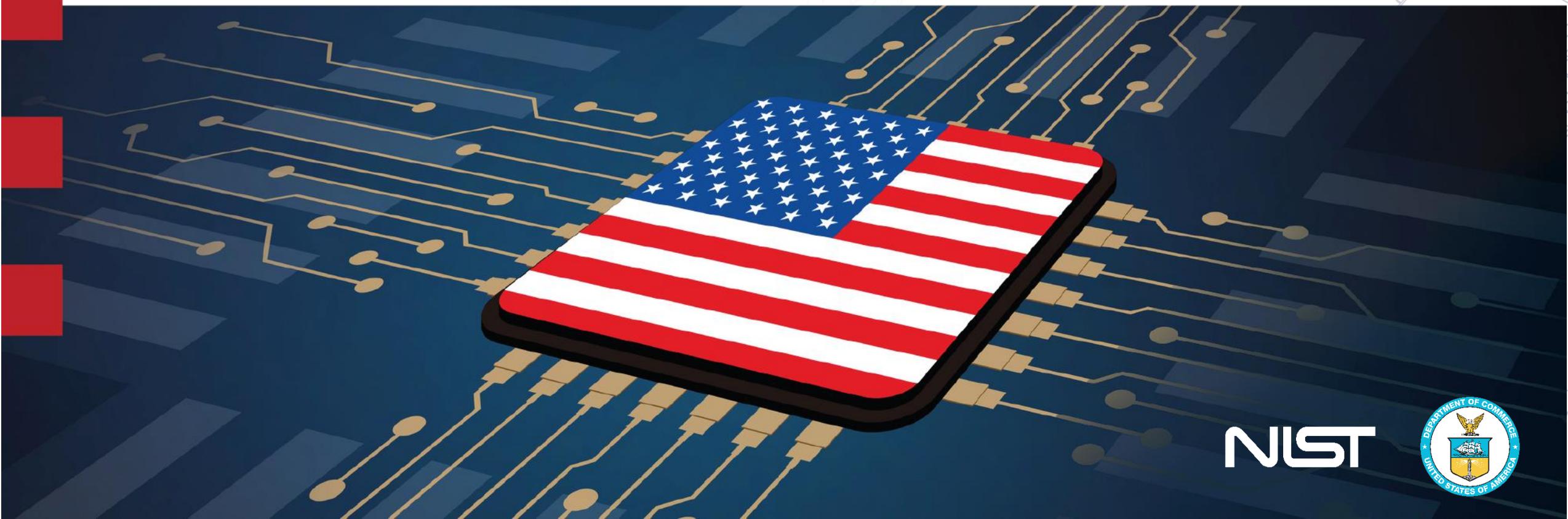
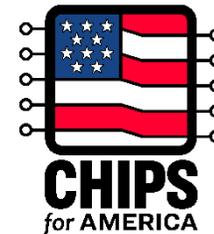


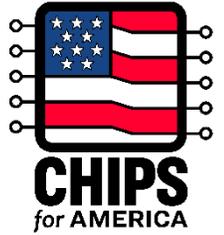
CHIPS for America Research and Development Program

Presented by Jason Boehm and Eric Lin
October 2022



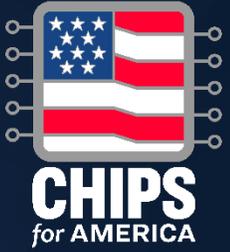
NIST





WELCOME

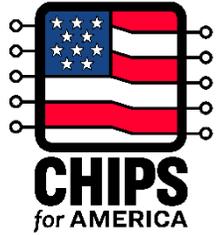
- We look forward to your questions. Click the Q&A button, type your question, and click “Post Question” to submit.
- We will answer as many questions as possible today.
- Visit [CHIPS.gov](https://www.chips.gov)
 - Get the strategy paper
 - Sign up for email updates



CHIPS for America Vision

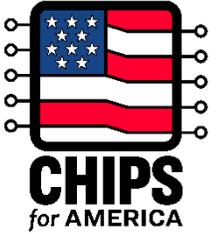
Jason Boehm
Chief of Staff

National Institute of Standards and Technology



Chips are the foundation of the modern world

Chips were invented in America



But most chips are made outside of the U.S.

