>> 9:30 – 10:15

The Bloch Legacy and MDI: Promoting Human Resources and Innovation

CHAIRS:

Bill Harris, President and Chief Executive Officer, Science Foundation Arizona (SFAz) and former Director of Mathematical and Physical Sciences Directorate at the National Science Foundation

Bob Corell, Principal, Global Environment and Technology Foundation and former Assistant Director of the Geosciences Directorate at the National Science Foundation

>> 10:15 – 10:45 — Break

>> 10:45 – 12:00

Design for a Healthy Society

MODERATOR:

Bruce Pitman, Professor, Department of Materials Design and Innovation, University at Buffalo

This session explores the complex interplay between climate and human health. Guided by the use of advanced data analytical methods, our panel will discuss how materials science together with data science, can play an important role in providing solutions to pressing problems in human health.

>> 10:45 – 12:00

KEYNOTE SPEAKER:

Rita Colwell, Distinguished Professor, University of Maryland at College Park, Johns Hopkins University Bloomberg School of Public Health | President and Chairman of CosmosID, Inc. | Member of the National Academies of Science | 11th Director of the National Science Foundation: *“Climate, Human Health, Cholera and CosmosID”*.

PANEL PRESENTATIONS AND DISCUSSION:

Balaji Narasimham, Vlasta Klima Balloun Chair, Department of Chemical and Biological Engineering, Iowa State University

Ed Lattman, Director NSF-STC BioXFEL- Department of Structural Biology & Department of Materials Design and Innovation, University at Buffalo

D. Scott Mackay, Professor, Department of Geography and Associate Dean, College of Arts and Sciences, University at Buffalo

>> 12:00 – 12:45 – Lunch

>> 12:45 – 1:00 – Group photo in Grace Plaza

>> 1:00 – 1:30

Data Science: Enabling Convergence Across Disciplines

MODERATOR:

Krishna Rajan, Erich Bloch Endowed Chair for the Department of Materials Design and Innovation, University at Buffalo

The theme of “data science” is pervasive in the new Department of Materials Design and Innovation. In this session, we will discuss

the power of data science and its role in enabling the convergence of vastly different and diverse disciplines to promote innovation.

KEYNOTE SPEAKER:

Sanjay Padhi, Principal at Amazon Web Services, Global Scientific Computing Team *“Amazon Web Service: Evolution of Predictive Analytics: from Bosons to the ‘Bottom Line’”.*

>> 1:45–3:00

Policy for a Sustainable Society

MODERATOR:

Liesl Folks, Dean, School of Engineering and Applied Sciences and Professor of Electrical Engineering, University at Buffalo

Along the entire arc of the life cycle of materials – from the extraction of raw materials, processing, manufacturing, and use of materials, decommissioning and/or recycling of materials, the issues of sustainability and materials science are inextricably linked. Developing appropriate policies is predicated on decision makers having the full understanding of the relevant scientific information. This session explores the challenges and strategies for communicating evidence-based information to those who can help develop policies for a sustainable society.

KEYNOTE SPEAKER:

Neal Lane, Senior Fellow in Science and Technology Policy, Baker Institute for Public Policy | Malcom Gillis University Professor of Physics and Astronomy Emeritus, Rice University | 10th Director of the National Science Foundation: *“Giving the President Advice on Science and Technology – and Why It’s Getting Harder”.*

PANEL PRESENTATIONS AND DISCUSSION:

Mark Rossi, Executive Director, Clean Production Action

Alan Rabideau, Professor, Department of Civil, Structural and Environmental Engineering, University at Buffalo

Pavani Ram, Co-director, Community of Excellence on Global Health Equity and Associate Professor, Department of Epidemiology and Environmental Health, University at Buffalo

>> 3:00 – 3:30 – Break

>> 3:30 – 4:45

Energy for a Regenerative Economy

MODERATOR:

Quanxi Jia, Empire Innovation Professor and National Grid Professor of Materials Research, Department of Materials Design and Innovation, Scientific Director of UB's New York State Center of Excellence in Materials Informatics (CMI), University at Buffalo

Developing energy systems that can accommodate the rapid increase in energy needs for a burgeoning global population and at the same time not amplify their adverse environmental and health impacts is one of the grand challenges facing society. Materials science can play a critical role in developing technologically viable solutions. Strategies and potential innovations for developing a 'regenerative economy' based on an energy infrastructure that is clean and affordable is the focus of this session.

KEYNOTE SPEAKER:

Terry Sobolewski, Senior Vice President, Chief Customer Officer, National Grid: *"The Bridge from a Carbonized to De-Carbonized World: Achieving Societal Change While Preserving Energy Affordably"*.

