

DMEA
SBIR 20.1 PROPOSAL SUBMISSION INSTRUCTIONS

INTRODUCTION

The Defense Microelectronics Activity (DMEA) SBIR/STTR Program is implemented, administrated, and managed by the DMEA Office of Small Business Programs (OSBP). If you have any questions regarding the administration of the DMEA SBIR/STTR Program, please contact the DMEA SBIR/STTR Program Manager (PM), Mr. Greg Davis, at smbus@dmea.osd.mil.

For general inquiries or problems with electronic submission, contact the DOD SBIR/STTR Help Desk at 703-214-1333 between 9:00 am to 5:00 pm ET. For questions about the topic during the pre-release period (10 December 2019 through 13 January 2020), contact the Technical Point of Contact (TPOC) listed under each topic on the <https://sbir.defensebusiness.org/> website prior to the Open phase of the DOD SBIR Program Broad Agency Announcement (BAA) FY 20.1. The SBIR/STTR Interactive Topic Information System (SITIS) will be open to questions during pre-release and close to new questions two weeks prior to the announcement close date. Information regarding the DMEA mission and programs can be found at <http://www.dmea.osd.mil>.

PHASE I GUIDELINES

DMEA intends for Phase I to be only an examination of the merit of the concept or technology that still involves technical risk, with a cost not exceeding \$167,500 (excludes Discretionary Technical and Business Assistance (TABAs) amount).

A list of the topics currently eligible for proposal submission is included in this section followed by full topic descriptions. These are the only topics for which proposals will be accepted at this time. The topics are directly linked to DMEA's core research and development requirements.

Please ensure that your e-mail address listed in your proposal is current and accurate. DMEA cannot be responsible for notification to companies that change their mailing address, e-mail address, or company official after proposal submission.

PHASE I PROPOSAL SUBMISSION

Read the DOD SBIR Program BAA FY 20.1 for detailed instructions on proposal format and program requirements. When you prepare your proposal submission, keep in mind that Phase I should address the feasibility of a solution to the topic. Only UNCLASSIFIED proposals will be entertained.

The technical period of performance for the Phase I effort should be no more than six (6) months. DMEA will evaluate and select Phase I proposals using the evaluation criteria contained in Section 6.0 of the DOD SBIR Program BAA FY 20.1 Preface Instructions. Due to limited funding, DMEA reserves the right to limit awards under any topic, and only proposals considered to be of superior quality will be funded.

DMEA does not accept Phase I proposals exceeding \$167,500. DMEA will conduct a price analysis to determine whether cost proposals, including quantities and prices, are fair and reasonable. Contractors should expect that cost proposals will be negotiated.

If you plan to employ NON-U.S. citizens in the performance of a DMEA SBIR contract, please identify these individuals in your proposal as specified in Section 5.4.c(8) of the DOD SBIR Program BAA FY 20.1.

It is mandatory that the ENTIRE Technical Volume, DOD Proposal Cover Sheet and Cost Volume are submitted electronically through the DOD SBIR website at <https://www.dodsbirsttr.mil/submissions/>. The DOD proposal submission site submission will lead you through the process for submitting your technical proposal and all of the sections electronically. Each of these documents is submitted separately through the website. If you have any questions or problems with the electronic proposal submission, contact the DOD SBIR/STTR Help Desk at 703-214-1333 or email dodsbirsupport@reisystems.com.

Your proposal submission must be submitted via the submission site on or before the 8:00 p.m. ET deadline on 12 February 2020.

Proposal submissions that are not complete or that are received after the closing date and time will not be considered for award.

PHASE II GUIDELINES

Phase II is the prototype/demonstration of the technology that was found feasible in Phase I. DMEA encourages, but does not require, partnership and outside investment as part of discussions with DMEA sponsors for potential Phase II efforts.

Phase II proposals may be submitted for an amount not to exceed \$1,100,000 (excludes Discretionary Technical and Business Assistance (TAB) amount). The technical period of performance for the Phase II effort should be no more than twenty-four (24) months.

PHASE II PROPOSAL SUBMISSION

Phase I awardees may submit a Phase II proposal without invitation not later than sixty (60) calendar days following the end of the Phase I contract. The Phase II proposal submission instructions are identified in the Phase I contract, Part I – The Schedule, Section H, Special contract requirements, “SBIR Phase II Proposal Submission Instructions.”

