Update on CHIPS Research and Development

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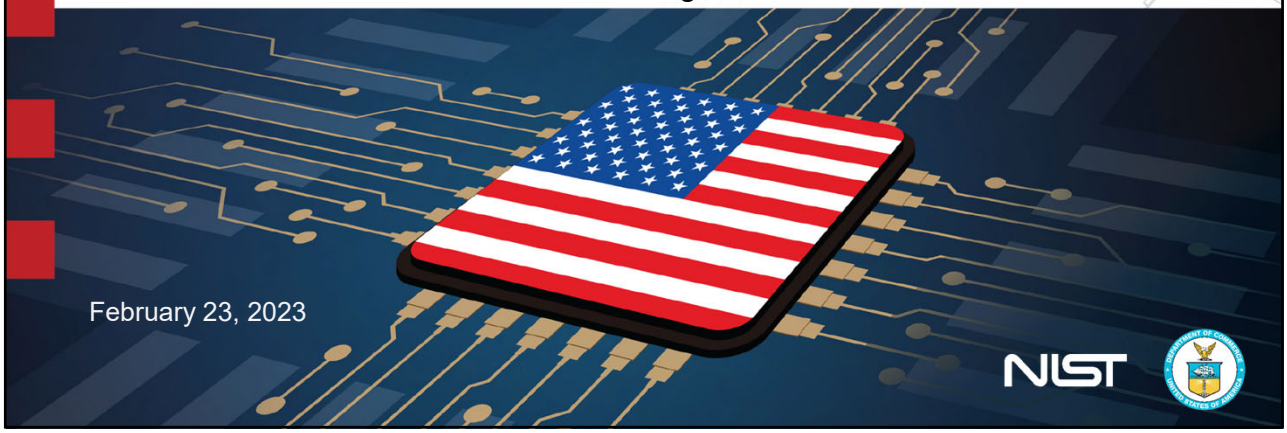

February 23, 2023

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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.

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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

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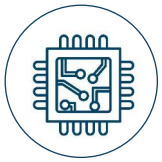
CHIPS for America will:



Return leading-edge chip manufacturing to U.S.

Expand capacity to make current/mature chips and critical supplies

Reinforce U.S. strengths in chip design and equipment

Grow a U.S. workforce and strengthen communities

Create a domestic semiconductor ecosystem for national and economic security

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Key Dates

August 9, 2022	CHIPS & Science Act of 2022 passed into law and signed by President Biden
September 6, 2022	CHIPS for America launched
September 6, 2022	A Strategy for the CHIPS for America Fund released
September 20, 2022	CHIPS Program and R&D offices founded, senior leadership announced
September 29, 2022	IAC members announced, first meeting
October 12, 2022	Incentives RFI
October 13, 2022	Manufacturing USA RFI
December 8, 2022	IAC 1st public meeting
September – October 2022	CHIPS webinars and briefings
November 18, 2022	NSTC Update to the Community
February 7, 2023	IAC 2nd public meeting
Late February 2023	Manufacturing incentives funding announcement released; Rolling applications begin
By end March 2023	NSTC white paper released
March 2023 and on	Application review and funding (rolling)
	Webinars for the public and applicants

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Manufacturing Incentives

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Funding Opportunities

Late February	• First Notice of Funding Opportunity • For commercial leading-edge, current, and mature node fabrication facilities • Statements of interest encouraged
Late spring	• For material suppliers and equipment manufacturers
Early fall	• To support the construction of semiconductor R&D facilities

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Eligibility Criteria

For organizations that are…	that can substantially…	a U.S. facility for…	of…
☐ private	☐ finance	☐ fabrication	☐ semiconductors
☐ non-profit	☐ construct	☐ assembly	☐ materials
☐ consortia	☐ expand	☐ testing	☐ manufacturing equipment
	☐ modernize	☐ packaging	
		☐ production	
		☐ R&D	

More details will be released in the Notice of Funding Opportunity

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Update:
Manufacturing Incentives

- Funding application process
  - Notice of Funding Opportunity to be announced in February 2023 (6 months from enactment)
  - Proposals considered on a rolling basis
  - Relationship managers and application feedback rounds will result in the best proposals
- Learn more
  - Visit CHIPS.gov
  - Read the Implementation Strategy
  - Join our mailing list

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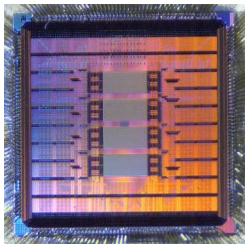
CHIPS R&D Vision



U.S. Technology Leadership

The U.S. invents, develops, and deploys the foundational semiconductor technology of the future.

Accelerate Ideas to Market

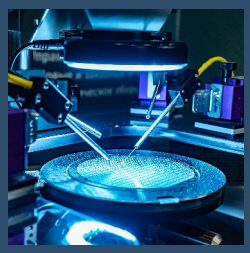
A thriving ecosystem that is focused on getting the best ideas to commercial scale as quickly and cost effectively as possible.