PANEL PRESENTATIONS AND DISCUSSION:

Ramamurthy Ramprasad, Centennial Term Professor, Department of Materials Science and Engineering, University of Connecticut

Abani Patra, Office of Advanced Scientific Computing Research, Department of Energy and Professor, Department of Mechanical and Aerospace Engineering, University at Buffalo

Mark Swihart, Executive Director, New York State Center of Excellence in Materials Informatics and Distinguished Professor, Department of Chemical and Biological Engineering, University at Buffalo with **Paras Prasad**, Distinguished Professor, Department of Chemistry, University at Buffalo

>> 5:00 – 6:30 — Symposium Reception

[Thursday, June 1st]

>> 7:30 - 8:30 — Registration and Continental Breakfast

>> 8:30 - 9:45

Innovation for a Global Workforce

Agenda

MODERATOR:

Grace Wang, SUNY Vice Chancellor of Research and Economic Development and Professor, Department of Materials Design and Innovation, University at Buffalo

An important goal for the MDI Department is to implement novel approaches to help students obtain the learning skills necessary for interdisciplinary science, as well as for promoting social responsibility. In this session, we explore the challenges and opportunities in achieving these goals by exploring this topic from numerous perspectives.

INTRODUCTION:

Charles Zukoski, Provost and Executive Vice President for Academic Affairs, University at Buffalo

KEYNOTE SPEAKER:

C. Daniel Mote, Jr., President, National Academy of Engineering: *"The Grand Challenges for Engineering and the Grand Challenges Scholar Program"*.

PANEL PRESENTATIONS AND DISCUSSIONS:

Venu Govindaraju, Vice President of Research and Economic Development, SUNY Distinguished Professor, Computer Science and Engineering, University at Buffalo

Graham Hammill, Vice Provost and Dean of the Graduate School, University at Buffalo

Robin Schulze, Dean, College of Arts and Sciences and Professor of English, University at Buffalo

9:45 - 10:30 — Break

10:30 – 11:45

Design and Innovation for Materials Science

MODERATOR:

Olga Wodo, Assistant Professor, Department of Materials Design and Innovation

The concept of “design” is used in many fields and in this session we bring together experts who design materials using concepts that are at the nexus of biology, physical sciences, engineering and architecture. This serves to demonstrate the intellectual vibrancy of materials science as we explore how innovation in this field is driven by the ability to understand the relationship between shape, form and function of materials, whether it be “atom-by-atom” or “brick-by-brick”.

KEYNOTE SPEAKER:

Gavin McIntyre, Co-founder and Chief Scientist, Ecovative Design: “*Harnessing Biology for Materials Design*”.

PANEL PRESENTATIONS AND DISCUSSIONS:

Sadasivan Shankar, Margaret and Will Hearst Lecturer in Computational Science and Engineering, Harvard University

Frank Ernst, Leonard Case Jr. Professor and Chair, Department of Materials Science and Engineering, Case Western Reserve University

Kemper Lewis, Director, Sustainable Manufacturing and Advanced Robotic Technologies Community of Excellence (SMART CoE) and Professor and Chair, Department of Mechanical and Aerospace Engineering, University at Buffalo with

Omar Khan, Co-director, SMART CoE and Associate Professor and Chair, Department of Architecture, University at Buffalo

>> 11:45 – 12:15

Interdisciplinary Data Science: Harnessing the Tools

MODERATOR:

Krishna Rajan, Erich Bloch Endowed Chair & Empire Innovation Professor, Department of Materials Design and Innovation, University at Buffalo

In this session, we will provide case studies on how accelerated materials development, aided by data driven science, can achieve critical solutions for the next generation of transportation systems.

KEYNOTE SPEAKER:

Brian Storey, Toyota Research Institute's Accelerated Scientific Discovery Program and Professor of Mechanical Engineering, Olin College: *"Accelerated Materials Design and Discovery: Launching a New Industry-University Collaboration"*

>> 12:15 - 12:30 – Closing Remarks

Krishna Rajan, Erich Bloch Endowed Chair & Empire Innovation Professor, Department of Materials Design and Innovation, University at Buffalo

>> 12:30 - 2:00 – Lunch

>> 2:30 - 5:00 – Post Symposium Regional Networking Workshop (101 Davis Hall)

Building a Regional Hub for Research, Economic and Community Development

MODERATOR:

Grace Wang, SUNY Vice Chancellor of Research and Economic Development and Professor, Department of Materials Design and Innovation, University at Buffalo



Keynote Speakers

Keynote Speakers



Rita Colwell

Distinguished University Professor, University of Maryland, College Park, and Johns Hopkins University Bloomberg School of Public Health

Rita Colwell is a Distinguished University Professor both at the University of Maryland, College Park and at Johns Hopkins University Bloomberg School of Public Health,

senior advisor and chairman emeritus at Canon US Life Sciences, Inc., and president and CEO of CosmosID, Inc. She was the 11th Director of the National Science Foundation. Her research interests are focused on global infectious diseases, water, and health. Colwell is currently developing an international network to address emerging infectious diseases and water issues, including safe drinking water for both the developed and developing world. Colwell has been awarded 55 honorary degrees from institutions of higher education, including her alma mater, Purdue University. She is the recipient of the Order of the Rising Sun, Gold and Silver Star, bestowed by the Emperor of Japan; the 2006 National Medal of Science, awarded by the President of the United States; and the 2010 Stockholm Water Prize, awarded by the King of Sweden. In 2017, the National Science Board presented Colwell with the Vannevar Bush Award, which recognizes exceptional, lifelong leaders who have made substantial contributions to the nation through public service activities in science, technology and policy.



