



U.S. NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 24-130

Dear Colleague Letter: ECosystem for Leading Innovation in Plasma Science and Engineering (ECLIPSE): Special Focus on PFAS and Microelectronics

September 16, 2024

Dear Colleagues:

With this Dear Colleague Letter (DCL), the US National Science Foundation (NSF) encourages submission of interdisciplinary proposals that capitalize on opportunities for bringing fundamental plasma science and engineering investigations to bear on two focus areas of societal and technological need:

1. removal of per- and polyfluoroalkyl substances (PFAS) from the environment; and
2. novel and more efficient methods for fabrication of microelectronics.

Per- and polyfluoroalkyl substances (PFAS) are a large group of synthetic chemicals that have been used for decades in consumer products and manufacturing processes. Because of the strength of the carbon-fluorine bonds, PFAS do not degrade easily and are persistent in water and soil. These "forever chemicals" are now widely distributed in the environment. Growing evidence shows that environmental PFAS bioaccumulate in fish, wildlife, and humans and may contribute to a wide range of adverse health effects. Limited methods are available for the destruction of PFAS in water and soil, either directly or after concentration. Plasmas generate highly reactive species, which may be effective at breaking down PFAS, particularly long-chain PFAS.

Semiconductors are also manufactured using many steps that involve plasmas during their fabrication. Many semiconductor devices are made in a low temperature plasma environment where the plasma is used in key parts of the workflow in semiconductor manufacturing to etch/deposit material, and in clean, dope or ash steps, etc. Plasmas are used in process steps that may produce or reduce PFAS. At the same time, lithography also plays a critical role in semiconductor manufacture and, as the feature sizes get smaller, tools using shorter wavelengths into the extreme ultraviolet (EUV) are entering the manufacturing process. Here

plasmas can play an important role in generating the EUV light needed for lithography.

Proposals submitted in response to this DCL should be responsive to and will be considered within the ECosystem for Leading Innovation in Plasma Science and Engineering (ECLIPSE) meta-program, [PD 24-110Z](#).

This DCL does not constitute a new competition or program. Proposals submitted in response to this DCL should be prepared and submitted in accordance with guidelines in the [NSF Proposal & Award Policies & Procedures Guide](#) (PAPPG) and should clearly articulate:

- the fundamental scientific and/or engineering challenge in plasma science and engineering that is proposed to be overcome; and
- how the proposed resolution of the stated scientific and/or engineering challenge will address either of the two focus areas under this DCL.

This DCL also encourages workforce development towards careers associated with the two focus areas through participation in plasma science and engineering research by the full spectrum of diverse talent that society has to offer, which includes underrepresented and underserved communities.

For consideration in the FY2025 funding cycle, proposals responsive to this DCL should be submitted directly to the ECLIPSE program description [PD 24-110Z](#) by 5 p.m. submitter's local time on **November 18, 2024**.

Proposal titles should begin with (1) "**ECLIPSE-PFAS:**" or (2) "**ECLIPSE-CHIPS:**" followed by any other relevant prefixes and the project title.

Proposals addressing DCL's two focus areas may also be submitted in response to:

- Solicitation [NSF 24-575](#): EPSCoR Centers of Research Excellence in Science and Technology (EPSCoR CREST Centers). Titles for proposals submitted to [NSF 24-575](#) should begin with "EPSCoR CREST ECLIPSE Phase I Proposal: Center for ". CREST Partnership Supplements may also be submitted by CREST Center awardees to support collaborative research on topics within either of the two focus areas.
- Solicitation [NSF 23-563](#): Historically Black Colleges and Universities – Undergraduate Program (HBCU-UP). Titles for proposals submitted to [NSF 23-563](#) should begin with "ECLIPSE [Insert HBCU-UP track]: Project Title."
- Solicitation [NSF 23-598](#): Historically Black Colleges and Universities – Excellence in Research (HBCU-EiR). Titles for proposals submitted to [NSF 23-598](#) should begin with "Excellence in Research ECLIPSE: Project Title."

All correspondence and inquiries regarding this DCL should be submitted to eclipse@nsf.gov.

Sincerely,

David B. Berkowitz, Assistant Director
Directorate for Mathematical and Physical Sciences (MPS)

Susan S. Margulies, Assistant Director
Directorate for Engineering (ENG)

James L. Moore III, Assistant Director
Directorate for STEM Education (EDU)

Alicia Knoedler, Office Head
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