Talent

A new generation of skilled workers, inventors, designers, researchers, technicians, and others able to build and sustain semiconductor manufacturing in the U.S.

Research & Development

- Strengthen and advance U.S. leadership in R&D
- An integrated ecosystem that drives innovation
- In partnership with industry, academia, government, and allies
- A strategic view of R&D infrastructure, participant value-proposition, and technology focus areas
- Informed by the Industrial Advisory Committee



National Semiconductor Technology Center

Vision: Will serve as the **focal point** for research and engineering throughout the semiconductor ecosystem, advancing and enabling disruptive innovation to provide U.S. leadership in the industries of the future.

Structure: A public-private consortium as an independent entity with a governing board informed and advised by industry, academia, government, and key stakeholders.

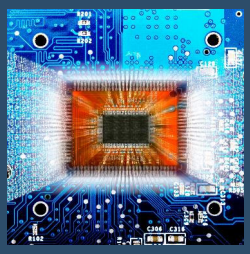
National Semiconductor Technology Center

Elements:

- Core of centrally operated, in-house research, engineering, and program capabilities combined with a network of directly funded and affiliated entities.
- Includes applied research, prototyping of devices and processes in a real-world environment, challenges related to scaling, start-up company support, or development of advanced manufacturing tools and processes.
- Focus research and engineering on challenging projects with a time horizon beyond 5 years.
- The NSTC will serve as a key convening body for the ecosystem.

Process:

- NSTC white paper, 1st quarter 2023.
- Summarize the results of a landscape analysis, outline a governance structure, and describe a preliminary operating and financial model.



National Advanced Packaging Manufacturing Program

- Strengthen semiconductor advanced test, assembly, and packaging capability in the domestic ecosystem
- Leverage public-private partnerships, that can include support for facilities managed by the NSTC and Manufacturing USA
- Broad range of technologies:
  - Heterogeneous integration
  - Wafer and panel-based approaches
  - Tooling and automation
  - Substrate technology

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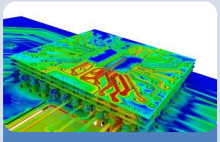
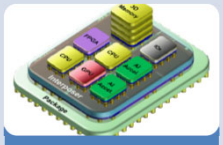
NAPMP Target Areas

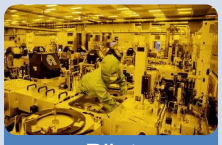
Technology innovation	Create an R&D environment advancing the state-of-the art in advanced packaging.
Ecosystem support	Investments to bolster the growth in domestic capacity and enhance capabilities for competitive edge.



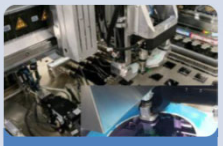
Co-design and simulation



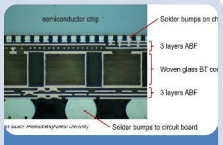
Chiplets



Pilot packaging facilities



Tooling and automation



Materials and substrates

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Manufacturing USA Institute(s)

- Up to three new public-private partnership institutes in the Manufacturing USA network
- To advance research and commercialization of semiconductor manufacturing technologies
- Pre-competitive collaboration among researchers and manufacturers
- Ex: Virtualization, simulation, and automation; packaging
- Workforce training