All Phase II proposals must have a complete electronic submission. Complete electronic submission includes the submission of Cover Sheet, Cost Volume, the entire Technical Volume, and any appendices via the DOD submission site (<https://www.dodsbirsttr.mil/submissions/>). The DOD proposal submission site will lead you through the process for submitting your technical volume and all of the sections electronically. Each of these documents is submitted separately through the website. Your proposal must be submitted via the submission site on or before the DMEA-specified deadline or it will not be considered for award.

The technical period of performance for the Phase II effort should be no more than twenty-four (24) months. DMEA will evaluate Phase II proposals based on the Phase II evaluation criteria listed in Section 8.0 of DOD SBIR Program BAA FY 20.1 Preface. DMEA does not have an established page limit for Phase II submissions. Please reference the DOD SBIR Submission site FAQs for more information on generating Phase II proposals. Due to limited funding, DMEA’s ability to award any Phase II, regardless of proposal quality or merit, is subject to availability of funds. Please ensure that your proposal is valid for 120 days after submission, and any extension to that time period will be requested by the contracting officer.

Any follow-on Phase II proposal (i.e., a second Phase II subsequent to the initial Phase II effort) shall be initiated by the Government Technical Point of Contact for the initial Phase II effort and must be approved by the DMEA SBIR/STTR Program Manager in advance.

COST VOLUME GUIDELINES

The on-line cost volume for Phase I and Phase II proposal submissions must be at a level of detail that would enable DMEA personnel to determine the purpose, necessity, and reasonability of each cost element. Provide sufficient information (a. through h. below) on how funds will be used if the contract is awarded. Include the itemized cost volume information (a. through h. below) as an appendix in your technical proposal. The itemized cost volume information (a. through h. below) will not count against the 20-page limit on Phase I proposal submissions.

- a. **Special Tooling and Test Equipment and Material:** The inclusion of equipment and materials will be carefully reviewed relative to need and appropriateness of the work proposed. The purchase of special tooling and test equipment must, in the opinion of the Contracting Officer, be advantageous to the government and relate directly to the specific effort. They may include such items as innovative instrumentation and/or automatic test equipment. Title to property furnished by the Government or acquired with Government funds will be vested with the DOD Component; unless it is determined that transfer of the title to the contractor would be more cost effective than recovery of the equipment by the DOD Component.
- b. **Direct Cost Materials:** Justify costs for materials, parts, and supplies with an itemized list containing types, quantities, price, and where appropriate, purposes.
- c. **Other Direct Costs:** This category of costs includes specialized services such as machining or milling, special testing or analysis, costs incurred in obtaining temporary use of specialized equipment. Proposals, which include leased hardware, must provide an adequate lease *versus* purchase justification or rationale.
- d. **Direct Labor:** Identify key personnel by name if possible or by labor category if specific names are not available. The number of hours, labor overhead and/or fringe benefits and actual hourly rates for each individual are also necessary.
- e. **Travel:** Travel costs must relate to the needs of the project. Break out travel cost by trip, with the number of travelers, airfare, and per diem. Indicate the destination, duration, and purpose of each trip.
- f. **Cost Sharing:** Cost sharing is permitted. However, cost sharing is not required, nor will it be an evaluation factor in the consideration of a proposal.
- g. **Subcontracts:** Involvement of university or other consultants in the planning and /or research stages of the project may be appropriate. If the offeror intends such involvement, describe the involvement in detail and include information in the cost proposal. The proposed total of all consultant fees, facility leases, or usage fees and other subcontract or purchase agreements may not exceed one-third of the total contract price or cost, unless otherwise approved in writing by the Contracting Officer. Support subcontract costs with copies of the subcontract agreements. The supporting agreement documents must adequately describe the work to be performed (i.e., Cost Volume). At the very least, a statement of work with a corresponding detailed cost volume for each planned subcontract must be provided.
- h. **Consultants:** Provide a separate agreement letter for each consultant. The letter should briefly state what service or assistance will be provided, the number of hours required, and the hourly rate.

DMEA SBIR PHASE II ENHANCEMENT PROGRAM

To encourage transition of SBIR into DOD systems, DMEA has a Phase II Enhancement policy. DMEA's Phase II Enhancement program requirements include: up to one-year extension of existing Phase II, and up to \$550,000 matching SBIR funds. Applications are subject to review of the statement of work, the transition plan, and the availability of funding. DMEA will generally provide the additional Phase II Enhancement funds by modifying the Phase II contract.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TAB A)

DMEA does not provide Discretionary Technical and Business Assistance (TAB A).

PHASE I PROPOSAL SUBMISSION CHECKLIST:

All of the following criteria must be met or your proposal will be REJECTED.

 1. Your Technical Volume and DOD Cover Sheet, and the Cost Volume have been submitted electronically through the DOD submission site by 8:00 pm ET on 12 February 2020.