Logic chip production by country, 2021



Memory chip production by country, 2021



One Hundred Seventeenth Congress
of the
United States of America

AT THE SECOND SESSION

*Begun and held at the City of Washington on Monday,
the third day of January, two thousand and twenty-two*

An Act

Making appropriations for Legislative Branch for the fiscal year ending September 30, 2022, and for other purposes.

*Be it enacted by the Senate and House of Representatives of
the United States of America in Congress assembled,*

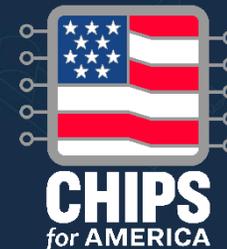
SECTION 1. TABLE OF CONTENTS.

The table of contents for this Act is as follows:

- Sec. 1. Table of contents.
- Sec. 2. References.

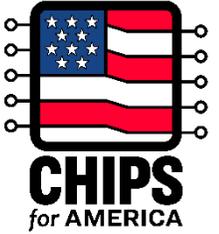
DIVISION A—CHIPS ACT OF 2022

- Sec. 101. Short title.
- Sec. 102. Creating helpful incentives to produce semiconductors (CHIPS) for America fund.
- Sec. 103. Semiconductor incentives.
- Sec. 104. Opportunity and inclusion.
- Sec. 105. Additional GAO reporting requirements.
- Sec. 106. Appropriations for wireless supply chain innovation.
- Sec. 107. Advanced manufacturing investment credit.



The CHIPS and
Science Act
of 2022

CHIPS for America Vision



Economic Security

This act enables us to build more resilient supply chains for important components.



National Security

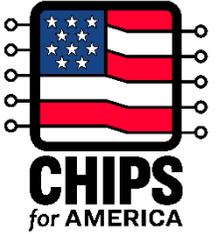
This act enables us to bring the most sophisticated technologies back to the U.S.



Future Innovation

Chips are key to the technologies and industries of the future, so we need to be at the forefront. This act will ensure long-term U.S. leadership in the sector.

CHIPS for America Incentives



\$39 billion for manufacturing

Two component programs:

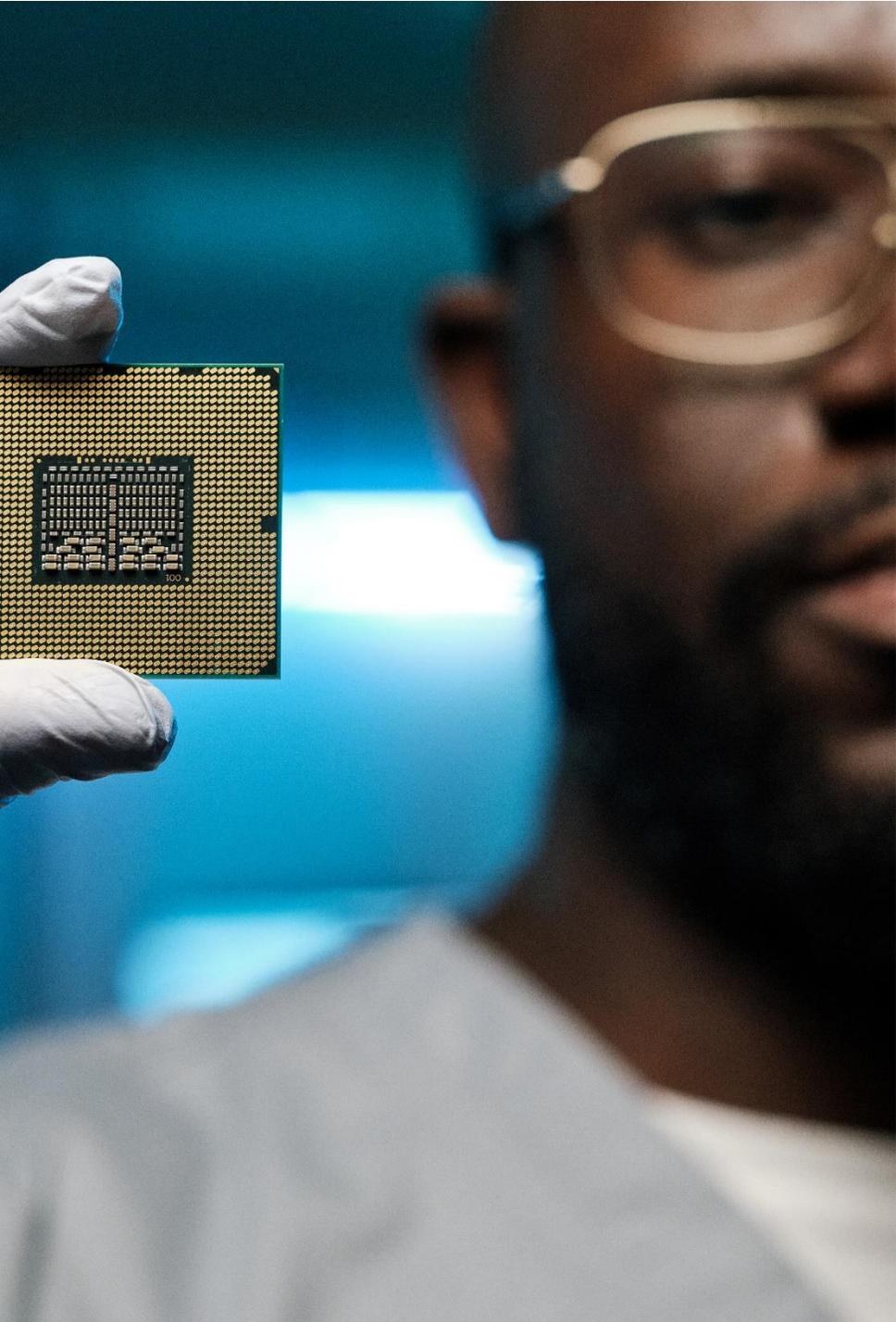
1. Attract large-scale investments in advanced technologies such as leading-edge logic and memory
2. Incentivize expansion of manufacturing capacity for mature and other types of semiconductors

\$11 billion for R&D

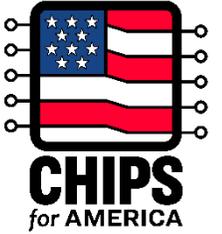
- National Semiconductor Technology Center
- National Advanced Packaging Manufacturing Program
- Manufacturing USA institute(s)
- National Institute of Standards and Technology measurement science

Together with CHIPS initiatives from other agencies, including DOD, State, NSF, and Treasury

Workforce development



Manufacturing incentives will spur:



Large-scale investments in
leading-edge logic and memory
manufacturing clusters

Manufacturing capacity for

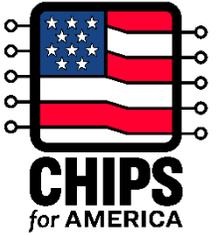
- Mature and current-gen chips
- New and specialty technologies
- Suppliers to the industry

R&D funding will spur:

A domestic infrastructure for research and prototyping innovations

R&D collaborations between academia and industry

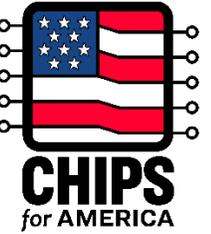
Workforce development and training



Guiding Principles

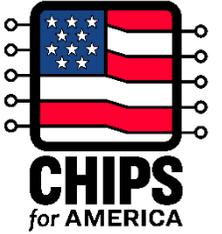
- 1 Meet economic and national security needs
- 2 Ensure long-term leadership in the sector
- 3 Strengthen and expand regional clusters
- 4 Catalyze private sector investment
- 5 Generate benefits for a range of stakeholders and communities
- 6 Protect taxpayer dollars

Timeline



*Timeline is tentative

Accountability



Projects must be economically viable and compatible with strategy

Beneficiaries must meet performance, reporting, audit, and oversight requirements

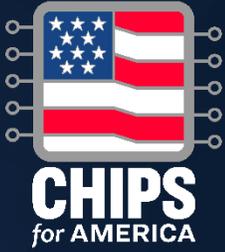
Beneficiaries may not send funded technology abroad or engage with countries of concern

