NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 22-116

Dear Colleague Letter: Research Coordination Networks for Semiconductors (RCN-SC)

August 29, 2022

Dear Colleague:

With this Dear Colleague Letter (DCL), the Directorate for ENG encourages the submission of proposals to the Research Coordination Networks for Semiconductors (RCN-SC) program that focuses on developing, piloting, and sharing innovative and transformative approaches to enhance knowledge in the broader area of semiconductors (SC). Proposed RCN-SC with networking activities that lower access barriers to advanced technologies, encourage student engagement, and support a pipeline of talent in semiconductors education and innovation, are especially encouraged.

Semiconductor technologies play a vital role in our modern society. They have paved the path to today's advances, such as cellular phones, computers, and smart devices. Semiconductors are fundamental to Artificial Intelligence (AI), 5G/6G, quantum computing, high-power electronics, additive manufacturing, autonomous vehicles and countless more. They directly impact industries such as transportation, robotics, healthcare, agriculture, smart infrastructure, education, media, etc. Semiconductor-enabled technologies hold significant potential to provide efficient solutions to clean energy production, manufacturing, supply chain, healthcare, etc. With growing demand arises many challenges and opportunities. New solutions are needed to help meet the growing demand, including specialized manufacturing tools and automation, sustainable processes, the ability to recycle SC materials, better design tools to handle complex designs, characterization and models of nanoscale devices working well into the terahertz frequency regime, 3D packaging and effective thermal management to meet the functional density requirement to name a few. The fundamental steps to meeting this challenge are a well-trained workforce, a better understanding of the current and future SC ecosystem, and a greater focus on research and development. Towards this goal, the RCN awards will provide opportunities for SC communities to communicate-collaborate and exchange information in research and teaching.

For purposes of this DCL, RCN proposals that address one or more of the following SC

priorities are encouraged, but not limited to:

A. Semiconductor foundry technology access enabling RCN that serves as the interface of foundries to academic researchers. Such RCN-SC should lower the barrier to accessing advanced technology nodes at one or more semiconductor foundries, accommodate collaborative design teams, including international partnerships, and enhance faculty and students' hands-on experiences in semiconductor chip design, fabrication, and evaluation. The RCN should provide one-stop service and design support, such as handling legal processes, issuing design packages, facilitating cloud design environment, and distributing foundry wafers to users. High-quality service may be provided by the proposing institution(s) or by contractual arrangement integrated through and managed by the proposing institution(s).
B. Semiconductor engineering training reinvigorating RCN that serves as a hub of collaboration among networked institutions of higher education (IHEs) and a facilitator for IHEs (including national labs)-industry engagement. The envisioned outcome should include revitalizing the semiconductor and microelectronics curriculum encompassing advanced materials, devices, architecture, system integration and sustainability. Coordinated efforts should reinvigorate engineering education and training to include hands-on exposures to modeling, design and co-design, fabrication, packaging, testing, and internships. Such RCN-SC should engage a wide spectrum of educational institutions, address the shortage of skilled workforce in semiconductors, promote innovative approaches, and channel community recommendations for NSF on sustained US leadership in semiconductor research and education.
C. Electronics packaging and heterogeneous integration RCN that serves as a hub for systems integration research, education, and collaboration. This RCN should bring together researchers from academia, industry, and national labs to exchange information, provide hands-on experience in packaging and heterogeneous integration, and guide research and development on systems integration for the next generation of systems (e.g., autonomous vehicles and low-orbiting satellites), and maturing standards. Such RCN-SC should enable the transfer of knowledge between industry and academia and provide one-stop service and design support.

Proposals emphasizing training and educational activities geared towards the next generation of scientists and engineers involved in SC-related technologies are highly encouraged. Proposals should offer novel and integrated conceptual frameworks for developing SC technologies and sharing knowledge in materials, devices, chip design, microfabrication, manufacturing, packaging, and testing. All RCN-SCs must communicate information and ideas to the public and the broader community of researchers and teachers and promote a respectful, inclusive, and collaborative environment.

Proposals should be prepared in accordance with the guidance contained in the RCN solicitation including the seven guidance items outlined in Section II. Program Description.

When submitting the proposal, select the RCN solicitation and then direct the proposal to the EPMD-ElectrnPhoton&MagnDevices program in the ECCS Division of ENG. Proposal titles should begin with "RCN:SC:" followed by a substantive title. For full consideration, RCN-SC proposals should be received by May 31, 2023 (due by 5 p.m. submitter's local time).

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 4 - 5

Anticipated Total Funding Amount: $3,600,000

The estimated program budget, number of awards and average award size/duration are subject to the availability of funds and the quality of proposals received. **RCN-SC proposals can be up to 5 years in duration.** Although the RCN solicitation states that awards should be less than $500,000 in total, we will consider larger awards, up to a maximum of $1,000,000, if well-justified based on the scope of the proposed activity.

As stipulated in the RCN solicitation, eligibility is limited to institutions of higher education and non-profit, non-academic organizations. Proposals involving Minority-Serving Institution (MSI) and early-career investigators are especially encouraged. The Research Coordination Networks are expected to be multi-organizational; a single organization must serve as the lead, and all other organizations are identified as subawardees.

Investigators must contact the cognizant Program Officer(s) to discuss suitability of an RCN idea and teaming arrangements before submitting a proposal.

- Premjeet Chahal (pchahal@nsf.gov), Rosa Lukaszew (rlukasze@nsf.gov), or Jenshan Lin (jenlin@nsf.gov) of ENG\ECCS
- Thomas Kuech (tkuech@nsf.gov) of ENG\CMMI
- J. Kemi Ladeji-Osias (jladejio@nsf.gov) of ENG\EEC

Sincerely,

Susan Margulies
Assistant Director for Engineering