DARPA-PA-24-04-06 Intrinsically Tough and Affordable Ceramics Today (INTACT) Frequently Asked Questions (FAQs) as of 3/7/2025

57Q: We are trying to select the PI for the project, but I will be on family leave for the first two months of when the program is slated to start. The next, most appropriate colleague will be available at the beginning of the program but will then go on family leave for a couple of months about 5 months later. How hard/discouraged is it to switch PIs during the program? The paperwork does not seem to accommodate co-PIs.

57A: The proposed solution should include a labor mix that enables successful performance throughout the period of performance. If proposing co-PIs is part of a solution to manage consistent oversight, that would be acceptable.

56Q: The proposal template requires us to "Provide appropriate measurable milestones (quantitative if possible) at intermediate stages of the project to demonstrate progress; milestones should be clearly articulated and defined in time relative to the start of the project" in the "Technical Plan" section, while we have been given fixed milestones in the "Intact Schedule of Milestones and Payments" appendix. Should we just copy those fixed milestones to the "Technical Plan" section?

56A: No, measurable milestones in the technical plan should be specific to your proposed approach. The payment-related milestones are intentionally broad and applicable to all potential performers.

55Q: Does the DARPA extranet submission account allow for a PI to use another user to help compile the proposal? Or vice versa, if the proposal is started by the admin, can they share the proposal with a PI for official submission?

55A: Either the Principal Investigator (PI) or the administrative point of contact (POC) can create an account, but account information is unique to that individual and cannot be shared.

54Q: Are their certifications that need to be made (i.e. clicked) during submission that should be done by the PI, rather than by proxy?

54A: There are no certifications required in the BAA Tool.

53Q: Does DARPA allow admins to set up the extranet account and submit on behalf of the Principal Investigator (PI), or is the expectation that the PI is submitting themselves?

53A: An administrative POC can create an account and submit on behalf of the PI.

52Q: We received a notification from the DARPA-PA-24-04 solicitation that the Volume 2: DARPA Standard Cost Proposal Spreadsheet is being removed and replaced with a new template provided for each DO. Does this new amendment apply to INTACT?

52A: No, this Amendment to the Program Announcement does not apply to INTACT. Please complete and include the Volume 2: DARPA Standard Cost Proposal Spreadsheet Template found under DARPA-PA-24-04 in your proposal package.

51Q: I have the 5 questions below regarding Month 1 and 4 milestones. Month 1 states, "All supporting positions and level of effort identified in the proposal are assigned to personnel." Month 4 states, "All personnel working on project at proposed level of effort."

- 1) Are all proposed personnel considered key personnel?
- 2) We have staff members with similar skill sets that may be asked to work on the project depending on availability. Is approval required to substitute any proposed personnel or modify their proposed level of effort (or is that limited to key personnel)?
- 3) How will employee level of effort be monitored? Do proposed and actual hours need to be included in each milestone report?
- 4) Is there a minimum level of effort required for key personnel?
- 5) Is there a threshold that can be used for meeting the level of effort requirement? For example, can an employee's actual hours be +/- 10% of their planned hours without issue?

51A: In response to your 5 questions: (1) Not all proposed personnel are necessarily considered key personnel, (2) Approval is not required to substitute personnel, but this should be kept to a minimum, (3) DARPA will not be monitoring the hours of individuals, (4) There is no minimum level of effort required for key personnel, but for operational efficiency it is generally desirable to have smaller dedicated teams over large distributed teams, (5) There is no set threshold.

50Q: Does this solicitation consider theoretical/computational research proposals, or is collaboration with an experimental group mandatory?

50A: All program metrics and requirements must be substantiated experimentally. Theoretical/computation proposals alone are insufficient.

49Q: Due to the current budget environment, can you please confirm this solicitation is still ongoing?

49A: Yes, the INTACT DO is still an active solicitation.

48Q: Is the 6 g/cm3 bulk density limit a strict limit or is there a 5% tolerance for instance?48A: A technical path to meeting all program requirements must be proposed.

DARPA-PA-24-04-06 FAQs

-↑↑↑New Q/A↑↑↑------

47Q: It is stated that "production methods resembling traditional **composite** manufacturing routes (i.e., multistep consolidation of distinct material forms/phases) are not in scope." Are production methods resembling traditional **ceramic** manufacturing routes in scope (e.g., green body formation followed by final densification), if specific manufacturing steps incorporate novel non-equilibrium processing techniques?

47A: Yes, processing method resembling traditional ceramic manufacturing routes are in scope.

46Q: The fixed milestone for Month 6 involves "preliminary strength and fracture toughness testing results." Do these "preliminary results" need to be obtained using the test methods specified for the program metrics (i.e., the Month 12 fixed milestone) or can indentation/micro-scale testing be used to produce the preliminary results?

