DARPA-PA-26-03: Crystal Palace

Question and Answer (Q&A) Document

Version 1, December 16, 2025

Technical Questions

1. Are there any specific target applications that should be prioritized?
    a. No. We are interested in generalizable technology; proposals must focus on tools, techniques, and processes that can be used to grow different materials.
2. Are there any preferred material choices?
    a. No, as long as proposed materials adhere to the requirements detailed in the material constraints table.
3. Can adding an alloying element count as increasing elemental complexity?
    a. Yes, as long as all proposed complex materials satisfy the requirements detailed in the material constraints table.
4. Clarify how "possible crystal structures" are defined in the material constraints table.
    a. By structure, we mean the crystalline phase of a material, i.e., the unit cell structure of the constituent atoms. For example, in the simple carbon-carbon system, possible crystal structures are hexagonal graphite/graphene and diamond cubic.
5. Clarify how "structural complexity" is defined.
    a. To meet the structural complexity requirement in the material constraints table, all possible crystal structures must have the same composition (they must be polymorphs of the same inorganic compound). For structurally complex materials, phase selectivity must be demonstrated for the final synthesized samples (single crystal quality of a specific material phase).
6. Do thermodynamically metastable materials that are kinetically stable at room temperature (for example, diamond) satisfy the "stable at room temperature" requirement?
    a. Yes.
7. Will 2D materials be considered?
    a. While there is no specific emphasis on this class of materials, they may be considered if the proposed 2D material is novel, has a clear and compelling justification for its relevance to DARPA/DoW, and meets all program requirements. For ultrathin 2D materials, a characterization plan must also be proposed to evaluate single crystal quality across a 2-inch scale (i.e., if

XRD is not suitable due to thickness constraints). Single atomic layers are not of interest in this program.

   b. Proposals that address only 2D material growth will not be considered. Material growth approaches in Crystal Palace must be generalizable to a variety of types and classes of materials.

8. Can proposed complex materials be previously synthesized materials but at a length scale less than 2 inches?
   a. Yes, as long as relevance to DARPA/DoW is specified, and all requirements in the material constraints table are met.
9. Can proposed complex materials be previously grown at 2-inch scale, but by a different technique?
   a. No.
10. Can teams propose complex materials that have been previously grown at 2-inch scale on other substrates?
   a. No.
11. Will different nanostructures/geometries, such as nanowires, be considered?
   a. This program is focused on directly grown single crystal thin films, not nanostructures.
12. Can proposers define geometry of growth area, rather than having a blanket film over the whole substrate area?
   a. We are open to approaches that grow on defined areas, as long as such approach can be scaled up to at least 2 inches.
13. If proposed material simultaneously has multiple intrinsic material property types, would that meet the “two different material types” requirement?
   a. Each proposed/grown material can only satisfy one material type. If a material can fall under multiple different types, proposers must pick one property type to measure.
14. Do two proposed materials have to be different in BOTH material type AND class?
   a. Not necessarily, as long as all four proposed materials, in total, cover at least two different material types and at least two different material classes.
15. If two different materials are stacked, would that satisfy the “two different material types and classes” requirement?
   a. No. Each CM in the material constraints/metrics table should be a separate sample.
16. Is there interest in this program for integrating different materials in one device/substrate area?
   a. Heterogeneous stacking is outside the scope of this program.

17. If we were to propose a complex material in the semiconductor domain, are there any requirements for lattice matched substrates and stack up?
    a. No. If the materials that are being synthesized are new and have not been previously grown as a single crystal at large scale, using lattice matched substrates is allowed.
18. Can a buffer layer be used for single crystal thin film growth on a solid substrate?
    a. A buffer layer may be used. Epitaxial approaches are permissible, but homo-epitaxy is not allowed.
19. Are material transfer techniques to enable new heterostructures within the scope of the program?
    a. We are only interested in direct growth techniques for this program. Transfer techniques are not allowed.
20. Clarify the novel tool/technique demonstration milestone. Are teams expected to propose a brand-new growth tool, or propose modifications to existing tools?
    a. Both are allowed.
21. Is the solicitation open to solution-based approaches, provided they meet the program constraints and performance metrics?
    a. Yes, we are open to a variety of growth techniques in Crystal Palace, provided they are generalizable to a variety of materials.
22. Clarify the local control aspect of the technical challenges.
    a. The local control technical challenge specifically refers to precise process control and then scaling up this precision to ultimately grow complex single crystal materials.
23. With the local control aspect to growth, are localized composition measurements required?
    a. Not necessarily, but composition of the entire final film must be uniform.
24. Is nm-scale localization or nm-scale fine nucleation a requirement for the program?
    a. The goal of the program is to ultimately get large-scale single crystal complex materials using new tools and techniques, and the program metrics are designed to evaluate the final single crystal quality.
    b. Localization at the nm-scale can be used as an approach to meet metrics, given a pathway is presented to achieve single crystal at large scale.
25. Does the growth rate constraint refer to lateral area or thickness?
    a. This constraint is for film thickness growth rate at a 2-inch lateral scale.
26. Can substrates larger than 2 inches be used?
    a. Yes, as long as uniformity is demonstrated across a continuous 2-inch scale area, at a minimum.

