CHIPS Research and Development Office

CHIPS National Advanced Packaging Manufacturing Program (NAPMP)

Overview

On February 28, 2024, the Department of Commerce issued a Notice of Funding Opportunity (NOFO) to seek applications for research and development (R&D) activities that will establish and accelerate domestic capacity for advanced packaging substrates and substrate materials, a key technology for manufacturing semiconductors. This is the third NOFO released overall by CHIPS for America, and the first that is focused on R&D.

President Biden signed the bipartisan CHIPS and Science Act into law on August 9, 2022. The Department of Commerce (the "Department") is overseeing $50 billion to revitalize the U.S. semiconductor industry and strengthen the country's economic and national security. CHIPS for America's Research and Development (R&D) program office within the Department is responsible for administering $11 billion to advance U.S. leadership in semiconductor R&D.

The CHIPS R&D Office's first funding opportunity seeks projects that are expected to include, but not necessarily be limited to, basic and applied research, substrate and demonstration device development and production, commercial viability and domestic manufacturing, integrated workforce education and training, and pilot-level substrate production.

The CHIPS for America program anticipates approximately $300 million in funding innovation across multiple technologies ranging from semiconductor-based to glass and organics.

CHIPS National Advanced Packaging Manufacturing Program Funding Opportunity

Program Priorities

"Advanced packaging" refers to many chips with diverse functions assembled tightly together on a substrate in two or three dimensions at extremely fine dimensions. This method achieves function, performance, and power savings far greater than can be achieved with conventionally packaged chips on a printed circuit board. Recent advances in artificial intelligence, for example, would not be possible without advanced packaging.

Advanced packaging can be a transformative capability that helps U.S. manufacturers compete globally, but there are many technological challenges to solve. The CHIPS Research and Development Office has established the CHIPS National Advanced Packaging Manufacturing Program to address these challenges, including:

- How do we design and assemble chips so tightly that they behave like a single traditional large chip, but with the production efficiency and cost savings of advanced packaging?
- How do we supply power to and dissipate heat from such tightly coupled assemblies?
- How do we test and repair such complex assemblies?

- How do we ensure their reliability since traditional methods of visual inspection cannot be performed on such small, tightly packaged dimensions?

The CHIPS NAPMP will enable the development of a robust domestic advanced packaging ecosystem by:

- Establishing an advanced packaging piloting facility (or facilities) that accelerates the transfer of innovations in packaging, equipment, and process development into manufacturing;
- Driving the development of digital tools to reduce the time and cost of advanced packaging engineering; and,
- Establishing and supporting partnerships among industry, academia and training entities, and government to contribute to an advanced packaging workforce.

The six priority research investment areas of the CHIPS NAPMP are:

- Materials and substrates
- Equipment, tools, and processes
- Power delivery and thermal management for advanced packaging assemblies
- Photonics and connectors that communicate with the outside world
- A chiplet ecosystem
- Co-design of multi-chiplet systems with automated tools

Process + Application

There are two main components to this application:

- **Mandatory Concept Paper:** Applicants will be asked to submit a concept paper. Concept papers are due on April 12, 2024.
  - Eligible applicants can only submit one concept plan paper under this NOFO.
  - No entity may be included as a subrecipient on more than two concept papers.
  - Concept plans received after the deadline will not be reviewed or considered.
- **Full Application Process:** Full proposals are due July 3, 2024.
  - Full applications will only be accepted from applicants who were invited to submit a full application after review of their mandatory concept paper.

Can Applicants form teams and submit applications?

- CHIPS R&D encourages collaborative proposals under this NOFO.
- Though not required, CHIPS R&D expects that applicants assembling teams (comprising one or more subrecipients and potentially unfunded collaborators) may be best suited to collectively provide the full range of expertise and capabilities needed to achieve the program objectives, including the proposed project-level targets.
- For purposes of this NOFO a project team comprises all funded entities (the applicant and any proposed subrecipients) as well as unfunded collaborators planned for inclusion in a single proposal.
- The lead institution will be the applicant entity at the full application stage and must have substrate prototyping capability or describe a plan for achieving that capability within 3 months of receiving an award.

Eligibility

Who is eligible for this NOFO?

- Eligible applicants include domestic for-profit and non-profit organizations; accredited domestic institutions of higher education including community and technical colleges; and state, local, territorial, and Indian tribal governments.
- Applicants may only submit one full application under this NOFO. Entities may not be included as subrecipients on more than two applications.
- Applicants and recipients are required to have an active registration in SAM.gov and are encouraged to begin the process of registering as early as possible.

What types of projects would typically be funded under this NOFO?

- This NOFO seeks applications relevant to one or more of the following technical areas:
    - Organic materials and substrates (including fan-out)
    - Glass materials and substrates
    - Semiconductor-based substrates
- Applicants may address one or more technical areas in a single proposal.