Neal Lane

Senior Fellow in Science and Technology Policy, Baker Institute, and Professor of Physics and Astronomy Emeritus, Rice University

Neal Lane is a senior fellow in science and technology policy at the Baker Institute. He is also a professor of physics and astronomy emeritus at Rice University. He was the 10th Director of the National

Science Foundation. Lane has received the National Academy of Sciences Public Welfare Medal, the American Institute of Physics K.T. Compton Medal, the Association of Rice Alumni Gold Medal and the Distinguished Friend of Science Award from

the Southeastern Universities Research Association. In 2013, the National Science Board presented Lane with the Vannevar Bush Award, which recognizes exceptional, lifelong leaders who have made substantial contributions to the nation through public service activities in science, technology and policy. He is a fellow of the American Academy of Arts and Sciences and other honorary and professional associations. Lane received his PhD, MS and BS in physics from the University of Oklahoma.



Gavin McIntyre

**Co-founder and Chief Scientist,
Ecovative Design LLC**

Gavin McIntyre is the co-founder and chief scientist of Ecovative Design LLC, and has led all mycological material and biological process development in the company's strides to replace synthetics. McIntyre co-invented the MycoBond platform, a

patent-pending technology that uses a growing organism to transform agricultural byproducts into strong composite materials. These materials are 100% compostable, and made with a fraction of the energy of conventional plastics. He has served as the principal investigator on grants from the U.S. Environmental Protection Agency (EPA), U.S. Department of Agriculture, National Science Foundation and the New York State Energy Research and Development Authority. McIntyre has also served on Technology Roundtables hosted by former NYS Governor David Paterson, the Department of Energy and the EPA, and Congressman Paul Tonko. He received a dual BS in mechanical engineering and product design from Rensselaer Polytechnic Institute.

Keynote Speakers



C. Daniel Mote, Jr.

**President, National Academy of
Engineering**

C. Daniel Mote is president of the National Academy of Engineering and regents professor, on leave, from the University of Maryland, College Park. Mote is a native Californian who

earned his BS, MS, and PhD degrees at the University of California, Berkeley in mechanical engineering between 1959 and 1963. After a postdoctoral year in England and three years as an assistant professor at the Carnegie Institute of Technology in Pittsburgh, he returned to Berkeley to join the faculty in mechanical engineering for the next 31 years. He and his students investigated the dynamics, stability, and control of high-speed rotating and translating continua as well as biomechanical problems emanating from snow skiing. He coined the area called “dynamics of axially moving materials” encompassing these systems. Mote’s recognitions include the NAE Founders Award, the American Society of Mechanical Engineers Medal, and the Humboldt Prize of the Federal Republic of Germany. Fifty-eight PhD students earned their degrees under his mentorship.



Sanjay Padhi

**Principal, Amazon Web Services’
Global Scientific Computing Team**

Sanjay Padhi leads the Amazon Web Services (AWS) Global Scientific Computing Team’s research initiatives, including those with the National Science Foundation. Padhi has more than 15 years of experience in large-scale distributed computing, data analytics and machine learning. He is the co-

creator of the Workload Management System, currently used for all the data processing and simulation activities by CMS, one of the largest experiments in the world at CERN, consisting of more than 180 institutions across 40 countries. He also co-founded the ZEUS Computing Grid project at Deutsches Elektronen-Synchrotron (DESY), Germany before joining CERN. Padhi obtained his PhD in high energy physics from McGill University and also serves as adjunct associate professor of physics at Brown University.



Terry Sobolewski

**Senior Vice President and Chief
Customer Officer, National Grid US**

Terence (Terry) Sobolewski joined National Grid in August 2011. In his current role as senior vice president and chief customer officer, he is

responsible for the company's strategy on brand, new products, emerging technologies, sales of gas conversion and energy efficiency programs, gas and electric procurement and supply, and customer analytics. He leads a team that provides the linkages between corporate citizenship, economic development and local communities, supporting all areas of customer focus and execution across National Grid's jurisdictions. In his previous role as senior vice president, business planning and performance, he was responsible for leading the design, implementation and on-going ownership of the U.S. region's integrated business operating cycle model. He was also responsible for integrating performance excellence and applying discipline and focus to achieve successful delivery of the strategies and goals outlined in the company's U.S. strategy, Elevate 2018.



Brian Storey

Toyota Research Institute's Accelerated Scientific Discovery Program Leader and Professor of Mechanical Engineering, Olin College

Brian Storey is part of the Toyota Research Institute's leadership team for artificial intelligence and robotics research, where his role is accelerating scientific discovery. He is also a professor of mechanical engineering at Olin

College. He holds a PhD from the University of California, Berkeley, MS from the University of Illinois at Urbana-Champaign and BS from the University of Texas at Austin, all in mechanical engineering. Storey's research interests and experiences are in the broad areas of fluid dynamics and computational science, including applications such as microfluidics, geophysical flows, and cavitation. Current research projects involve electro kinetic flows in micro and nano-scale devices, and nonlinear dynamics in fluid networks. Storey has received National Science Foundation funding to support undergraduate research projects at Olin. These projects have led to publications authored by undergraduate students as well as student talks at professional conferences. Recently, Storey has been aiding in the development of a new two-week school, which offers research training to scientists from developing countries.