Workers on funded construction projects to earn prevailing wages

Priority to programs that engage a diversity of participants

Public funds cannot be used for stock buybacks or dividend payments

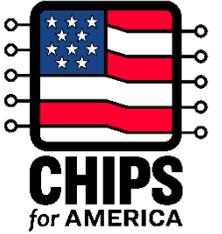
Funds to be returned if taxpayer funds are misused



CHIPS for America Research and Development

Eric Lin
Interim Director
CHIPS R&D Office

R&D Ecosystem Gaps



Facilities and
equipment

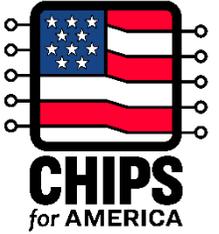
Advanced
packaging and
testing

Metrology and
characterization

Advanced
manufacturing

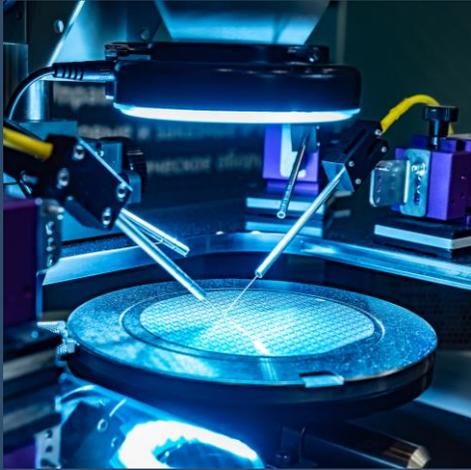
Workforce
development

Research & Development



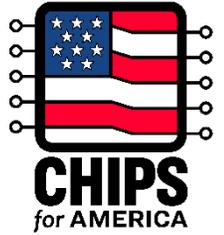
- To strengthen and advance U.S. leadership in R&D
- An integrated ecosystem that drives innovation
- In partnership with industry, academia, government, and allies
- Informed by the Industrial Advisory Committee



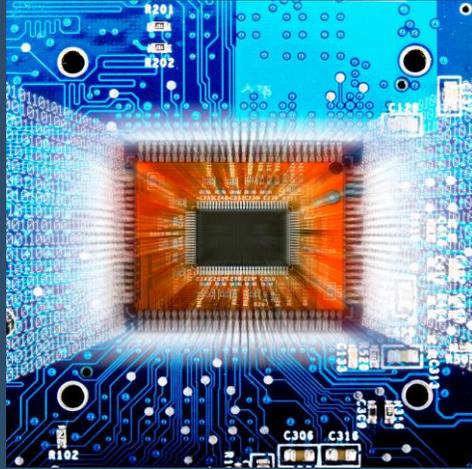


NATIONAL SEMICONDUCTOR TECHNOLOGY CENTER

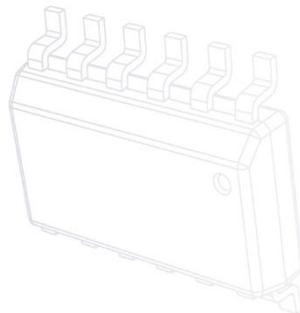
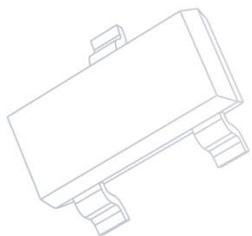
- A center of excellence to drive semiconductor innovation
- Public-private consortium to include academia
- Program areas to include:
 - Research and prototyping
 - Investment fund
 - Workforce development



NATIONAL ADVANCED PACKAGING MANUFACTURING PROGRAM



- To expand and grow U.S. capacity in advanced packaging
- Capture available market share in packaging revenue
- Pilot facility for testing and integration of new processes
- A network of public private partnerships with universities, industry, and other government agencies focused on a range of issues including:
 - Substrate technology
 - Heterogeneous integration
 - Wafer and panel-based approaches
 - Tooling and automation





