NJIT Office of Research

NJIT New Jersey Institute of Technology
Chapter of the National Academy of Inventors

NAI-NJIT Chapter Workshop

Sustainable Societies: Global Environment and Climate Change

Innovations to Global Solutions

In Conjunction with
President's Forum
and
NJIT 2021 Faculty Research Showcase

Sponsored by:
National Academy of Inventors
NJIT Office of Research
Carbon Group Global
NJ Commission of Science, Innovation and Technology

November 15, 2021; Ballroom, Campus Center, NJIT
NAI-NJIT Chapter Workshop: 10.00 AM – 12.30 PM
Lunch and Networking: 12.30 PM – 1.00 PM
NJIT Faculty Research Showcase: 1.00 PM – 3.30 PM
YouTube Live Streaming at https://youtu.be/6glZj1hhWkw
Event Website: https://research.njit.edu/nai/events

Climate change is no longer a distant apocalypse, but an emerging reality experienced on the ground by regions around the globe. The recent spate of natural disasters – from forest fires, to searing temperatures, to drought, to hurricanes – injects urgency into the search for sophisticated data, near-term technological solutions and strategies for coping in an altered world. Indeed, as the Intergovernmental Panel on Climate Change noted, "*Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion—such as continued sea level rise—are irreversible over hundreds to thousands of years.*"

Sustained reductions in the emission of greenhouse gases are a top strategic priority that will require the involvement of communities around the globe and the participation of problem-focused partnerships among academia, industry, government and private and non-profit policy advocates. Societal gaps in knowledge about the severity and implications of climate change within individual countries and the political will to undertake coordinated global policies present real challenges. This workshop is designed to bring together key stakeholders with an eye toward developing an integrated approach toward the problem that focuses on education, research, innovation and technology translation.

This event is a part of the NAI-NJIT Chapter Workshop Series on "Innovations to Global Solutions" and the President's Forum is a featured event in the Albert Dorman Honors College Colloquium Series and is made possible in part by the generous support of the DeCaprio Family.

Program Agenda:

10.00 AM – 10.05 AM: Welcome Remarks:
Joel Bloom, President, NJIT
Commissioner Upendra Chivukula, New Jersey Board of Public Utilities
Fadi Deek, Provost and Senior Executive Vice President, NJIT
Atam Dhawan, Senior Vice Provost for Research, NJIT

10.05 AM – 10.35 AM: Keynote Presentation:
Distinguished Speaker: Karen Reif, Vice President – Renewables & Energy Solutions, PSE&G

10.35 AM – 11.25 AM: Distinguished Panel Discussion I: Sustainable Environment and Climate Change

Moderator:
Govi, Rao, CEO Phase Change Solutions & Co-founder, Carbon Group Global

Panelists:
Robin Leichenko, Co-Director, Rutgers Climate Institute
Professor, Department of Geography, Rutgers University
Elie Bou-Zeid, Professor of Civil and Environmental Engineering, and Director, the Metropolis Project, Princeton University
D. Scott Mackay, Professor & Chair, Department of Geography, Professor, Department of Environment and Sustainability, University of Buffalo
Judith Sheft, Executive Director, New Jersey Commission on Science, Innovation and Technology

11.25 AM – 12.15 PM: Distinguished Panel Discussion II: Sustainable Environment and Climate Change

Moderator:
Atam Dhawan, Senior Vice Provost for Research, NJIT

Panelists:
Pallavi Madakasira, Director, Clean Energy, New Jersey Economic Development Authority (NJEDA)
Michel Boufadel, Distinguished Professor, Civil and Environmental Engineering, Director, Center for Natural Resources

Xiaonan (Shannon) Tai, Assistant Professor, Department of Biological Sciences
Omowunmi "Wunmi" Sadik, Distinguished Professor and Chair, Chemistry and Environmental Science

12.15 PM – 12.30 PM: Concluding Remarks:
Distinguished Speaker: Mihri Ozkan, Professor, Department of Electrical and Computer Engineering and Climate Champion Faculty, University of California-Riverside; Fellow, National Academy of Inventors (NAI)

12.30 PM – 1.00 PM: Lunch and Networking Session

1.00 PM – 3.30 PM: Faculty Research Showcase
FY22 New Faculty Presentations
FY22 Faculty Seed Grants Presentations

Speakers Biographical Sketches

Karen Reif: Karen Reif is vice president of Renewable and Energy Solutions at Public Service Enterprise Group, where she oversees PSE&G's clean energy programs. She is responsible for the operations and strategic growth of both PSE&G and PSEG Long Island's solar energy, energy efficiency, demand response and alternative fuel vehicle programs.