Moderators & Panelists

Moderators & Panelists



Robert W. Corell

Principal, Global Environment Technology Foundation

Robert W. Corell is a principal at the Global Environment Technology Foundation and leads its Center for Energy and Climate Solutions, and chairs the Global Science Associates, an interdisciplinary nucleus of science experts. He has several recent academic appointments, including Professor II at the University of the Arctic's EALÁT Institute, as well as the Arctic Chair at the University of Tromsø, Norway (2009–2012). He is chair of the International Sea Level Institute and Senior Fellow, the Consortium for Ocean Leadership. Corell is actively engaged in research concerned with the sciences of global change and the interface between science and public policy. Corell was assistant director for geosciences at the National Science Foundation, where he had oversight for the Atmospheric, Earth, Ocean Sciences, Polar Programs and was chair for over a decade of the U.S. Global Change Research Program reporting to the White House's Office of Science and Technology Policy.



Frank Ernst

**Leonard Case Jr. Professor and Chair,
Department of Materials Science and
Engineering, Case Western Reserve University**

Frank Ernst is a professor and chair of the Department of Materials Science and Engineering at Case Western Reserve University. He joined Case as a post-doctoral researcher in the Department of Materials Science and Engineering in 1987. An esteemed scholar, Ernst has extensive research expertise in surface engineering of alloys as well as materials applications in the field of advanced energy, including fuel cell catalyst nanoparticles, solid-oxide fuel cells and photovoltaic thin films. Ernst is also an expert in micro characterization of materials, particularly in advanced techniques of transmission electron microscopy. He has held leadership roles in key university research facilities, including serving as co-director of the Swagelok Center for Surface Analysis of Materials and director of the Case Center for Surface Engineering. He earned a PhD from the University of Göttingen, Germany.

Liesl Folks

**Dean, School of Engineering and Applied Sciences and
Professor of Electrical Engineering, University at Buffalo**

Liesl Folks is dean of the School of Engineering and Applied Sciences and a professor in electrical engineering at the University



at Buffalo. Prior to joining UB in 2012, she spent 16 years in research and development in the magnetic data storage industry in Silicon Valley, working for IBM, Hitachi and Western Digital. Her research is in the fields of magnetic materials and devices, nanoscale metrology, and spin-electronic devices. She was president of the IEEE's Magnetics Society in 2013–2014 and in 2012, she served on the congressionally mandated panel for the Triennial Review of the National Nanotechnology Initiative, facilitated by the National Academy of Sciences. Folks is also the 2013 recipient of the AVS Excellence in Leadership Award, a national award recognizing her mentorship of science and engineering students. She holds a BSc (Hons) and a PhD, both in physics, from The University of Western Australia, as well as an MBA from Cornell University.



Venu Govindaraju

Vice President for Research and Economic Development and SUNY Distinguished Professor of Computer Science and Engineering, University at Buffalo

Venu Govindaraju is vice president for research and economic development and a SUNY Distinguished Professor of Computer Science and Engineering at the University at Buffalo. He is the founding director of the Center for Unified Biometrics and Sensors. A recognized authority in the field of pattern recognition, Govindaraju has served on the editorial boards of several premier journals and received numerous honors. They include the IAPR/ICDAR Outstanding Achievements (2015), Distinguished Alumnus Award from IIT Kharagpur (2014), the IEEE Technical Achievement Award (2010) and the MIT Global Indus Technovator Award (2004). He is a Fellow in several prestigious professional societies such as AAAS, ACM, IAPR, IEEE, and the SPIE, and most recently the National Academy of Inventors. Govindaraju has published five books and 425 articles in refereed publications. He has given more than 100 invited talks, keynotes, plenaries and seminars, as well as supervising the doctoral work of 36 students. He has an extraordinary sponsored funding record—about \$65 million—for research grants in which he served as the primary or co-investigator. He is a graduate of the Indian Institute of Technology and UB.

Graham Hammill

Vice Provost for Graduate Education and Dean of the Graduate School, University at Buffalo



Graham Hammill came to the University at Buffalo from the University of Notre Dame in 2008, and became vice provost for graduate education and dean of the Graduate School in August of 2015. Hammill is the primary executive officer of the Graduate School and is responsible for providing dynamic academic leadership and a vision for graduate and professional education to advance the University at Buffalo as a premier public research university. He is on the editorial board of *Postmodern Culture* and *The Spenser Review*, and served on the editorial board of *Shakespeare Quarterly*. He is the recipient of many awards and grants throughout his academic career, including being named a UB Humanities Institute Research Fellow (2012–2013), an award from the SUNY Conversations in the Discipline (2010), and a Kaneb Teaching Award from the University of Notre Dame (2006).



William C. Harris **President and Chief Executive Officer,** **Science Foundation Arizona**

William C. Harris is the president and chief executive officer of Science Foundation Arizona (SFAz). Prior to joining SFAz, Harris served as director general of Science Foundation

Ireland (SFI), a new agency that helped facilitate growth in Ireland's R&D sector. Immediately prior to going to Ireland, Harris was vice president of research and professor of chemistry and biochemistry at the University of South Carolina (USC). There, he oversaw research activities throughout the USC system, several interdisciplinary centers and institutes, the USC Research Foundation and sponsored research programs. Harris served at the National Science Foundation from 1978 to 1996, including as the director for mathematical and physical sciences (1991–1996). He earned his undergraduate degree at the College of William and Mary, and received his PhD in chemistry from the University of South Carolina.