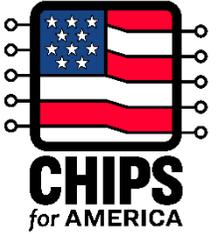
NIST METROLOGY R&D

- Measurement science for new materials and packaging
- Physical metrology for next-generation microelectronics
- Computation and data
- Virtualization and automation
- Reference materials and data, and calibrations
- Standards for processes, cybersecurity, and test methods

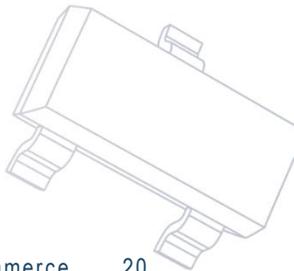
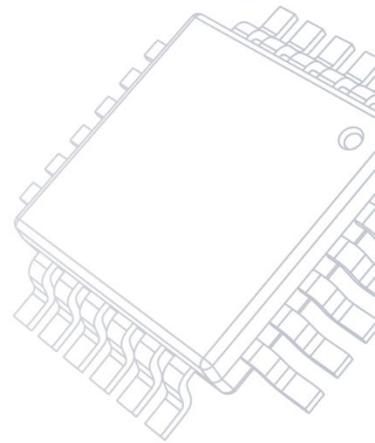


[https://nvlpubs.nist.gov/nistpubs/
CHIPS/NIST.CHIPS.1000.pdf](https://nvlpubs.nist.gov/nistpubs/CHIPS/NIST.CHIPS.1000.pdf)

Metrology Grand Challenges



- 1 Metrology for materials purity and properties
- 2 Future microelectronics manufacturing
- 3 Advanced packaging
- 4 Security of devices across the supply chain
- 5 Modeling and simulating semiconductor materials, designs and components
- 6 Improve the manufacturing process
- 7 Standardize new materials, processes and equipment

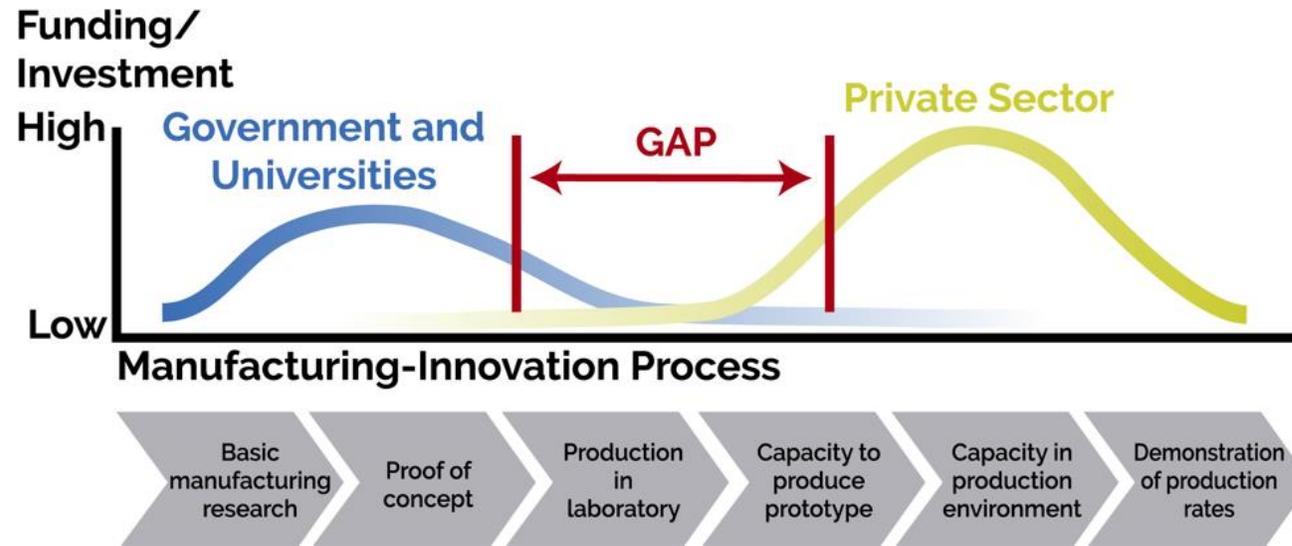


MANUFACTURING USA INSTITUTE(S)