27. What if proposers are limited by the size of substrates (i.e., nonavailability at ≥ 2-inch scale) that are suitable for their selected complex materials?
    a. In this case, mounting adjacent substrates to cover a 2 -inch area is permissible. Growth on these adjacent substrates must be performed in the same run to meet single crystal quality and non-uniformity metrics. Individual substrates CANNOT be less than 1 cm on an edge (i.e., "sample scale" dimension in the metrics table). The seam or the distance (also known as "saw street") between two mosaic sample scale coupons should conform to standard semiconductor packaging guidelines.
28. What if the non-uniformity value over 9 sampling points is above 5% given an exceptionally small Full Width at Half Maximum (i.e., orders of magnitude less than metric requirement?
    a. If this is the case, the exceptional single crystalline quality of the product will be considered, and we will be reasonable about the non-uniformity.
29. Do both technical challenges (TCs) have to be addressed simultaneously?
    a. The overall proposal has to address both TCs.
30. What is the thickness requirement for these single crystal materials?
    a. At least 20 nm, and by the end of the program, at least one complex material must be grown at 500 nm.
31. What is the rationale for the 20 nm minimum limit for thickness in the material constraints table?
    a. It is based on limitations of the XRD technique, which is critical in meeting the program metrics.
32. Is computationally guided material design within the scope of the program?
    a. No.
33. Is closed loop self-learning for process optimization within the scope of the program?
    a. This is not part of the scope of the program but can be integrated in the proposed approach for the growth of new single crystal complex materials.
34. Is post-processing of samples allowed?
    a. Post-processing is allowed if this is a required step to obtain a stable single crystal.
35. Is there a specific focus on portability of the developed technology?
    a. Portability of the growth tool in general does not matter.
36. Will Crystal Palace be related to M-STUDIO?
    a. Not specifically, because they are tackling different challenges; however, some M-STUDIO approaches may be used in Crystal Palace.

Logistical Questions

1. Can you provide more information on the Materials Fair?
    a. It is the same event as the End-of-Phase meeting, but with commercialization and transition partners also invited. This will be an opportunity for performers to present their innovation not only to DARPA, but also to potential partners who can transition their technology.
2. Clarify what commercialization plan is expected from proposers. Does DARPA expect teams to sell their tools/materials?
    a. We are open to any reasonable, well-justified commercialization plan. DARPA will have Government use rights for the innovation.
3. When can proposers expect feedback on their abstracts?
    a. On or around, 1/6/2026
4. Will abstract feedback include feedback on proposed budget?
    a. No.
5. How can non-traditional defense contractors participate in this program, and do they have any specific requirements?
    a. Non-traditional contractors should follow the proposal submission instructions within the PA propose directly or team up with other defense contractors to compliment the capabilities as required.
6. Are the milestones cost-based?
    a. No. They are fixed price milestones.
7. Will there be technical evaluations during the program?
    a. Yes, we will have a Government Independent Verification and Validation (IV&V) team to perform technical evaluation based on the program requirements and metrics.
8. Clarify the oral presentation requirement.
    a. Per Attachment C, oral presentation slides are a required part of the proposal package. Oral presentations will be held virtually after written proposals have been read by reviewers. During the oral presentation, proposers will give a brief 10-minute presentation, which will be followed by a 50-minute Q&A.
9. When is the estimated start date for this program?
    a. On or around August, 2026
10. How much is DARPA investing in this program?
    a. We cannot disclose this.
11. What are the challenge materials?

    a. Given the fast pace of materials discovery through artificial intelligence (AI) and machine learning (ML), after the start of the Crystal Palace program there may be emerging materials of interest that the community did not know about at the time of proposal submission. If new materials with unique DoW relevance emerge from AI/ML models, specific challenge materials may be determined by DARPA in collaboration with transition partners. The challenge to synthesize them will be an optional opportunity for Phase 2 performers to demonstrate the rapid generalizability of their material growth capability.

12. If proposed technology cannot address the challenge materials in Phase 2, will proposers still be considered?
    a. Yes, the challenge opportunities are fully optional. In addition, the challenge materials are not technology focused, but more materials focused.
13. Does DARPA have any insight on a compelling team composition?
    a. No preference on specific team composition, as long as required capabilities to carry out proposed work are met, and team complies with the program's CUI Guide.
14. Can PI be part of another team as a sub?
    a. Yes, as long as proposed work between two different submissions is different.
15. Is it mandatory to have industry partners on the team?
    a. Not required to perform in the program, but a plan for technology transition is required.
16. What is the required team size?
    a. Team size does not matter, as long as the overall team can perform the proposed work.
17. Does team composition need a theoretical/modeling aspect?
    a. No.
18. Is it possible to include equipment and equipment upgrades as part of the proposed budget?
    a. Yes, equipment is a category in the cost template. Any proposed equipment-related work must be feasible within the program schedule.
19. During the course of the program, can performers later pivot to a different material that they did not initially propose?
    a. Yes, with agreement from the DARPA PM.
20. Is it encouraged to start bringing in commercialization partners as part of proposal development?
    a. It is encouraged but not required.