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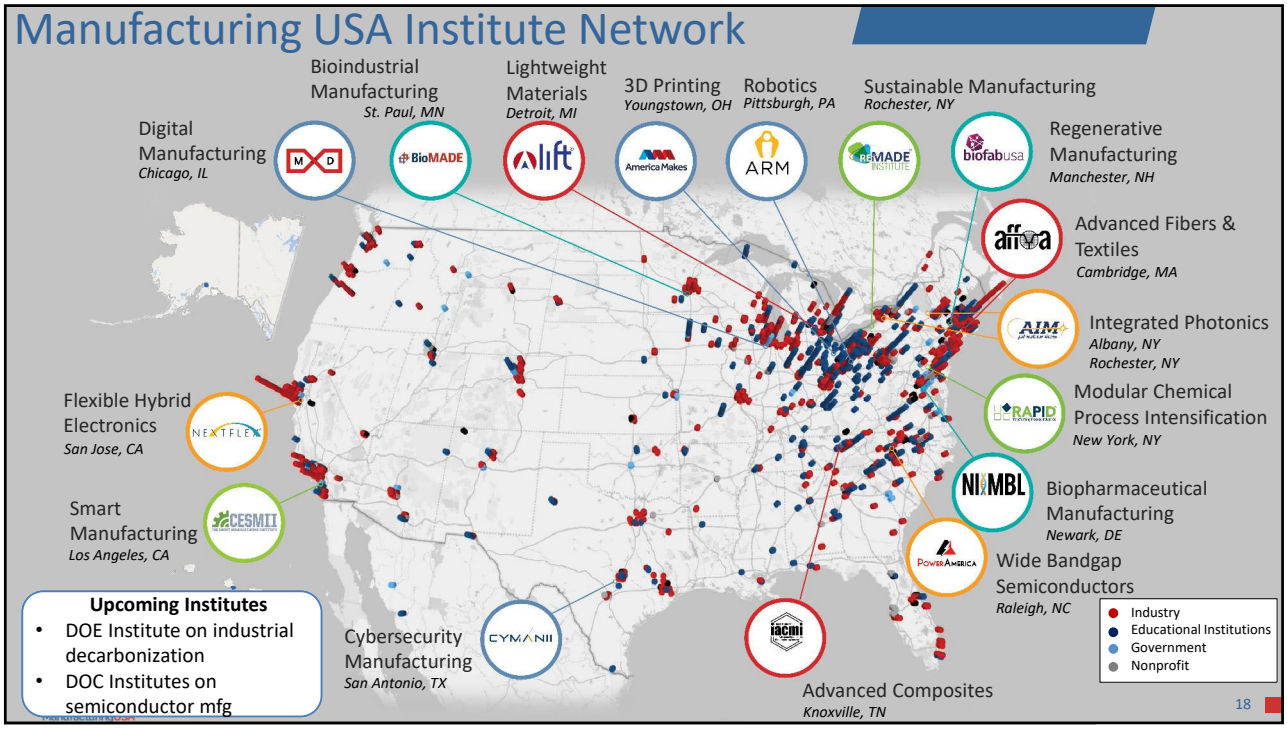
Manufacturing USA Institute Network



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RFI for Manufacturing USA Semiconductor Institutes

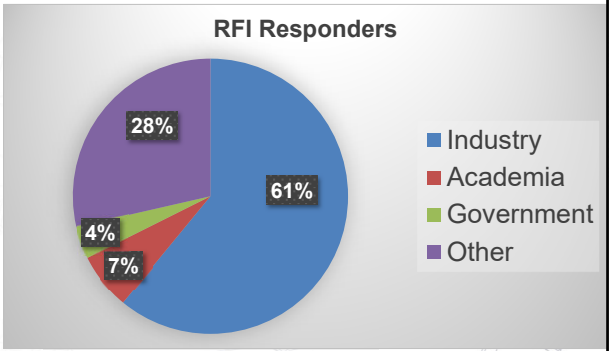
Purpose: inform design of up to three Manufacturing USA semiconductor institutes authorized by CHIPS Act

Three public webinars held with 463 registered participants

Public comment period Oct. 13 – Dec. 12, 2022

93 comments received*

Public report to be released



*all comments received are publicly posted at https://www.regulations.gov/docket/NIST-2022-0002/comments

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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

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Interagency Coordination

The impact of the CHIPS R&D program is maximized when integrated with programs across the USG.

We are working closely with DOD, NSF, DOE, and other agencies to realize this integration with guidance and support from the White House and OSTP.

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Program Development Timeline

	Q1Y23	Q2Y23	Q3Y23	Q4Y23
National Semiconductor Technology Center	White paper		Establish NSTC	
National Advanced Packaging Manufacturing Program			Outline program strategy	
Manufacturing USA institute(s)	RFI Summary		Select topic(s); begin proposal process	
Metrology R&D (NIST)	Internal investment		Select programs to begin	

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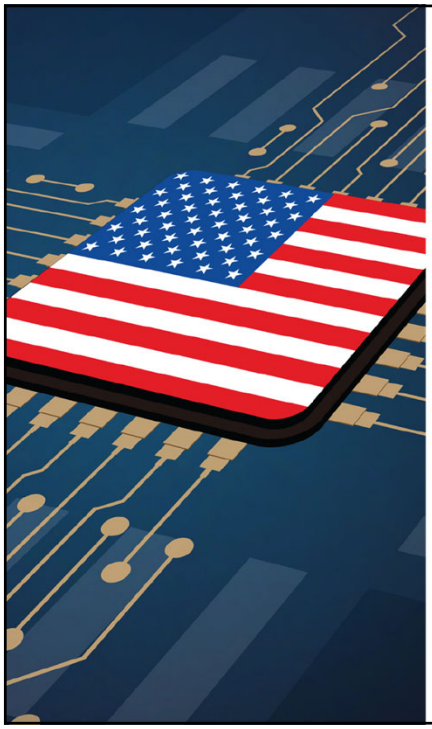

Next Steps

- Coming soon
  - NSTC White Paper in 1st Quarter 2023
  - Additional steps to be shared afterwards
- Learn more
  - Visit CHIPS.gov
  - Read the Implementation Strategy
  - Join our mailing list

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Questions and Answers

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