 2. The Phase I proposal does not exceed \$167,500 (excludes Discretionary Technical and Business Assistance (TAB A) amount).

DMEA SBIR 20.1 Topic Index

DMEA201-001 Robust Readout of DNA Marking for Electronic Counterfeit Detection

DMEA SBIR 20.1 Topic Descriptions

DMEA201-001 TITLE: Robust Readout of DNA Marking for Electronic Counterfeit Detection

TECHNOLOGY AREA(S): Chemical/Biological Defense, Electronics, Materials/Processes, Sensors

RESEARCH & TECHNOLOGY AREA(S):

ADVANCED CAPABILITIES:

ACQUISITION & SUSTAINMENT AOR:

OBJECTIVE: Develop and validate quantitative techniques to read and interpret DNA sequences used for management of supply chain security of electronic components.

DESCRIPTION: Management of supply chain security to detect counterfeit electronics is a global challenge. According to the Defense Standardization Program Office (DSPO) Journal, counterfeit electronic is defined as “One whose identity and pedigree has been deliberately altered, misrepresented or offered as an authorized product.” [1] There are various ways to confirm the authenticity of electronics such as X-ray microscopy inspection, physical delayering and imaging and etc. [2] However, these methods either rely on destructive analysis or have limitations in spatial resolution, and therefore do not present viable solutions to effectively mitigate the spread of counterfeit electronics in various sectors of society; specifically military components.

Deoxyribonucleic acid (DNA) can provide a form of forensic evidence since it is composed of a sequence of organic bases and is customized by organisms. [3] DNA-signature taggants have been demonstrated as a potential solution to protect electronic components against counterfeiting and diversion. [4] To utilize DNA for supply chain product tracking and anti-counterfeiting, it is important to develop efficient and defect free DNA readers. There is a trade-off that needs to be considered for the design of an effective DNA reader. Specifically, decreasing the amount of DNA constituents used for tagging an electronic part increases the potential for cost savings during authentication. However, more DNA constituent in the taggants allows for utilizing the emerging fast reader technologies; e.g., microarray technique and nanopore sequencing. Meanwhile, there are other developing techniques, electrical conductance measurement that can potentially be developed into DNA readers. [5] Therefore, it is expected that the performer come up with an innovative idea leveraging the already developed methods to efficiently read DNA taggants used to potentially authenticate electronic components.

PHASE I: Perform a feasibility study to read DNA sequences in a robust manner. Specifically, conduct research on both hardware and software techniques capable of identifying the organic bases within a DNA sequence. The feasibility study is expected to include the following items:

- 1) Read and interpret signature DNA taggants with a yield of greater than 95%
- 2) Incorporate artificial intelligent (AI) to predict issues of adulteration
- 3) Distinguish between defect-free DNA taggants and one with defects included

PHASE II: Phase II will result in building, testing and delivering a prototype of the method developed in phase I. Prototype demonstration will include numerous testing data on three main samples. The first sample is composed of an electronic part marked by DNA taggants. The second sample is identical to the first sample except for the sequence of DNA used to label the part. And, the third sample is still identical to the first and the second one; however, with no DNA taggants. It is expected that the performer deliver all the mathematical justifications, reasoning, and software coding utilized to develop the prototype.

PHASE III DUAL USE APPLICATIONS: Phase III will result in the expansion of the prototype system in Phase II into a tested pre-production system, which entails a technique to read DNA taggants from labeled electronic

components to protect the electronic supply chain from counterfeiting.

REFERENCES:

1. [1] Department of Commerce Bureau of Industry and Statistics Survey Results, Department of Commerce (2010).
2. [2] N. Asadizanjani, et al., "PCB Reverse Engineering Using Nondestructive X-ray Tomography and Advanced Image Processing," IEEE Transactions on Components, Packaging and Manufacturing Technology, vol. 7, no. 2, 2017.
3. [3] K. Sigmund, The physicist and the dawn of the double helix. Science, 366 (6461), p. 43, 2019.
4. [4] J. Hayward, et al., "DNA to Safeguard Electrical Components and Protect Against Counterfeiting and Diversion," Proc 37th Int'l Symp for Testing and Failure Analysis, pp. 238-241, 2011.
5. [5] Hihath J., Xu B., Zhang P., Tao N. "Study of single-nucleotide polymorphisms by means of electrical conductance measurements," Proc. Natl. Acad. Sci. USA. Pp. 16979–16983, 2005.

KEYWORDS: DNA Marking, Counterfeits, Semiconductor Devices, DNA Reading, Supply Chain