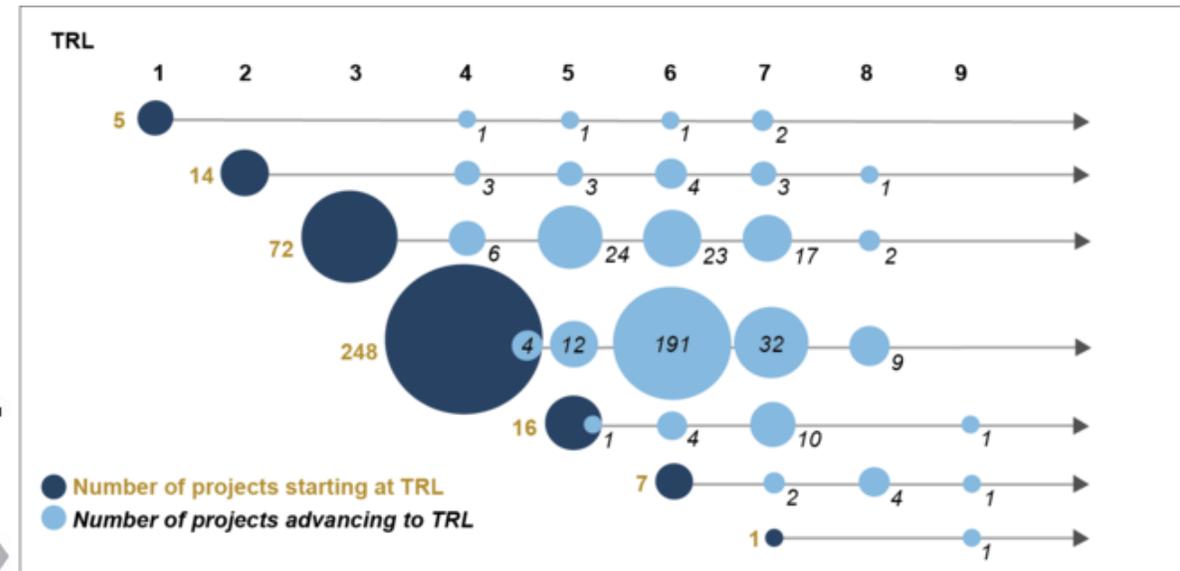
- At least one new public-private partner institute in the Manufacturing USA network
- To advance research and commercialization of semiconductor manufacturing technologies
- Pre-competitive collaboration among researchers and manufacturers
- Virtualization, simulation, and automation
- Workforce training