Quanxi Jia **Empire Innovation Professor and National** **Grid Professor, Department of Materials** **Design and Innovation, University at Buffalo,** **and Scientific Director, New York State Center** **of Excellence in Materials Informatics**

Quanxi Jia is an Empire Innovation Professor and National Grid Professor of Materials

Research at the University at Buffalo. He is also the scientific

director of the New York State Center of Excellence in Materials Informatics. Prior to joining UB in 2016, he was the director of the Center for Integrated Nanotechnologies, a Department of Energy Nanoscale Science Research Center operated jointly by Los Alamos and Sandia National Laboratories. Jia's research areas include synthesis and study of the structure-property relationships of nanostructured materials, multifunctional materials and thin films; development of novel deposition techniques for the growth of electronic materials; and development and fabrication of novel solid-state microelectronic/electro-optic devices. He is a Fellow of several professional societies including the Institute of Electrical and Electronics Engineers, the Materials Research Society (2014), the American Association for the Advancement of Science (2011), the American Ceramic Society (2010), the American Physical Society (2009) and the Los Alamos National Laboratory (2003). He holds 48 U.S. patents, and has received numerous awards, including the Federal Laboratory Consortium for Technology Transfer Award for Excellence in Technology Transfer in 2008.



Omar Khan

Co-director, Sustainable Manufacturing and Advanced Robotic Technologies (SMART) Community of Excellence; and Chair and Associate Professor, Department of Architecture, University at Buffalo

Omar Khan is an associate professor and chair of the Department of Architecture, and co-director of the Sustainable Manufacturing and Advanced Robotic Technologies (SMART) Community of Excellence at the University at Buffalo. His research and practice address responsiveness and performativity in architecture. Khan has received grants from the Rockefeller Foundation, New York State Council for the Arts and the Department of Education and is 2008 Fellow of the New York Foundation for the Arts. He serves on the Steering Committee of the Association for Computing Aided Design in Architecture (ACADIA), and the Information and Computing Technologies Strategic Strengths Committee at UB. Khan is a past editor for the Journal of Architectural Education and is currently a co-editor of the Situated Technologies Pamphlet Series published by the Architectural League of New York. He is co-director of UB's Center for Architecture and Situated Technologies, where his research includes transitive materials, responsive architecture and situated technologies.



Eaton Lattman

Professor, Department of Materials Design and Innovation, Professor, Department of Structural Biology, Jacobs School of Medicine and Biomedical Sciences, and Director, BioXFEL, University at Buffalo, and Principal Research Scientist, Hauptman-Woodward Institute

Eaton (Ed) Lattman joined the University at Buffalo's Department of Structural Biology as a faculty member, and Hauptman Woodward Medical Research Institute (HWI) as its chief executive officer, in 2008. In 2013, Lattman became director of a new NSF Science and Technology Center entitled BioXFEL. This center is administered by UB on behalf of a consortium of eight research institutions around the U.S., and is headquartered at the Hauptman-Woodward Institute. With the exception of a post-doctoral stint in the 1970s, Lattman spent his entire academic career at the Johns Hopkins University, beginning as a graduate student in biophysics, and rising through the ranks to become dean of research and graduate education in the Krieger School of Arts and Sciences. En route, he served as professor of biophysics in both the Schools of Medicine and of Arts and Sciences, giving him a very broad perspective on university life. He holds a PhD degree in biophysics from Johns Hopkins, and a BA in chemistry and physics from Harvard College. He served as a post-doctoral fellow with Nobel laureate Robert Huber.



Kemper Lewis

Director, Sustainable Manufacturing and Advanced Robotic Technologies (SMART) Community of Excellence; and Professor and chair, Department of Mechanical and Aerospace Engineering, University at Buffalo

Kemper Lewis is professor and chair of the Department of Mechanical and Aerospace Engineering at the University at Buffalo. He is also the director of UB's Community of Excellence in Sustainable Manufacturing and Advanced Robotic Technologies (SMART), an initiative that harnesses the strengths of faculty across the university to develop advanced manufacturing processes and technologies that enable cost-effective design of highly customizable, high-quality products. He teaches and conducts research in the areas of design theory, system optimization, decision modeling and design analytics. He is a Fellow of the American Society of Mechanical Engineers and has served on the National Academies Panel on Benchmarking the Research Competitiveness of the United States in Mechanical Engineering.



D. Scott Mackay

Professor, Department of Geography and Associate Dean, College of Arts and Sciences, University at Buffalo

D. Scott Mackay is a professor in the Department of Geography, as well as the Graduate Program in Ecology, Evolution and Behavior at UB. He is also associate dean of graduate education in the College of Arts and Sciences. Mackey serves as an advisory panel member for the Shale Hills Critical Zone Observatory, on the Board of Directors of the Consortium of Universities for the Advancement of Hydrologic Science, and on the Hydrology Process Team for HydroCLM, a project at the National Center for Atmospheric Research. He is also the editor of Water Resources Research. His research has been supported by the NSF, NASA, EPA, and DOE. He earned a PhD in civil engineering in 1997 from the University of Toronto, and served on the faculty at the University of Wisconsin-Madison prior to joining UB.