21. Could you tell me the rules about foreign applicants and/or direct me to the relevant policy?
    a. Please refer to Section V, bullet point 2 of the Program Announcement (PA) found on Sam.gov.
22. Are FFRDCs able to propose as a prime or sub?
    a. Please refer to Section IV: Submission Information of the PA on Sam.gov and click on the Proposer Instructions and General Terms and Conditions link.
23. Are the program metrics negotiable?
    a. Program metrics are not negotiable.
24. If we currently have a SBIR program, can we adapt Crystal Palace to the current SBIR program?
    a. No. We cannot adapt Crystal Palace as a part of a SBIR program.
25. Where will the Proposers Day slides be posted?
    a. The slides and the PM's presentation are located here: https://www.darpa.mil/research/programs/crystal-palace.
26. Is Crystal Palace intended for single-PI proposals, or are multi-institution teams preferred or expected?
    a. It is up to the proposer.
27. Is there guidance on the budget scale and cost share?
    a. No, but proposers must justify their proposed budget and price as per the Evaluation Criteria in Section II of the PA.
28. Can figures be included in the abstract?
    a. Yes.
29. Is it permissible for a PI to submit two distinct abstracts if they describe different approaches?
    a. A PI is not prohibited from submitting multiple distinct abstracts.
30. Is the notification of intent to propose different from the abstract submission?
    a. Abstract submission and intent to propose are two separate actions. Please review the Overview Section of the PA for these dates.
31. Should abstracts be sent via email to Crystal_Palace@darpa.mil?
    a. Please review Attachment A for instructions on how to submit an abstract through BAAT.
32. Does abstract submission factor into the evaluation of a full proposal (i.e., affect the likelihood of selection)?
    a. No. Please refer to Attachment A of the PA: "DARPA will review all conforming full proposals using the published evaluation criteria and without regard to any comments resulting from the review of an abstract. Proposers should note that a favorable response to an abstract is not a guarantee that a

proposal based on the abstract will ultimately be selected for award negotiation."

Contracting Questions

1. May Offerors propose adjustments to the Schedule of Milestones and Payments included in Attachment H?
    a. Attachment H (Schedule of Milestones and Payments) reflects the Government's baseline structure for technical evaluation, payment alignment, associated deliverables, and exit criteria required for milestone completion. Offerors may propose adjustments only to Phase 2 as part of their proposal submission; however, any such adjustments must be supported by clear rationale and are subject to Government review and approval. The milestones identified in Attachment H must be used as the foundational structure.

       Limited additions or refinements to the Phase 2 milestone schedule may be considered, but any such revisions must remain reasonable and may not exceed two additional milestones unless expressly approved by the Government. The Government will require retention of the baseline structure to ensure continuity in oversight, down-select alignment, and overall program execution.

2. What qualifies an entity as a non-traditional defense contractor for purposes of this Program Announcement?
    a. "Nontraditional defense contractor" is defined as "an entity that is not currently performing and has not performed, for at least the one-year period preceding the solicitation of sources by the Department of Defense for the procurement or transaction, any contract or subcontract for the Department of Defense that is subject to full coverage under the cost accounting standards prescribed pursuant to section 1502 of title 41 and the regulations implementing such section."

3. Is cost/resource sharing required under this Program Announcement?
    a. No. Cost/resource sharing is not required for eligibility under this Program Announcement. Voluntary cost or resource contributions may be considered to the maximum extent practicable; however, such voluntary contributions will not result in preferential consideration, evaluation weighting, or selection advantage, and will be reviewed only for relevance to technical feasibility, schedule realism, and overall risk.

4. May Independent Research and Development (IRAD) be considered cost/resource sharing?

a. No. IRAD will not be recognized as cost/resource sharing under this Program Announcement.

5. Will milestone payments be made on a best-effort basis or on achievement of milestones?
    a. Milestone payments are made only when the specific deliverables and exit criteria listed in Attachment H (Schedule of Milestones and Payments) have been successfully completed and verified by the Government. Payments are not based on effort or time spent, only on the achievement of the agreed-upon results. This is a fixed-payable milestone structure, not a cost-reimbursement or effort-based arrangement. Payments are tied to achieved results, not time or effort expended. This ensures that funding is tied to actual progress and completed work, consistent with the fixed-payable milestone structure of the Agreement.

6. If title to equipment acquired under a prior federally funded award has transferred to the performer, may that equipment be used as cost/resource sharing on this effort?
    a. The underlying equipment itself may not be credited as cost/resource sharing. Cost/resource sharing must represent the performer's independent, non-Federal investment, and equipment originally purchased with Federal funds does not meet that standard.

       However, on a case-by-case basis, the Government may consider incremental, non-Federally funded usage costs directly associated with the equipment (e.g., calibration, maintenance, specialized operating costs) if they are newly incurred, allocable to this effort, and not reimbursed under any Federal award. Such approval is at the sole discretion of the Government.