Institutes Address the “Scale-Up” Gap

Market Failure in Pre-Competitive Applied Manufacturing R&D



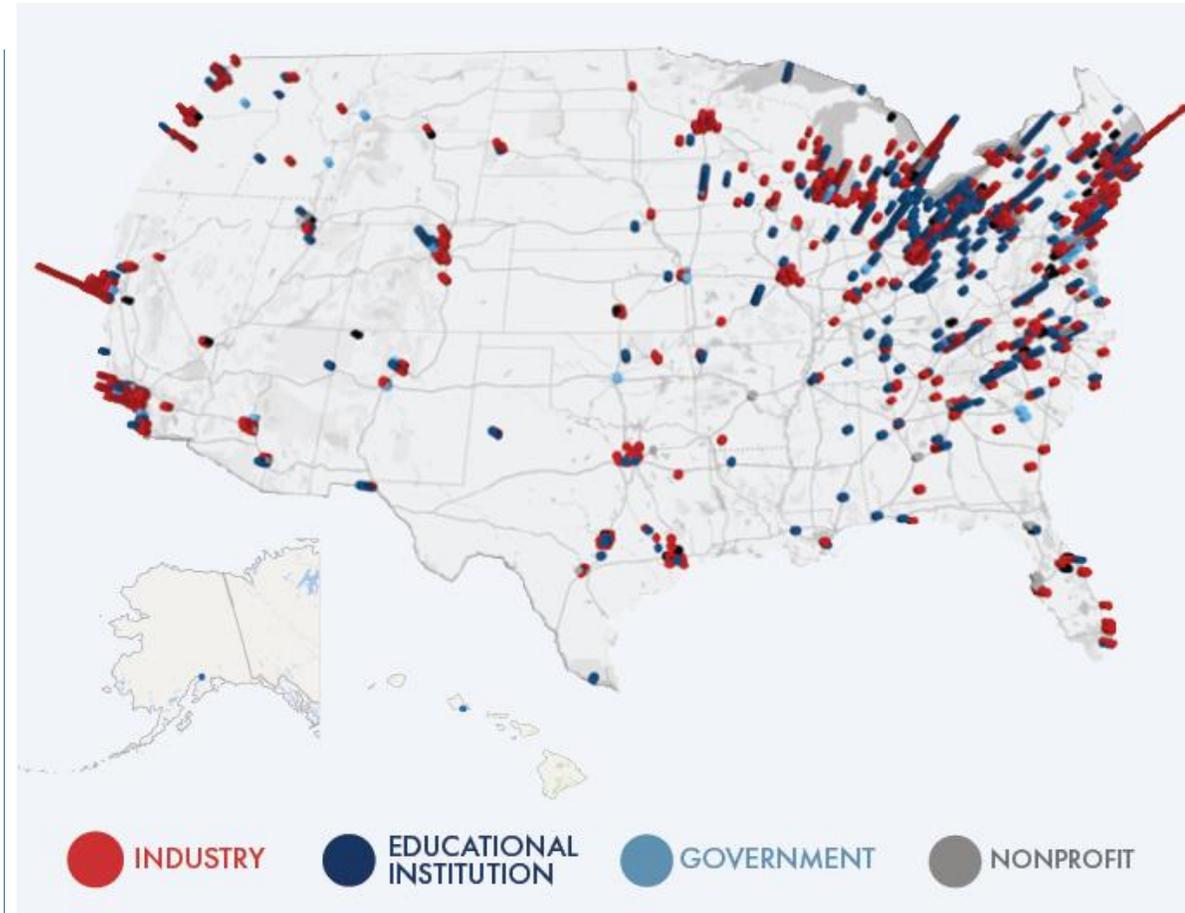
Readiness Levels (1-10)



Source: GAO analysis of data provided by Manufacturing USA institutes. | GAO-22-103979

Manufacturing USA Network Today

Electronics	Materials	Energy/ Environment	Digital / Automation	Bio- Manufacturing
 Integrated Photonics Albany, NY Rochester, NY	 Advanced Fibers and Textiles Cambridge, MA	 Modular Chemical Process Intensification New York, NY	 Additive Manufacturing Youngstown, OH El Paso, TX	 Regenerative Manufacturing Manchester, NH
 Flexible Hybrid Electronics San Jose, CA	 Advanced Composites Knoxville, TN Detroit, MI	 Sustainable Manufacturing Rochester, NY	 Advanced Robotics Pittsburgh, PA	 Biopharmaceutical Manufacturing Newark, DE
 Wide Bandgap Semiconductors Raleigh, NC	 Lightweight Materials Detroit, MI	 Smart Manufacturing Los Angeles, CA	 Digital Manufacturing Chicago, IL	 Bioindustrial Manufacturing St. Paul, MN
			 Cybersecurity Manufacturing San Antonio, TX	



Request for Information (RFI)



Published October 13, 2022

Comments close on Nov 28



FEDERAL REGISTER

The Daily Journal of the United States Government



 Notice

Manufacturing USA Semiconductor Institutes

A Notice by the National Institute of Standards and Technology on 10/13/2022



<https://www.federalregister.gov/documents/2022/10/13/2022-22221/manufacturing-usa-semiconductor-institutes>



Three public webinars scheduled

- October 20, 2022 1:00 PM - 2:00 PM ET
- November 2, 2022 11:00 AM - 12:00 PM ET
- November 16, 2022 2:00 PM - 3:00 PM ET

Register at <https://www.nist.gov/oam/manufacturing-usa-semiconductor-institute-rfi>



Manufacturing USA: We Want Your Input

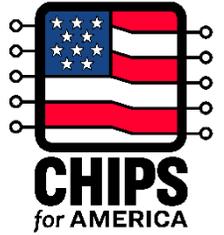
RFI open from Oct. 13, 2022 – Nov. 28, 2022

