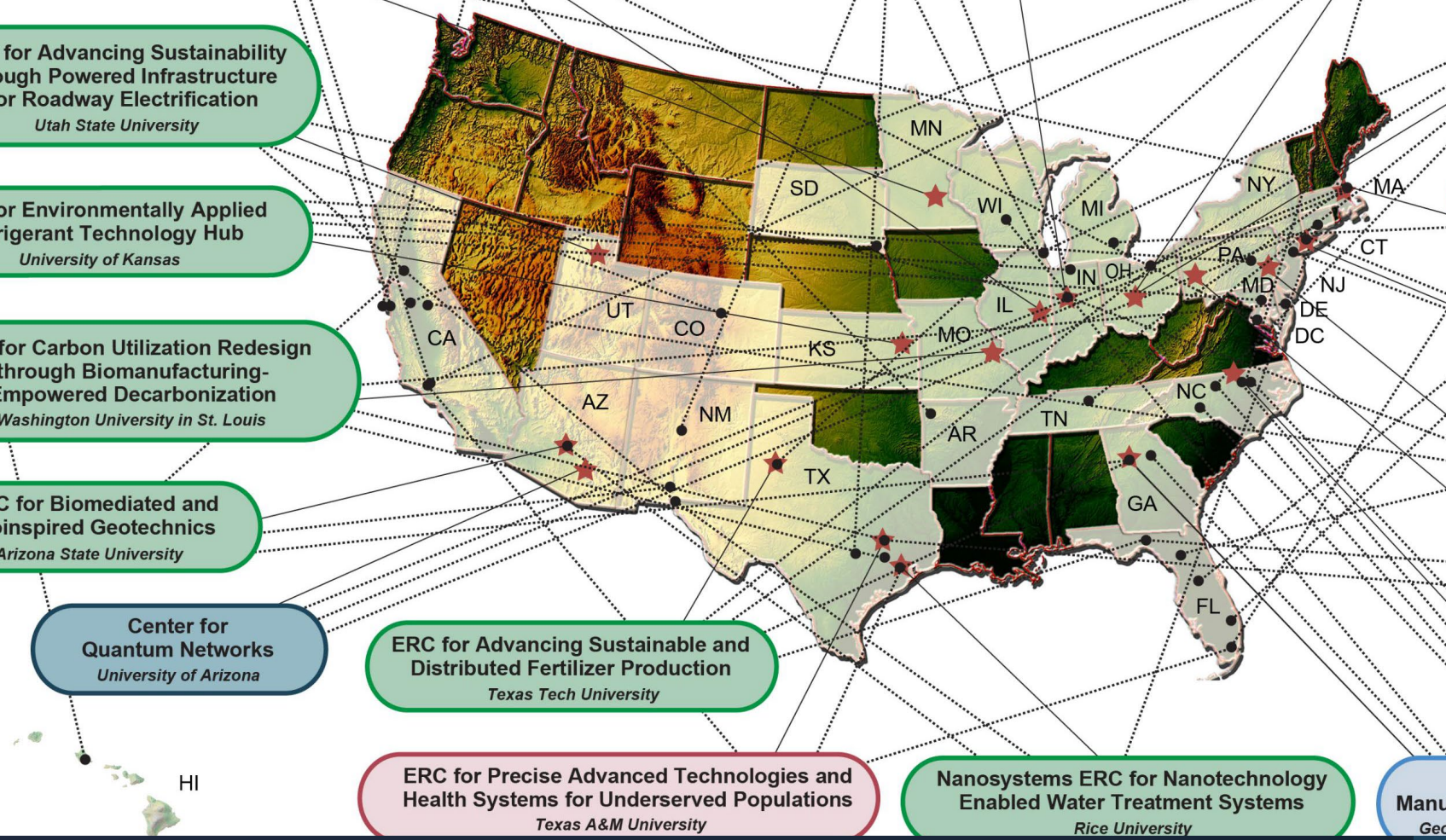
Announcement
Four New Gen-4 ERC

(Lead institutions ★ and core partners)



ERC for Advanced Technologies for Preservation of Biological Systems
University of Minnesota

ERC for Power Optimization for Electro-Thermal Systems
University of Illinois at Urbana-Champaign

ERC for Innovative and Strategic Transformation of Alkane Resources
Purdue University

ERC for Transformation of American Rubber through Domestic Innovation for Supply Security
The Ohio State University

ERC for Advancing Sustainability through Powered Infrastructure for Roadway Electrification
Utah State University

ERC for Hybrid Autonomous Manufacturing Moving from Evolution to Revolution
The Ohio State University

ERC for Environmentally Applied Refrigerant Technology Hub
University of Kansas

Engineering Research Center in Cellular Metamaterials
Boston University

ERC for Carbon Utilization Redesign through Biomanufacturing-Empowered Decarbonization
Washington University in St. Louis

Center for Smart Streetscapes
Columbia University

ERC for Biomediated and Bioinspired Geotechnics
Arizona State University

ERC for the Internet of Things for Precision Agriculture
University of Pennsylvania

Center for Quantum Networks
University of Arizona

ERC for Human AugmentatioN via Dexterity
Carnegie Mellon University

ERC for Advancing Sustainable and Distributed Fertilizer Production
Texas Tech University

ERC for Precision Microbiome Engineering
Duke University

ERC for Precise Advanced Technologies and Health Systems for Underserved Populations
Texas A&M University

Nanosystems ERC for Nanotechnology Enabled Water Treatment Systems
Rice University

ERC for Cell Manufacturing Technologies
Georgia Institute of Technology

NSF ERC for Carbon Utilization Redesign through Biomanufacturing-Empowered Decarbonization (CURB)

Shuhua Yuan (Principal Investigator)

Lead: Washington University in St. Louis in partnership with the University of Delaware, Prairie View A&M University and Texas A&M University.