Balaji Narasimham

Vlasta Klima Balloun Chair, Department of Chemical and Biological Engineering, Iowa State University

Balaji Narasimham is the Vlasta Klima Balloun Professor in the Department of Chemical and Biological Engineering at Iowa State University. He received his PhD from Purdue University and a B.Tech from the Indian Institute of Technology Bombay, both in chemical engineering. His current research interests are in engineered biomaterials for controlled delivery of drugs, peptides, and vaccines, nanoscale manipulation of multiphase polymeric materials, bio-inspired materials, nanoparticles, and combinatorial materials science.



Abani K. Patra

Office of Advanced Scientific Computing Research, Department of Energy and Professor, Department of Mechanical and Aerospace Engineering

Abani K. Patra works with the Office of Advanced Scientific Computing Research for the United State Department of Energy and is a professor in the Department of Mechanical and Aerospace Engineering at the University at Buffalo. He obtained a PhD in computational and applied mathematics from the University of Texas-Austin in 1995.

After a short post-doctoral stint, he joined the University at Buffalo in 1996 and was promoted to full professor in 2004. He spent three years at the National Science Foundation as a program director in the Office of Cyberinfrastructure from 2007-2010. He is actively engaged in computational science research and was among the founding members of the Center for Computational Research and the Center for Geohazards at UB. He has published numerous articles on topics ranging from adaptive meshing and error analysis of finite elements, HPC and more recently, large data driven methodologies. The TITAN2D toolkit, developed by Patra and co-workers, is used by over 200 groups worldwide for mass flow hazard analysis. His research interests are computational mechanics, solution adaptive finite element methods, parallel and high performance computing, with applications to biomechanical systems.



E. Bruce Pitman

Professor, Department of Materials Design and Innovation, University at Buffalo

E. Bruce Pitman is a professor in the Department of Materials Design and Innovation at the University at Buffalo. He holds a bachelor's degree in physics from Northwestern

University and earned his PhD in mathematics from Duke University in 1985. He joined UB's Department of Mathematics in 1989. Pitman has served in various administration positions at UB including vice provost for educational technology from 2000-2003, associate dean for research and sponsored programs from 2003-2011, and dean of the College of Arts and Sciences from 2011-2016. Throughout his administrative career, he has maintained an active, funded research program. Working with colleagues at the Center for Computational Research, since 1999, he has organized an annual workshop on computational science for high school students.



Paras N. Prasad

Distinguished Professor of Chemistry, Physics, Medicine and Electrical Engineering, and Executive Director, Institute for Lasers, Photonics and Biophotonics, University at Buffalo

Paras N. Prasad is a Distinguished Professor of Chemistry, Physics, Medicine and Electrical Engineering, the highest rank in the New York

State University system. He also holds the Samuel P. Capen Chair at the University at Buffalo and is the executive director of the multidisciplinary Institute for Lasers, Photonics and Biophotonics. Prasad has published over 700 scientific papers, and co-edited,

authored or co-authored several books. He also holds a number of patents. Prasad has received much recognition for his work, including Scientific American's Top 50, and Inventor of the Year in Life Sciences Award by the Technical Council of the Niagara Frontier. He is a Fellow of SPIE, the American Physical Society and the Optical Society of America. He is also a recipient of the prestigious Sloan and Guggenheim fellowships. He has received an honorary professorship from Zhejiang University in China for his pioneering work in photonics, nanophotonics and biophotonics, as well as for his world leadership advancing a global infrastructure in science and technology. Recently he received an honorary doctorate from the Royal Institute of Technology in Sweden (KTH) and an honorary degree from Aix-Marseille University in France.



Alan Rabideau

Professor and Director of Graduate Studies, Department of Civil, Structural and Environmental Engineering, University at Buffalo

Alan Rabideau is a professor and the director of graduate studies in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo. His research examines groundwater contamination and remediation in a variety of settings. Most recently, his work included the West Valley Demonstration Project, an inactive nuclear fuel processing facility 30 miles south of Buffalo. Rabideau leads UB's Ecosystem Restoration through Interdisciplinary Exchange (ERIE), a collection of academic programs and research projects that advance the science and policy of ecosystem restoration, with an emphasis on the Great Lakes and Western New York. Rabideau received his PhD in environmental science and engineering from the University of North Carolina Chapel Hill, and an ME and MA from the University at Buffalo. He is a member of a National Academy of Science panel that explores ways to improve hazardous waste management at thousands of sites where subsurface contaminants pose risks to drinking water.



Krishna Rajan

Erich Bloch Chair and Empire Innovation Professor, Department of Materials Design and Innovation, University at Buffalo

Krishna Rajan, an internationally recognized expert on materials informatics, is the Erich Bloch Chair and Empire Innovation Professor of the University at Buffalo's Department of Materials Design and

Innovation. Rajan has authored or co-authored more than 300 publications and has delivered more than 270 invited lectures and presentations. He is the founding editor-in-chief of the new journal *Materials Discovery*, and serves on numerous national and international panels, including the National Academy of Sciences' Member Science and Technology Experts Group (ISTEG): National Academies of Sciences, Engineering, and Medicine. He has received numerous awards and recognitions, including most recently the Alexander von Humboldt Research Award. Rajan received his doctorate from MIT in materials science with a minor in science and technology policy and held post-doctoral appointments at MIT and Cambridge University. He was a staff scientist at the National Research Council of Canada and then served on the faculties at Rensselaer Polytechnic Institute and Iowa State University.