As of July 2018, PSE&G has made more than $1.3 billion in solar investments in New Jersey and more than $400 million in energy efficiency programs in the state. PSE&G's current **Solar 4 All** investment is concentrating on turning landfills and brownfields green by building solar farms on otherwise unusable sites. In addition, the company has announced plans to propose an additional $2.5 billion in energy efficiency programs, $300 million in electric car infrastructure investment and $100 million in battery storage projects.

Previously, she was senior director of continuous improvement for the Shared Services Organization at PSEG and established this function for PSEG, which is responsible for developing sustainable, repeatable and quantifiable business improvements based on industry best practices. She also has worked in the Information Technology Department and in multiple areas of IT focusing on finance, strategy, business relationship, application implementation, quality assurance, process management, and program management. Prior to working in PSEG, Reif was a consultant with Scott, Madden & Associates.

She holds a B.A. in Economics and International Studies from Emory University as well as an M.B.A. (M.S.I.A.) from Carnegie Mellon University. She has the following certifications: Project Management Professional, Lean Six Sigma, and Information Technology Infrastructure Library (ITIL) Foundation.

Mihri Ozkan, PhD: Mihri Ozkan is a professor of the Electrical and Computer Engineering Department at UCR. Mihri is a Fellow of National Academy of Inventors and Frontier National Academy of Engineering, and an Alumna of Keck National Academy of Science. She is the

Climate Action Champion and Change Maker Professor of the University of California. Mihri completed her graduate studies at Stanford University and at UC-San Diego.

Mihri's research is sparked with her commitment in climate control and environmental improvement. Her research group has been developing game-changer solutions for Li-ion battery technologies using sustainable materials and using green chemistry with low power processing. Transforming waste glass and plastic bottles, biomass (mushrooms, sugar) and natural sources such as sand and diatoms into high grade battery electrodes are among her group's achievements.

Mihri's creative nature has resulted in 29 granted and 15 active patents in the area of advanced Li-ion battery technologies for smart grid, electric vehicle and portable electronics applications. Her invention portfolio puts her at the level of most innovative faculty of UCR. Hence, she has been selected as the most remarkable women of UCR by the UC Regents. Her creative research and innovative approaches for the advanced Li-ion battery technologies have brought her nearly 56 scientific national and international honors/awards including the Medal of Engineering Science, Humanitarian Star, Emerging Scholar, Great Inventor, Young Investigator, Achievement in Technical Ingenuity, the Top 100 Science awards, and she has been named as John J. Guarrera Engineering Educator, Top 50 Creator, Climate Global Winner, and Top 100 Author-by the Nature publisher.

Mihri has published 180 journal papers and 155 conference proceedings. She advised and graduated nearly 79 graduate students. Her Google scholar citations is nearly 11062, h-Index is 55 and i10-Index is 140. She actively has organized symposiums and meetings at the national and international levels. Lately, she is the lead organizer of the Climate Change Mitigation Technologies Symposium at the Fall MRS 2021 Boston meeting. She is also a guest editor for the Carbon Capture Materials special issue in the MRS Bulletin 2022.

Govi Rao: Govi Rao is a visionary thought leader and seasoned business growth architect with more than 25 years of leadership experience globally - scaling businesses and transforming eco-systems across several industries including specialty chemicals, coatings, building materials, lighting, energy and the rapidly evolving Fourth Industrial Revolution. In his current role as CEO of Phase Change Solutions, Govi leads a team of highly innovative and inspiring leaders, with a vision to decarbonize our footprint and enable human health with sustainable solutions to manage temperature in any environment. Govi is a co-founder of the CARBON Group Global - a sustainable impact enterprise scaling transformational solutions, specifically to address education, total resiliency of women and resource efficiency (food, energy & water). Prior to CARBON, Govi was the President and Chief Executive Officer of Noveda Technologies a leader in water and energy management solutions, based in Bridgewater, NJ. Govi is the former Chairman and Chief Executive Officer of Lighting Science Group Corporation, a leading LED lighting Solutions Company. He was instrumental in envisioning and establishing Lighting Science as an innovative pace setter in the emerging LED lighting space.

Previously, Govi was Vice President and General Manager of the Philips Solid State Lighting business in North America. He also held several other leadership roles at Philips, including Vice President of Business Creation & Brand, where he was responsible for product management, strategic marketing, branding and sustainability. Prior to joining Philips, Govi spent over a decade with specialty chemicals leader Rohm and Haas Company (now part of Dow Chemicals) in various leadership roles across a range of businesses and geographies. In addition to his

experience with a wide business portfolio, Govi has extensive functional expertise that includes strategic planning, product management, marketing, operations, leadership development and general management. Widely traveled across Asia, Europe and the Americas, Govi has a keen sense of value creation in emerging markets and technologies, grounded on the principles of sustainability. Govi has built winning teams that achieved extraordinary goals in start-ups as well as mature businesses – pioneering and inspiring profitable and sustainable growth.

