Notice of Intent to Review Marketplace Solutions

ERIS Shopping Notice: New Growth Controls for Achieving Single-Crystal Complex Inorganic Materials

SHOPPING NOTICE: DARPA-SN-26-83
MARKETPLACE: Defense Advanced Research Projects Agency (DARPA) Expedited Research Innovation System (ERIS)
REQUIRING ACTIVITY: DARPA, Multi X Office (MXO)
NOTICE DATES: May 21, 2026 – June 30, 2026
TOPIC AREA: Developing advanced technologies for improved resilience, efficiency, and effectiveness of strategic systems. This topic area supports technologies for critical infrastructure and military command-and-control systems (networks and applications across strategic, command, operational, and tactical edges).

1.0 PURPOSE

Between the dates listed above, DARPA MXO will be actively "shopping" the ERIS Marketplace for innovative, post-competitive, awardable solutions that address the need for new capabilities to grow large-scale complex inorganic materials at single-crystal quality.

This is an active and immediate search for solutions. Submissions will be reviewed on a rolling basis in accordance with the procedures set forth in DARPA-PS-25-05.

2.0 PROBLEM & SCOPE

Complex inorganic materials are defined as materials having multiple different element types and many possible crystal structures. Presently, there are many inorganic materials desired for various critical capabilities, whose realization at high-quality and at scale is still under development because of their inherent elemental and/or structural complexity. Further, with the emergence of artificial intelligence (AI), there are numerous new materials that have been predicted to be stable and possess highly desirable properties; yet, due to their complexity, such new materials are increasingly harder to synthesize and physically demonstrate. DARPA is exploring the development of new and unconventional controls, beyond optical approaches, that promote the growth of large-scale single crystal complex inorganic materials.

- **Current Obstacles:** The inability to produce new complex materials is in part due to traditional growth techniques not developing at the same pace as advancements in AI material discovery. With increasing material complexity, there is a need for an increased number of control knobs in material growth tools and techniques.

- **Desired Research Focus:** We are seeking solutions for added controls in material growth. It is expected that the added controls will need to be localized to some extent to allow precise compositional and structural control over the resulting atomic and crystallographic arrangements in synthesized complex material thin films. Some preferred solutions include, but are not limited to, energy modalities such as plasma, electric fields, electron beams, and acoustic waves, or phase selectivity using specific organic precursor chemistries, among others. Specifically excluded are any approaches utilizing light or optical controls, such as, but not limited to, laser-based localized control and substrate engineering as a form of control.

The proposed solution must be demonstrated on a novel complex material of the proposer's choice. The constraints for this proposer-defined complex material are that it 1) must not have been previously grown as a single crystal on a ≥ 2-inch scale, 2) must have a clear target application, and 3) must be stable at room temperature. Complexity of the material must also be justified either in terms of elemental complexity, wherein the material must have no less than two different constituent elements, or structural complexity, wherein the material must have at least four different polymorphs or competing crystal structures at the same composition.

3.0 DESIRED CAPABILITIES AND EXPERTISE

While ***all submissions will be evaluated against the standard criteria published in the ERIS Master Solicitation***, MXO will be specifically looking for solutions that demonstrate strength in the following areas. These are not new evaluation criteria, but rather highlight the specific attributes of interest for this opportunity.

- **Defining the Problem & Current State of the Art:**
  Strong submissions will demonstrate a deep understanding of the problem space. They should clearly define the scope of the technical challenge they address and compare their proposed solution to the limitations of the current state of the art, particularly regarding growth of a complex inorganic material that has never been grown as a single-crystal thin film at a scale of at least 2 inches.

- **Advancing the State of the Art (Technical Innovation):**
  The most compelling solutions will be those that offer a significant technical leap forward. We are looking for a novel control or set of controls that can be implemented to comprise a fully functional material growth system. Submissions should clearly articulate how their proposed innovation overcomes the limitations of existing solutions.

- **Team Capability (Expertise and Vision):**
  We are seeking teams with a strong vision and demonstrated expertise relevant to solving this complex problem. Proposing teams should possess significant, combined expertise in inorganic thin film growth. A proven track record of developing or modifying material growth tools, techniques, and processes is highly desirable.

- **Impact (Defense and Commercial Use Case):**
  Solutions should demonstrate a clear path to enabling the growth of materials with anticipated breakthrough properties that will advance the state of the art. Submissions should discuss how their innovation could realize and produce new materials that are useful for both defense and commercial applications.

4.0 HOW TO RESPOND

This notice is a call for solutions to be flagged for review.

For Existing Awardable Solutions:
Existing ERIS Solution providers who believe their current ERIS solution(s) meet the above characteristics may flag their existing solution video for inclusion in this market research activity by emailing ERIS@darpa.mil with the following:

- Subject Line: Shopping Notice Response: DARPA-SN-26-83 - [Your Company Name]
- Body: The Title and Video URL of your existing awardable solution.

For New Submissions:
Prospective ERIS Solutions Providers interested in having their solutions included in this market research activity must submit a video solution through the standard ERIS submission process in either the May or June 2026 collection period. If the submitted solution is determined awardable in the respective assessment period (June or July 2026), through the standard ERIS assessment process, then the Solutions Provider may flag their awardable solution video for inclusion in this market research activity.

If you have a new solution, please submit it to the following Topic Area via the ERIS portal:

> *"Developing advanced technologies for improved resilience, efficiency, and effectiveness of strategic systems. This topic area supports technologies for critical infrastructure and military command-and-control systems (networks and applications across strategic, command, operational, and tactical edges)."*

To ensure it is associated with this notice, please use the following format for your video title:

- Video Title Format: DARPA-SN-26-83: [Your Solution Title]
  (Example: DARPA-SN-26-83: Single Crystal Growth Control Solution)

If determined awardable during any of the assessment periods detailed above, please send a notification email to ERIS@darpa.mil with:

- Subject Line: Shopping Notice Response: DARPA-SN-26-83 - [Your Company Name]
- Body: The Title of your new submission and its Date of Submission.

5.0 RESOURCES

- ERIS Master Solicitation: SAM.gov link
- DARPAConnect offers free resources to potential performers to help them navigate DARPA, including "Understanding DARPA Award Vehicles and Solicitations", "Making the Most of Proposers Days", and "Tips for DARPA Proposal Success". Join DARPAConnect at DARPAConnect.us to leverage on-demand learning and networking resources.
- To Submit a New Solution: DARPAConnect ERIS Portal