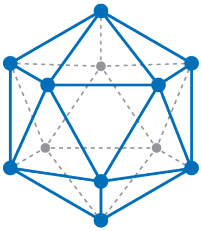
University at Buffalo
Department of Materials Design and Innovation
School of Engineering and Applied Sciences
College of Arts and Sciences

Presenting the third annual



Erich Bloch MDI SYMPOSIUM

Discovering Pathways to Innovation

Program

June 4 – 5, 2019
University at Buffalo

buffalo.edu/ebs2019

University at Buffalo
The State University of New York

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 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 Zürich 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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Acknowledgements

The Erich Bloch Symposium has received generous support from the University at Buffalo and the JPB Foundation. Numerous individuals have helped with the organization of the meeting, but special thanks go to:

The Symposium Advisory Committee:

Dr. Grace Wang, Interim Provost and Senior Vice Chancellor for Research and Economic Development, State University of New York and Professor, Department of Materials Design and Innovation, University at Buffalo; Dr. Liesl Folks, Dean, School of Engineering and Applied Sciences; Dr. Robin Schulze, Dean, College of Arts and Sciences; Alexandra McPherson, Principal, Niagara Share; Dr. Mark Rossi, Executive Director, Clean Production Action; Dr. Chitra Rajan, Associate Vice President for Research Advancement, University at Buffalo.

Symposium Staff:

Margaret Poniatowski, Director of Administration, Department of Materials Design and Innovation; Jennifer Giegel, Director of Strategic Initiatives, School of Engineering and Applied Sciences; Margaret Shea, Staff Assistant, Research and Economic Development; Michelle Bowen, Outreach Coordinator, School of Engineering and Applied Sciences; Jane Stoyle Welch, Director of Communications, School of Engineering and Applied Sciences; Holly Acito, Assistant Director of Communications, School of Engineering and Applied Sciences; Sarah D'Iorio, Assistant 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 Third Annual Erich Bloch Symposium in Materials Design and Innovation at the University at Buffalo (UB). The symposium is dedicated to the late Erich Bloch, former director of the National Science Foundation, who helped endow the recently established 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 honors Erich Bloch's legacy and embodies 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. In that spirit, this year's theme is "Discovering Pathways for Innovation".

MDI trains a new genre of materials scientists and engineers using advanced computational tools, in conjunction with bench science, to reduce the cost and time it takes to discover and develop new materials and technologies that can positively impact economic projects. The department forges critical partnerships between government, industry, community groups 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 thought leaders 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!

Dr. Krishna Rajan

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

MDI SUMMER INSTITUTE

About the MDI Summer Institute

The MDI Summer Institute is an extra-mural program of UB's Department of Materials Design and Innovation that supports a broad range of outreach activities to promote research and education platforms in materials design. Its flagship event is the annual Erich Bloch Symposium.

The Summer Institute includes additional events in conjunction with the Bloch Symposium. Following the Bloch Symposium, on June 5, 2019, the Collaboratory for a Regenerative Economy (CoRE) will host a workshop – the CoRE Solar Summit, and will continue through June 6th, 2019. Attendance to this event is by invitation.

CoRE SUMMIT

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

William Bauer

Research Assistant Professor

PhD, Structural Biology, University at Buffalo

Research Interests: X-ray crystallography, membrane protein biochemistry, with a focus on education and diversity inclusion.

Scott Broderick

Research Assistant Professor

PhD, Materials Science and Engineering, Iowa State University

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

Erik Einarsson

Assistant Professor

PhD, Mechanical Engineering, University of Tokyo

Research Interests: Synthesis of low-dimensional materials such as graphene and single-walled carbon nanotubes, materials characterization, and THz applications of nanoscale materials

Quanxi Jia

Empire Innovation Professor and National Grid Professor of Materials Research; 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

Research Professor

PhD, Biophysics, Johns Hopkins University

Research Interests: X-ray free-electron lasers in biological scattering, protein folding, development and improvement of methods in protein crystallography

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

Edward Snell

Professor, Director of BioXFEL; Senior Scientist; CEO of Hauptman-Woodward Medical Institute, Department of Structural Biology, Jacobs School of Medicine and Biomedical Sciences

PhD, Chemistry, University of Manchester

Research Interests: Bioinformatics, protein function and structure, proteins and metalloenzymes, structural biology, x-ray crystallography

Grace Wang

Interim Provost and Senior Vice Chancellor for Research and Economic Development, State University of New York; and Professor, Department of Materials Design and Innovation, University at Buffalo

PhD, Materials Science and Engineering, Northwestern University

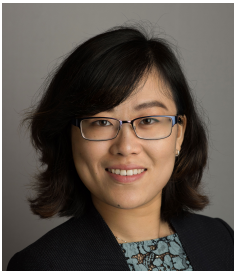
Research Interests: Development of materials for microelectronics

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

Assistant Professor

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

Research Interests: Nanomaterials and nanostructures for energy storage and conversion

MDI Lab Directors

David Eason

Research Assistant Professor

PhD, North Carolina University

Research Interests: Thin film deposition

Alan Friedman

Research Associate Professor

PhD, Chemistry, University of California at Santa Barbara

Research Interests: Analytical chemistry, organometallic chemistry, photochemistry