Govi serves on several boards including the Undergraduate Research and Innovation at NJIT, the department of Chemistry and Chemical Biology at Rutgers University and the Center for Great Expectations, a social impact organization providing dignified, uncompromised, and comprehensive behavioral health and substance-use treatment for men, women, and children - to break the generational cycle of abuse, homelessness, and substance use. Govi also serves as an advisor to Hellothinkster, an AI based educational technology company. Govi is active in discussions with various Governments, NGOs, and investment groups to drive market adoption of social impact & energy efficiency solutions and is a contributing author of the Sustainable Enterprise Fieldbook (AMACOM 2008). Govi has testified to the U.S House of Representatives on IP and Innovation.

Robin Leichenko, PhD: Robin Leichenko is Professor of Geography at Rutgers University and co-Director of the Rutgers Climate Institute. Her current research explores the economic and equity impacts of climate change with a focus on the Northeastern United States. Dr. Leichenko serves as co-chair of the fourth New York City Panel on Climate Change, an independent 20-member advisory body that synthesizes scientific information and advises city policymakers on local resiliency and adaptation strategies. Dr. Leichenko previously served as a review editor for Working Group II of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Leichenko has authored or co-authored three books and more than 70 peer-reviewed journal articles and book chapters. Her book, Environmental Change and Globalization: Double Exposures (2008, Oxford University Press, with Karen O'Brien), won the Meridian Book Award for Outstanding Scholarly Contribution from the American Association of Geographers. Her latest book, Climate and Society: Transforming the Future (with Karen O'Brien) was published by Polity Press in 2019.

Elie Bou-Zeid, PhD: Elie Bou-Zeid is Professor of Civil and Environmental Engineering at Princeton University. An expert in atmospheric physics and micrometeorology, Prof. Bou-Zeid serves on the executive board for the Princeton-Geophysical Fluid Dynamics Lab Cooperative Institute for Modeling the Earth System and is Editor of the American Meteorological Society's Journal of the Atmospheric Sciences. His research is broadly focused measurement and modelling of air flow and energy transfer in the lower atmosphere, with applications to urban environmental quality, building energy efficiency, wind energy production, and polar sea ice fluctuations. Prof. Bou-Zeid is the founding director of Princeton's School of Engineering and Applied Science's Metropolis Project, which brings together a diverse group of investigators to advance urban technological innovations that make cities more sustainable, resilient, livable, and equitable.

D. Scott Mackay, PhD: Scott Mackay is Professor of Ecohydrology in the Department of Geography and the Department of Environment and Sustainability, University at Buffalo, The

State University of New York, and editor of the American Geophysical Union journal, *Water Resources Research*. His current research examines plant responses to environmental stresses using plant hydraulics, biophysical modeling, and Bayesian analysis. One area of his research aims to improve our understanding of why some trees die in response to warm (climate change) droughts, while others survive, focusing on belowground physiological processes that lead to root growth towards sources of water or passive adjustments in locations of water uptake, and physical processes that control groundwater flow interacting with plant roots. Another area of his research seeks to improve biophysical understanding of crop growth responses to their microbiome and how crops fare under drought and heat stress in a warming climate. His research is funded by several grants from the National Science Foundation.

Judith Sheft: Judith Sheft is the Executive Director of the New Jersey Commission of Science, Innovation and Technology. The Commission's mission is to accelerate economic development in New Jersey through science, innovation and technology including stimulating academic-industrial collaboration and encouraging and supporting entrepreneurs and inventors. Previously she was involved with regional economic and cluster development having responsibilities at the New Jersey Innovation Institute @ NJIT for the HealthIT Connections entrepreneurial cluster development program, the NJIT I-Corps Site and the Procurement Technical Assistance Center. She has been engaged with technology /IP innovation and commercialization efforts working with faculty and students to create startup companies and establishing licensing relationships with corporate partners. She advised external startups at NJIT's high technology / life sciences business accelerator/incubator. She is on the Board of Advisors to the NJIT Murray Women's Center and serves as a mentor and coach to students and faculty. She is a member of the NJ – Israel Commission and serves on the Board of Greater Newark Enterprise Corporation, StartUp Newark, Women's Center for Entrepreneurship Corporation, Einstein's Alley, SheTek and NJEDA Technology Advisory Board, working to assist early stage tech and life sciences entrepreneurs foster regional economic growth. She was a co-chair of Governor Murphy's transition advisory committee for Technology Government and Innovation (2017).

Atam Dhawan, PhD: Atam P. Dhawan is the senior vice provost for research at NJIT, the founder and executive director of the university's Undergraduate Research and Innovation program, the president of the newly established NJIT chapter of the National Academy of Inventors (NAI), an elected Fellow of the NAI and a distinguished professor of electrical and computer engineering. He focuses on medical imaging and analysis, computer-aided diagnoses and point-of-care technologies. He is the inventor, for example, of a device that enables doctors to use light to look beneath the outer layer of the skin to detect diseases such as early-stage skin cancers.