- CURB will transform U.S. manufacturing by ***curbing CO2 emissions*** and decreasing the human ecological footprint.
- CURB will create ***cost-effective and emissions-free biomanufacturing technologies, facilitating the next-generation bioeconomy and empowering industrial decarbonization.***
- Global industrial and energy emissions topped ***36.8 billion tons in 2022, potentially causing $6.8 trillion in social costs***. CURB will advance, deploy, and scale ***innovative hybrid electro-biomanufacturing engineered systems*** to empower a ***new circular carbon economy*** wherein ***CO2 will serve as valuable feedstock*** for ***manufacturing a broad range of products*** much ***more efficiently than current state-of-the-art and natural systems***.
- Ultimately, CURB ***will transform U.S. manufacturing to zero- and negative emissions, valorize waste CO2 from broad industries, mitigate climate change, reduce hazardous compounds in emissions, and produce plastics that are biodegradable rather than polluting.***
- CURB will produce evidence-based practices for the inclusion of underrepresented groups and workforce pathways to success to empower rapid technology deployment and promote environmental justice. Through partners ranging from start-ups to major corporations, CURB?s technology commercialization will empower a billion-ton level carbon emission reduction and tens of billions of dollars in economic growth.

NSF ERC for Environmentally Applied Refrigerant Technology Hub (EARTH)

Mark Shiflett (Principal Investigator)
Lead: University of Kansas
Partners: Lehigh University, University of Hawaii, University of Maryland, University of Notre Dame and University of South Dakota.

- EARTH will create a transformative, ***sustainable refrigerant lifecycle to reduce global warming*** from refrigerants while increasing the energy efficiency of heating, ventilation and cooling.

- EARTH's vision is to create a transformative "sustainable refrigerant lifecycle" to address the ***HVACR ecosystem's*** key technical and societal challenges: (1) ***lowering HFC emissions***, (2) ***creating safe, property-balanced replacement refrigerants***, and (3) ***increasing HVACR energy efficiency.***
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- Heating, ventilation, air conditioning, and refrigeration (HVACR) are high-global-warming-potential (GWP) hydrofluorocarbons (HFCs) with up to 4000 times the impact of CO_2. High HVACR-associated energy consumption and HFC leaks account for 7.8% of total greenhouse-gas emissions. The American Innovation and Manufacturing (AIM) Act mandates an 85% phasedown of HFCs over the next two decades, but these challenges threaten that goal.

- EARTH ERC brings together talent in engineering (chemical, environmental, mechanical, and materials), architecture, business, chemistry, economics, geography, history, law, psychology, and entrepreneurship in one Innovation Ecosystem to co-create convergent technical and societal solutions with industry partners, technical and community colleges, professional organizations, regulators, and end users.

NSF ERC for Human AugmentatioN via Dexterity (HAND)

James Colgate (Principal Investigator)
Lead: Northwestern University
Partners: Carnegie Mellon University, Florida A&M University, and Texas A&M University, and with engagement of MIT.

- HAND will revolutionize the ***ability of robots to augment human labor*** by transforming dexterous robot hands into versatile, easy-to-integrate tools.
- The purpose is to create robot manipulators that are widely useful (out of the box) Today, making them inaccessible to many who might benefit, including most of the country's quarter-million ***Small and Medium Enterprises (SMEs).***
- ***Robots*** must have truly versatile end-effectors (hands), ***AI-powered dexterous skills, and intuitive interfaces that trained workers can use immediately***.
- The breadth and structure of the ERC program will enable HAND to ***ultimately democratizing access to robot dexterity.***
- Robots will find ***application in low-volume high-mix manufacturing, food processing, remote handling of precious or dangerous materials, assistance for individuals with motor impairments,*** and many other areas.

NSF ERC for Transformation of American Rubber through Domestic Innovation for Supply Security (TARDISS)

Judit Puskas (Principal Investigator)
Lead: Ohio State University
Partners:
Caltech, North Carolina State University, Texas Tech University and the University of California, Merced.

- TARDISS will create bridges between ***engineering, biology, and agriculture*** to revolutionize and on-shore ***alternative natural rubber production from U.S. crops***. The outcomes will be ***a sustainable domestic rubber industry***

- TARDISS will lead fundamental research ***towards US natural rubber biomanufacturing***. Currently the single commercial source ***of natural rubber is the tropical rubber tree*** (Hevea brasiliensis), with production areas all outside of the United States.

- The TARDISS team will ***collaborate with communities, farmers, processors and rubber manufacturers*** to enable biomanufacturing-based natural rubber production optimized to large parts of the US, with a focus on marginal agricultural lands.

- TARDISS will enable a ***circular biomanufacturing economy*** that respects natural systems, including pollinator services by the new domestic crops, water recycling and re-use, additional CO2 capture, and **an estimated 2 million jobs tied to US soil**.