SYMPOSIUM Agenda

Tuesday, June 4

» **8:00 – 9:00 a.m.:** Breakfast and registration

9:00 - 9:15 a.m.: Welcome

» 9:00 – 9:05 a.m.: Opening remarks

Krishna Rajan, Erich Bloch Chair, Department of Materials Design and Innovation

» 9:05 – 9:15 a.m.: Introduction

Grace Wang, Senior Vice Chancellor for Research and Economic Development, State University of New York; Professor, Department of Materials Design and Innovation, University at Buffalo

9:15 - 10:00 a.m.: Plenary Speaker

James Kurose, Assistant Director, Computer Information Science and Engineering, National Science Foundation

10:00 - 10:30 a.m.: Response

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

» **10:30 – 11:00 a.m.:** Break

11:00 a.m. - 12:15 p.m.: Session I: Water, Materials and the Environment

SESSION COODINATOR:
Prathima Nalam, Assistant Professor, Department of Materials Design and Innovation, University at Buffalo

» Keynote Speaker

Yoram Cohen, Distinguished Professor, Chemical and Biomolecular Engineering, University of California, Los Angeles

» Panel

Bob Shibley, Dean, School of Architecture and Planning, University at Buffalo

D. Scott MacKay, Professor, Department of Geography, University at Buffalo

Jill Jedlicka, Executive Director, Buffalo Waterkeepers

David Castillo, Professor, Department of Romance Languages and Literatures; Director, Humanities Institute, University at Buffalo

John Atkinson, Assistant Professor, Department of Civil, Structural, Environmental Engineering, University at Buffalo

» 12:15 – 1:30 p.m.: Lunch and group photo

1:45 - 3:00 p.m.: Session II: AI, Materials and the Economy

SESSION COODINATOR:
Kristofer Reyes, Assistant Professor, Department of Materials Design and Innovation, University at Buffalo

» Keynote Speaker

Peter Warrian, Senior Research Fellow, Munk School of Global Affairs and Public Policy, University of Toronto

» Panel

Joanne McLaughlin, Assistant Professor, Department of Economics, University at Buffalo

Sage Green, Community Energy Planning Specialist, PUSH Buffalo

Lauren Asplen, Director, Healthy Sustainability Program, BlueGreen Alliance

Alexandra McPherson, Principal, Niagara Share

3:00 - 4:15 p.m.: Session III: Materials for Solar Technology

SESSION COODINATOR:
Fei Yao, Assistant Professor, Department of Materials Design and Innovation, University at Buffalo

» Keynote Speaker

Vikram Dalal, Thomas Whitney Professor and Anson Marston Distinguished Professor, Electrical and Computer Engineering Department, Iowa State University

» Panel

Sheila Davis, Executive Director, Silicon Valley Toxics Coalition

Mark Rossi, Executive Director, Clean Production Action

Alexandra McPherson, Principal, Niagara Share

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

4:15 - 5:30 p.m.: Reception

Wednesday, June 5

» **8:00 – 8:30 a.m.:** Breakfast

8:45 - 9:30 a.m.: "What's Next?" Enabling the 4th Industrial Economy in Erich Bloch's Legacy

» Introduction

Bill Harris, President and CEO, Science Foundation Arizona

Bryan Berry, Assistant Director of Technology and Business Innovation, New York State Energy Research and Development

9:30 - 11:00 a.m.: Session IV: Materials and the 4th Industrial Economy

SESSION COODINATOR:
Baishakhi Mazumder, Assistant Professor, Department of Materials Design and Innovation, University at Buffalo

» Keynote Speakers

Paul Smith, Vice President and Center Director, Xerox Canada, Inc.

Matthew Hull, Associate Director for Innovation and Entrepreneurship, Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure, Virginia Polytechnic Institute

» Panel

E. Frits Abell, Founder and Managing Director, Impact Industries

Christina Orsi, Associate Vice President for Economic Development, University at Buffalo

Nate Cady, Professor of Nanobioscience, SUNY Polytechnic Institute

Charles Ruffing, Director, New York State Pollution Prevention Institute, Rochester Institute of Technology

11:00 a.m. - 12:30 p.m.: Session V: Workforce for the 4th Industrial Economy

SESSION COODINATOR:
Jung-Hun Seo, Assistant Professor, Department of Materials Design and Innovation, University at Buffalo

» Keynote Speakers

Ramesh Sitaraman, Professor, College of Information and Computer Sciences, University of Massachusetts, Amherst

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

» Panel

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

Meera Sampath, Associate Vice Chancellor for Research, State University of New York

Tyra Johnson Hux, Founder and President, Blue Sky Design Supply

Abani Patra, Professor, Department of Mechanical and Aerospace Engineering, University at Buffalo

12:30 - 2:00 p.m.: Student Poster Presentations - Molecules to Neighborhoods

(during lunch)

SESSION COODINATOR:
Scott Broderick, Research Assistant Professor, Department of Materials Design and Innovation, University at Buffalo

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