Pavani Ram

Professor, Department of Epidemiology and Environmental Health and Co-director, Community of Excellence on Global Health Equity, University at Buffalo

Pavani Ram joined the Department of Epidemiology and Environmental Health at the University at Buffalo in 2005 as a research assistant professor. She was appointed as an assistant professor in January 2008 and promoted to associate professor in 2012. An internist by training, she began her career in public health as an epidemic intelligence service officer at the Centers for Disease Control and Prevention (CDC) in 2001. Ram served as a medical epidemiologist at the CDC from 2003 to 2005. She has conducted numerous outbreak investigations, participated in the CDC response to the terrorist attacks of September 11, 2001, as well as the anthrax bioterrorism events of that same year. She has extensive international public health experience, primarily in child survival.



Ramamurthy Ramprasad

Centennial Term Professor, Department of Materials Science and Engineering, University of Connecticut

Ramamurthy Ramprasad is a Centennial Term Professor in the Department of Materials Science and Engineering at the University of Connecticut. He received his B. Tech. in metallurgical engineering at the Indian Institute of Technology, Madras, an MS degree in materials science and engineering at Washington State University, and a PhD degree, also in materials science and engineering, at the

University of Illinois, Urbana-Champaign. After a six-year stint with Motorola's R&D laboratories in Tempe, AZ, he joined the Department of Materials Science and Engineering at the University of Connecticut in 2004. Ramprasad's area of expertise is in the development and application of first principles and data-driven computational tools, and more broadly in the utilization of such methods for the design and discovery of new materials, especially dielectrics and catalysts. His research is funded by the Office of Naval Research, the National Science Foundation, the Department of Energy, ACS Petroleum Research Fund, the Electrical Power Research Institute, the Air Force Office of Fundamental Research, and industry.



Mark Rossi

Executive Director, Clean Production Action

Part of the Clean Production Action team since 2004, Mark Rossi has the unique ability to bring together diverse groups and achieve innovative outcomes. In 2006, he founded BizNGO, a collaboration of organizations who work together to advance safer chemicals and sustainable materials. Innovative products of BizNGO include the Alternatives Assessment Protocol, Guide to Safer Chemicals, and Plastics Scorecard. He is also the co-author of the GreenScreen. Launched in 2007, the GreenScreen is now the gold standard in hazard assessment tools. In 2014, he co-founded the Chemical Footprint Project, the first initiative of its kind to benchmark corporations on their overall chemical management performance. Rossi is the author and/or co-author of numerous articles, reports, and blogs on advancing safer alternatives to toxic chemicals. Most recently, he authored the United Nations Environment Program's report, *The Business Case for Knowing Chemicals in Products and Supply Chains*. Rossi is a research fellow at the Lowell Center for Sustainable Production. He received his PhD in environmental policy from the Massachusetts Institute of Technology.



Robin Schulze

**Dean, College of Arts and Sciences and
Professor of English, University at Buffalo**

Robin Schulze is dean of the College of Arts and Sciences and a professor of English at the University at Buffalo. She received her Bachelor's degree from Yale University (1983), and her first and second Master's degrees in Music (1986) and English (1987) and her PhD in English (1991) from the University of Michigan. She specializes in modernist American poetry, textual scholarship and

editorial theory, and modernist literature and culture. Prior to her appointment, Schulze served as associate dean for the humanities, College of Arts and Sciences, at the University of Delaware from 2014–2016. She came to Delaware from Penn State University, where she taught for more than a decade before accepting the position of head of the Department of English in 2007. Schulze has received prestigious grants from the UNIDEL Foundation (2015), the American Philosophical Society (2005–2006), and the Oregon State University Center for the Humanities (2005–2006), among others. Additional awards include the Class of 1933 Prize for Distinction in the Humanities (2005) and the George W. Atherton Award for Excellence in Undergraduate Teaching (1998).



Sadasivan Shankar

Margaret and Will Hearst Visiting Lecturer in Computational Science and Engineering, John A. Paulson School of Engineering and Applied Sciences, Harvard University

Sadasivan Shankar is the first Margaret and Will Hearst Visiting Lecturer in Computational Science and Engineering at Harvard's John A. Paulson School of Engineering and Applied Sciences. He earned his PhD in chemical engineering and materials science from the University of Minnesota. He has initiated and led multiple efforts at Intel, most recently the materials design program. Over his tenure in research and development in the semiconductor industry, he and his team have worked on several new initiatives; using modeling to optimize semiconductor processing and equipment for several technology generations, advanced process control using physics-based models, thermo-mechanical reliability of microprocessors, thermal modeling of 3D die stacking, and using thermodynamic principles to estimate energy efficiency of ideal computing architectures.