46A: Month 6 preliminary results must be obtained using the standard test methods specified (i.e., ASTM C1211 and ASTM C1421) as will be used for the Month 12 program metrics milestone.

45Q: Can equipment be charged under this program?

45A: Yes, equipment can be included as part of the total proposed cost.

44Q: Are letters of support allowed to be included with the proposal and if so, is there a required format?

44A: Letters of support may be included in the proposal package, but they will not be evaluated as part of the formal proposal review process. There is no template for these letters.

43Q: Our organization cannot accept Other Transaction (OT) agreements. If our proposal is selected for negotiations, will we be able to choose another funding mechanism?

43A: OT for Prototype will be the only type of award for selected proposals under the INTACT DO.

- 42Q: Is there a specification on "initial toughness" before improving that property?
 42A: No as long as the final toughness meets or exceeds program metrics it does not matter what the initial toughness was.
- 41Q: Is there a specification on which ceramic materials are of most interest to DARPA?41A: Any ceramic material capable of meeting or exceeding program metrics is of interest.

40Q: Is manufacturing a necessity as a part of the project or can we engineer atomic toughening mechanisms on commercially available materials?

40A: Performers must demonstrate manufacturing of a challenge part geometry as outlined in the Program Announcement.

39Q: Would there be some flexibility on the test coupon dimensions if there was a clear path for scaling to larger dimensions? E.g. metrics achieved in a 100um thick bar with a clear path for scaling to mm+ dimensions.

39A: Metrics must be substantiated using traditional mm-scale test coupons. Micro- or nano-scale testing is not acceptable.

38Q: Does the < 1% porosity listed have to be achieved in the test coupons during the program? Or is that bullet just clarifying that the material density must be in line with the <6g/cm3 metric in the case in which the material achieves <1% porosity?

38A: <1% porosity must be demonstrated in test coupons experimentally during the program.

37Q: How much tolerance does the INTACT program have for functionally graded structures that would be part the desired toughness ceramics, and part CMC or more brittle monolithic structure?

37A: INTACT is focused on creating intrinsic toughness in bulk ceramics throughout; therefore, a graded approach may not be in scope.

- 36Q: Can you provide more information on the INTACT abstract submission process?36A: The INACT DO does not have an abstract phase and is only accepting full proposal submissions.
- 35Q: Are there specific metrics that we will be working toward?35A: Yes, see the program metrics table in the Program Announcement.

34Q: Any requirements on how fast and what quantity the program wants us to hit? Or is it just find a material in the lab first to validate performance requirements.

34A: See the program metrics for cycle time targets. Beyond that, there are no specific goals for production rate.

33Q: Does cycle time just count the time of the processes? For example, would the time to access a piece of equipment not be counted?

33A: Cycle time is defined as the total process time from raw material input to near-netshape part output. Queue time to access a piece of equipment would not be included. 32Q: What level of information sensitivity is allowed in the proposal?32A: This is an unclassified program that may contain elements of Controlled Unclassified Information (CUI) if necessary.

31Q: Could Phase 1 focus on Extrinsic toughening, while research in intrinsic toughening worked in parallel, then Phase 2 would focus on adding Intrinsic toughening?31A: No – extrinsic toughening mechanism are out of scope.

30Q: You did not talk about any chemical modifications. Is that considered or not?30A: If chemical modification leads to an intrinsically tough ceramic, it would be inscope.

29Q: How would the selection committee view microstructure alignment/engineering to enable intrinsic mechanisms (i.e. address number of slip systems available)?

29A: Any novel intrinsic toughening mechanism built on solid materials science underpinnings will be viewed favorably.

28Q: We are planning to propose to the INTACT DO. Is it possible to discuss our technical approach with the PM?

28A: To enable open and fair competition, the Program Manager is not holding individual meetings or commenting on specific ideas/technical approaches outside of the formal INTACT FAQ process.

27Q: What is the entity eligibility? Domestic only? Give us details please.27A: Eligibility is not limited to domestic entities only and it is unclassified. See Section 7 of DARPA-PA-24-04 for information on who may be eligible to respond to this announcement.

26Q: What are some limits and constraints for a non-profit research and development organization to participate either as a prime or subprime applicant?

26A: See Section 7 of DARPA-PA-24-04 for information on who may be eligible to respond to this announcement.

25Q: Should machining post thermal processing to achieve an appropriate geometry for the demonstration part in phase II be considered part of the process time?

25A: No. Any post-process machining that may be required is not included in the cycle time on this program.

24Q: What is the minimum material hardness required? 24A: There is no hardness requirement. 23Q: Will slide deck from the Information Session be made available?

23A: The INTACT Information Session slide deck and recording are available on the program page at https://www.darpa.mil/research/programs/intact-intrinsically-tough.

22Q: Does the toughness mechanism have to be dislocation driven or are phase transformation materials also of interest?

22A: Any intrinsic toughening mechanism is of interest. We are not only looking for dislocation-based toughening.