Provide comments at www.regulations.gov
enter NIST-2022-0002 in the search field

Email us at MfgRFI@nist.gov

“RFI Response: Manufacturing USA semiconductor institutes” in the subject line





INDUSTRIAL ADVISORY COMMITTEE

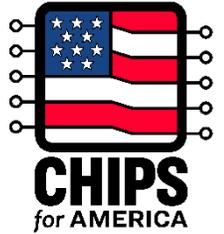
ADVISES THE SECRETARY OF COMMERCE ON

- The science and technology needs of the nation's domestic microelectronics industry
- The national strategy on microelectronics research
- The research and development programs and other advanced microelectronics activities funded through CHIPS for America
- Opportunities for new public-private partnerships

DOES NOT ADVISE ON

- The CHIPS incentives program

IAC Members



Industry



Mike Splinter
Chair
MRS Business and Technology Advisors



Susan Feindt
Vice-Chair
Analog Devices



Susie Armstrong
Qualcomm



Ahmad Bahai
Texas Instruments



Deirdre Hanford
Synopsys



Ken Joyce
Brewer Science



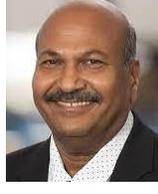
Ann Kelleher
Intel Corporation



Mukesh Khare
IBM Research



Meredith LaBeau
Calumet Electronics



Om Nalamasu
Applied Materials



Debo Olaosebikan
Kepler Computing



Alex Oscilowski
TEL America



Anthony Yen
ASML Technology Center

Ecosystem/ Customers



Daniel Armbrust
Silicon Catalyst



Bill Chappell
Microsoft



Charles Gray
Ford Motor Company

Academia/Other Stakeholders



James Ang
Pacific Northwest National Laboratory



Michael Fritze
Potomac Institute for Policy Studies



Carol Handwerker
Purdue University



Rajarao Jammy
MITRE Engenuity



Tsu-Jae King Liu
University of California Berkley



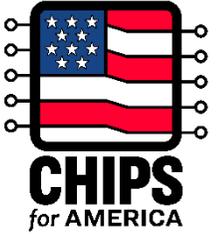
Willy Shih
Harvard Business School



Brandon Tucker
Washtenaw Community College

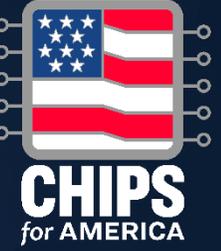


H.S. Philip Wong
Stanford University



Stay Engaged

- R&D next steps
 - NSTC White Paper expected no sooner than February 2023 (6 months from enactment)
 - Additional steps to be shared after that
- Learn more
 - Visit [CHIPS.gov](https://www.chips.gov)
 - Read the Implementation Strategy
 - Join our mailing list



Question and Answers

Q&A function on the righthand side of your screen.

Attendee View

(David Lee)

Event title → Sales Kickoff

Entry banner alerts Attendee that nobody will be able to see or hear them.

Exit the event

Speaker Volume

Mute Speaker

Full Screen

Questions & Answers

Expand side navigation (display Presenter roster)

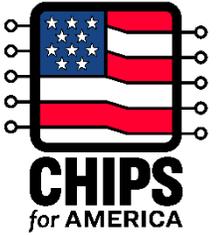
Settings (choose which speaker to use)

Slider bar – drag to change the size of video and content



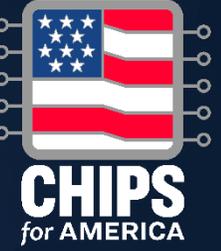
Year	RED	BLUE	GREEN	YELLOW
2004	10%	15%	10%	45%
2005	25%	35%	25%	55%
2006	40%	45%	30%	65%
2007	60%	55%	45%	75%
2008	75%	65%	60%	80%
2009	85%	75%	70%	85%
2010	90%	80%	75%	90%
2011	95%	85%	80%	95%

Q&A Button



Click the Q&A button, type out your question, and click “Post Question”.





Thank you for attending