Mark Swihart

UB Distinguished Professor, Department of Chemical and Biological Engineering, and Executive Director, New York Center of Excellence in Materials Informatics

Mark Swihart is a UB Distinguished Professor in the Department of Chemical and Biological Engineering and Executive Director, New York State Center of Excellence in Materials Informatics. He earned a BS in chemical engineering from Rice University in 1992, and a PhD in chemical engineering in 1997 from the University of Minnesota. He then spent one year as a post-doctoral researcher in mechanical engineering

at the University of Minnesota before joining UB as an assistant professor. Since 2007, he has directed the UB 2020 Strategic Initiative in Integrated Nanostructured Systems. His research interests include synthesis, processing, and applications of nanoparticles and other nanomaterials, with particular emphases on gas-phase synthesis of nanoparticles and on the computational modeling of nanomaterials processing. He has co-authored more than 135 journal papers, which have been cited more than 5,700 times.



Satish K. Tripathi

President, University at Buffalo

An internationally distinguished researcher and higher education leader, Satish K. Tripathi was appointed the 15th president of the University at Buffalo in 2011. Tripathi, who served as UB's provost from 2004–2011, was dean of the Bourns College of Engineering at the University of California–Riverside from 1997–2004. Previously, he spent 19 years as professor of computer science at the University of Maryland, including seven years as department chair. He holds a doctorate in computer science from the University of Toronto, as well as three master's degrees—one in computer science from the University of Toronto and two in statistics from the University of Alberta and Banaras Hindu University. A fellow of the IEEE and the American Association for the Advancement of Science, he was awarded honorary doctorates from the Indian Institute of Information Technology, Allahabad, and Brock University in Canada.



Grace Wang

SUNY Vice Chancellor for Research and Economic Development and Professor

Grace Wang was appointed vice chancellor for research and economic development by the SUNY Trustees in January 2017. In this role, Wang plays a lead role in designing, directing, and expanding the footprint of SUNY's research, graduate education, industry relations, and economic development activities. She supports the SUNY Chancellor and Provost in advancing SUNY's overall strategy and mission, and serves as a liaison to the SUNY Board of Trustees in the areas of research and economic development. She works with the Research Foundation for SUNY, providing the research vision the organization will work to operationally support. Prior to joining SUNY, Wang served as acting assistant director for engineering at the National Science Foundation (NSF). In this role, she led the Engineering

Directorate, managing a funding portfolio of over \$900 million dedicated to conducting frontier engineering research, supporting engineering education, and fostering innovation and technology commercialization. Previously at NSF, Wang was the Division Director of Industrial Innovation and Partnerships (IIP) division. She holds seven U.S. patents. Wang received her PhD in materials science and engineering from Northwestern University.



Olga Wodo

Assistant Professor, Department of Materials Design and Innovation, University at Buffalo

Olga Wodo is an assistant professor in the Department of Materials Design and Innovation at the University at Buffalo. Prior to joining UB, Wodo was a postdoctoral fellow

at Iowa State University. She received her PhD in mechanical engineering in 2008 from Czestochowa University of Technology in Poland. Her research interests are centered around developing computational methods to study the evolution of phases and interfaces in heterogeneous material systems. Her research is focused on high efficiency organic electronics, batteries with extended life-time and 3D printed elements free of defects.

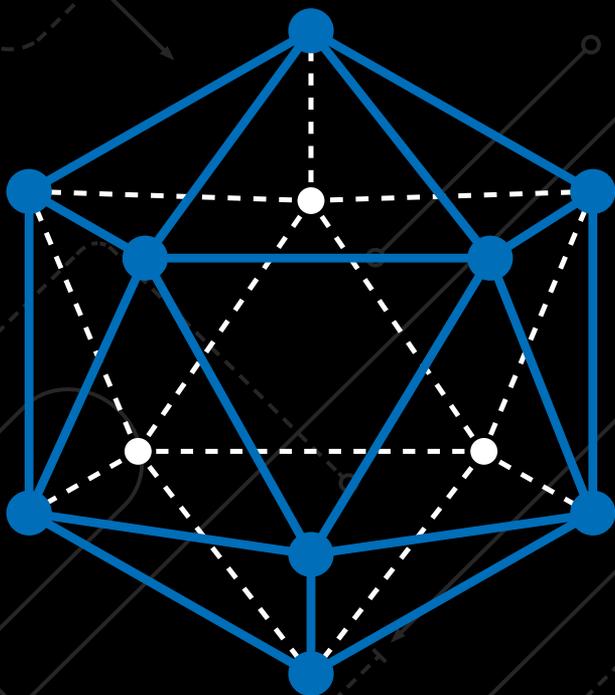


Charles F. Zukoski

Provost and Executive Vice President for Academic Affairs, University at Buffalo

An internationally recognized scholar in chemical engineering and accomplished higher education leader, Charles F. Zukoski was appointed provost and executive vice

president for academic affairs at the University at Buffalo in 2012. His research focuses on the chemical and physical properties that underlie changes in the state of dispersion of colloidal particles. A member of the National Academy of Engineering, he was named one of the “Hundred Chemical Engineers of the Modern Era” by the American Institute of Chemical Engineers. Zukoski joined UB from the University of Illinois at Urbana-Champaign, where he was vice chancellor for research and Elio Eliakim Tarika Chair of Chemical and Biomolecular Engineering. He holds a bachelor’s degree in physics from Reed College and a PhD in chemical engineering from Princeton University.



Erich Bloch
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