21Q: Can two phase materials be compliant as long as the toughening mechanism isn't interfacedominated?

21A: Any intrinsic toughening mechanism is compliant.

20Q: Atomic-level engineering is difficult to realize through structural-level production. Would you prioritize new science concepts or practical production methods?

20A: Both are important for this program. We are interested in new science concepts that will enhance both toughness and manufacturability in alignment with the program metrics.

19Q: Is the \$2M per performer for both phases? Say, \$500K for Phase I and \$1.5M for Phase II?
19A: Yes, it is \$2M per performer. Please review Section C of DARPA-PA-24-04-06, which states as follows: "Phase 1 award values must not exceed \$1,250,000, and Phase 2 awards must not exceed \$1,250,000. Both Phase 1 and Phase 2 award value limits include performer cost share, if proposed. The total award value for the combined Phase 1 and Phase 2 effort is limited to \$2,000,00."

18Q: How are Proposer Profiles used by DARPA, and where can I find the other Proposer Profiles that were submitted?

18A: Proposal Profiles are for the benefits of the proposers for teaming arrangement and are not used by DARPA. Proposer Profiles are due by 4pm ET on January 24, 2025 and the consolidated Proposer Profile will be sent via email to Information Session registrants who submitted a valid profile for distribution.

17Q: Does the cycle time mentioned in the Program Metrics include annealing/ heat treatment time typical of ceramic processing?

17A: Yes.

16Q: You mention engineered inclusions as out of scope. Does this mean something akin to oxide dispersion strengthening is out of scope?

16A: Yes, this would likely be out of scope. We are interested in intrinsic toughening mechanisms that prevent cracks from propagating.

15Q: What size teams are expected?

15A: There is no expectation on team size; this is at the discretion of the proposer.

14Q: If you select five awardees in which none achieved metrics to proceed to Phase 2, would you go back and select from high ranked proposals originally not selected?

14A: No.

13Q: Does the material have to be entirely ceramic or are metal matrix composites (MMCs) of interest?

13A: The focus of the program is intrinsic toughening in ceramic materials.

12Q: Is preliminary data required, or are first timers to toughened ceramics welcome as long as the idea is substantiated by other means (literature, facilities, etc.)?

12A: First timers are encouraged to apply. Preliminary data is not a prerequisite. Backing up your proposed approach by some means (for example preliminary calculations or literature data) will increase the likelihood of being selected for negotiation.

11Q: Is the toughness requirement at room temperature and associated with an assumed starting crack length?

11A: Refer to ASTM C1421, which has a starting crack, and it is at room temperature.

10Q: Is there an upper boundary for final component size? The manufacturing routes producing submarine hull panels vs heat shield tiles may be quite different

10A: No, there is no bound for the final component size with the exception on the minimum, which is $1 \text{cm} \times 1 \text{cm} \times 10$ cm.

9Q: What are the publication and Intellectual Property (IP) requirements?

9A: Publications are encouraged. There will be no publication restriction if the work is performed at a university. For work performed by an industry performer, publications must go through DARPA's Distribution Statement A Request (DISTAR) process. IP requirements will be evaluated on a case-by-case basis. Proposers may also assert IP rights for technologies previously developed and applied on INTACT.

8Q: Are you taking a broad view of what a ceramic is? Beyond borides, carbides, nitrides, & oxides or within that set?

8A: Yes, we are taking a broad view.

7Q: Even with intrinsic toughening, materials fail stochastically. How will this be factored into metrics? (i.e., flexural strength with what Weibull modulus??)

7A: We are asking for ten independent tests to evaluate repeatability and reproducibility of strength and toughness measurements.

- 6Q: Are we sending our test data, or will you have an IV&V team evaluating our materials?
 6A: Performers are required to do their own tests. There will be a government team in an Independent Validation & Verification (IV&V) role that may be called upon to reproduce performed-generated results.
- 5Q: Can government labs apply?

5A: See Section 7 of DARPA-PA-24-04 for information on who may be eligible to respond to this announcement.

4Q: Depending on the material, a 24h anneal at 1200C may eliminate any "non-equilibrium processing" outcomes. How heavily is this metric weighted?

4A: Meeting property metrics after a 24 anneal is a requirement and key challenge on the program. If annealing results in a moderate reduction in strength or toughness, but we understand the underlying mechanisms and can accurately project these properties over a given timeframe, this may be a viable path forward.

3Q: The timetable is aggressive if "new" processing techniques are to be developed. Any thoughts on Phase 1 having a longer performance period to facilitate?

3A: Phase 1 is 12 months and will not be extended.

2Q: How much of the evaluation is associated with improving material performance vs expanding understanding of the mechanism?

2A: It is both. We want to use fundamental understanding to improve material performance.

1Q: How many proposals will be funded?

1A: The number of awards depends on the quality of proposals received and is not a fixed target.