Pallavi Madakasira: Pallavi Madakasira is the Director, Clean Energy at the New Jersey Economic Development Authority (NJEDA). In her role she helps shape and lead the EDA's efforts to ensure the State's long-term competitiveness in the Clean Energy sector. Her key responsibilities include the roll out of grant programs, develop initiatives to create green jobs and serve as EDA's relationship manager for key industry stakeholders. Most recently Pallavi was the Head of Strategic Marketing at Solvay where she led the creation of new products and business models centered around sustainability. Prior to Solvay, Pallavi worked with Lux Research advising Fortune 500 companies to help define their strategies in the field of clean energy technologies

including solar, wind, and EV transportation. She has also worked with institutional investors in her role as an equity research analyst at Piper Jaffray. Pallavi received her Master's degree in Physics from the University of Texas at Dallas.

Michel Boufadel, PhD: Michel Boufadel is the Director, Center for Natural Resources Development and Protection and Distinguished Professor in the John A. Reif, Jr. Dept. Civil & Environmental Engineering at New Jersey Institute of Technology. He is a Professional Engineer in Pennsylvania and New Jersey, and a Professional Hydrologist as accredited by the American Institute of Hydrology. He is also a Fellow of the American Society of Civil Engineers (ASCE). Dr. Boufadel served recently on two National Research Council (National Academies) committees: "An ecosystem services approach to evaluate the impact of the Deepwater Horizon spill on the Gulf of Mexico", and "Evaluation of effective daily recovery capacity" of oil spills. He also served on the Environmental Protection Agency (EPA) Science Advisory Board on natural gas extraction from shale formations (2011-2012). Dr. Boufadel has more than 250 refereed articles in environmental engineering and science publications, such as NATURE geosciences, Environmental Science and Technology, and Environmental Fluid Mechanics. He is Associate Editor for the Journal of Environmental Engineering, ASCE, and Associate Editor for the American Institute of Mathematical Sciences (AIMS) in Environmental Science.

Xiaonan Tai, PhD: Xiaonan Tai is Assistant Professor, Department of Biological Sciences at NJIT. He joined NJIT in 2020 from the University of Utah, where she was a postdoctoral fellow at the Global Change & Sustainability Center. She works at the interdisciplinary boundaries between ecology, hydrology, GIScience, remote sensing and computer science. She is interested in seeking mechanistic understandings underlying the geospatial patterns of vegetation dynamics and how they might influence the future of ecosystems and water resources in the context of novel environmental conditions. Towards this end, her research combines advanced process-based modeling, machine learning, in situ and remote sensing observations, and parallel computation to synthesize various data sources and advance knowledge. She has worked with a range of different ecosystems, including montane, riparian and subalpine conifers. Her work has been published in journals such as New Phytologist, Annals of Botany, Water Resources Research, and Proceedings of the National Academies of Science.

Omowunmi "Wunmi" Sadik, PhD: Wunmi Sadik is Distinguished Professor and Chair, Chemistry and Environmental Science at NJIT. She joined NJIT in 2019 from the State University of New York at Binghamton (SUNY Binghamton), where she was a professor of chemistry and director of CREATES (Center for Research in Advanced Sensing Technologies & Environmental Sustainability) until August 2019. She received her Ph.D. in Chemistry from the University of Wollongong, Australia and was a National Research Council postdoctoral fellow at the Environmental Protection Agency before joining SUNY Binghamton in 1996.

Sadik has held appointments at Harvard University, Cornell University, and the Naval Research Laboratory. Her research areas include surface chemistry, sensors, materials for energy research and the environment. Sadik has translated basic research in biosensors to a portable, fully autonomous, and remotely operated sensing device known as an Ultra-Sensitive Portable Capillary Sensor, or U-PAC. She has published more than 200 peer-reviewed works and has given over 400 invited lectures and conference contributions worldwide. She has secured over $7 million in research grants and contracts from NSF, EPA, DOD, Procter & Gamble, and Bill &

Melinda Gates Foundation. She is a fellow the American Institute of Medical and Biological Engineering, the Royal Society of Chemistry and African Academy of Sciences. Her notable career highlights include the NIH's Outstanding Scientific Accomplishment and Lectureship, SUNY Chancellor's Award for Research, NSF's Discovery Corps Senior Fellowship, SUNY's Award for Outstanding Inventor, and Harvard University's Radcliffe Fellowship. Sadik serves on the advisory board of South Africa's Department of Science and Technology, and she is the co-Founder of the Sustainable Nanotechnology Organization.