Joint Service Small Arms Program (JSSAP)
Office of the Secretary of Defense (OSD)
20.3 Small Business Innovation Research (SBIR)
Direct to Phase II
Proposal Submission Instructions

IMPORTANT

Deadline for Receipt: Proposals must be completely submitted and certified no later than 12:00 p.m. ET, October 22, 2020. Proposals submitted after 12:00 p.m. will not be evaluated.

Proposers must follow all instructions as provided in the DoD SBIR 2020.3 BAA Instructions at https://www.dodsbirsttr.mil/submissions, EXCEPT for the specific deviations listed below.

Help Desk: If you have questions about the Defense Department's SBIR or STTR Programs, please call the DoD SBIR/STTR Help Desk email DoDSBIRSupport@reisystems.com (9:00 a.m. to 5:00 p.m. ET, Monday through Friday).

INTRODUCTION

The Joint Service Small Arms Program (JSSAP) is participating under the OSD SBIR Program on this SBIR 20.3 Broad Agency Announcement (BAA).

Proposers responding to the JSSAP topic listed in this Announcement must follow all instructions provided in the DoD SBIR 20.3 Broad Agency Announcement (BAA) posted on the DoD SBIR/STTR website at: https://www.dodsbirsttr.mil/submissions.

Firms with strong research and development capabilities in science or engineering in any of the topic areas described in this section, and with the ability to commercialize the results, are encouraged to participate. The OSD SBIR Program will support high quality research and development proposals of innovative concepts to solve the listed defense-related scientific or engineering problems, especially those concepts that also have high potential for commercialization in the private sector.

Objectives of the OSD SBIR Program include stimulating technological innovation, strengthening the role of small business in meeting DOD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DOD-supported research and development results. The guidelines presented in the announcement incorporate and exploit the flexibility of the SBA Policy Directive to encourage proposals based on scientific and technical approaches most likely to yield results important to DoD and the private sector.
**DIRECT TO PHASE II**

15 U.S.C. §638 (cc), as amended by NDAA FY2012, Sec. 5106, and further amended by NDAA FY2019, Sec. 854, PILOT TO ALLOW PHASE FLEXIBILITY, allows the Department of Defense to make an award to a small business concern under Phase II of the SBIR program with respect to a project, without regard to whether the small business concern was provided an award under Phase I of an SBIR program with respect to such project. OSD is conducting a Direct to Phase II (DP2) implementation of this authority for this 20.3 SBIR Announcement and does not guarantee DP2 opportunities will be offered in future Announcements.

Proposers interested in submitting a DP2 proposal in response to an eligible topic must provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the PI.

OSD will not evaluate the proposer’s related Phase II proposal if it determines that the proposer has failed to demonstrate that technical merit and feasibility has been established or the proposer has failed to demonstrate that work submitted in the feasibility documentation was substantially performed by the proposer and/or the PI.

Feasibility documentation cannot be based upon any prior or ongoing federally funded SBIR or STTR work and DP2 proposals MUST NOT logically extend from any prior or ongoing federally funded SBIR or STTR work.

The OSD SBIR Program reserves the right to not make any awards under this DP2 announcement. The Government is not responsible for expenditures by the offeror prior to award of a contract. All awards are subject to availability of funds and successful negotiations.
PROPOSAL SUBMISSION

Proposers are REQUIRED to submit UNCLASSIFIED proposals via the Defense SBIR/STTR Innovation Portal (DSIP) at https://www.dodsbirsttr.mil/submissions/. Firms submitting through this site for the first time will be asked to register. It is recommended that firms register as soon as possible upon identification of a proposal opportunity to avoid delays in the proposal submission process. Submission deadlines are strictly enforced. Proposals submitted by any other means will be disregarded.

Full proposal packages must be submitted by 12:00 PM EST on October 22, 2020.

DIRECT TO PHASE II PROPOSAL PREPARATION INSTRUCTIONS AND PROPOSAL REQUIREMENTS

The Technical Volume is limited to 30 pages, which includes 10 pages for the feasibility documentation and 20 pages for the Phase II Technical Proposal. The Cover Sheet, Cost Volume and Commercialization Report do not count toward the 30-page limitation. The Government will not consider pages in excess of the page count limitations.

Phase II proposals require a comprehensive, detailed submission of the proposed effort. OSD Direct to Phase II efforts are awarded up to a maximum value of the dollar amounts and duration listed in Chart 1.

A. Proposal Cover Sheet (Volume 1): Complete as specified in DoD SBIR BAA section 5.

B. Format of Technical Volume (Volume 2):

(1) The Technical Volume must include two parts, PART ONE: Feasibility Documentation and PART TWO: Technical Proposal.

(2) Type of file: The Technical Volume must be a single Portable Document Format (PDF) file, including graphics. Perform a virus check before uploading the Technical Volume file. If a virus is detected, it may cause rejection of the proposal. Do not lock or encrypt the uploaded file. Do not include or embed active graphics such as videos, moving pictures, or other similar media in the document.

(3) Layout: Number all pages of your proposal consecutively. Font size should not be smaller than 10-point on standard 8-1/2” x 11” paper with one-inch margins. The header on each page of the Technical Volume should contain your company name, topic number, and proposal number assigned by DSIP when the Cover Sheet was created. The header may be included in the one-inch margin.

C. Content of the Technical Volume (Volume 2)

PART ONE: Feasibility Documentation
• Provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of the topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results.

• Maximum page length for feasibility documentation is 10 pages. If you have references, include a reference list or works cited list as the last page of the feasibility documentation. This will count towards the page limit.

• Work submitted within the feasibility documentation must have been substantially performed by the proposer and/or the PI.

• If technology in the feasibility documentation is subject to Intellectual Property (IP), the proposer must either own the IP, or must have obtained license rights to such technology prior to proposal submission, to enable it and its subcontractors to legally carry out the proposed work. Documentation of IP ownership or license rights shall be included in the Technical Volume of the proposal.

• DO NOT INCLUDE marketing material. Marketing material will NOT be evaluated.

PART TWO: Technical Proposal
Maximum page length for the technical proposal is 20 pages. If you have references, include a reference list or works cited list as the last page of the technical proposal. This will count towards the page limit.

(1) **Significance of the Problem.** Define the specific technical problem or opportunity addressed and its importance.

(2) **Phase II Technical Objectives.** Enumerate the specific objectives of the Phase II work, and describe the technical approach and methods to be used in meeting these objectives.

(3) **Phase II Statement of Work.** The statement of work should provide an explicit, detailed description of the Phase II approach, indicate what is planned, how and where the work will be carried out, a schedule of major events and the final product to be delivered. The methods planned to achieve each objective or task should be discussed explicitly and in detail. This section should be a substantial portion of the total proposal.

   a) **Phase II Option Statement of Work** The statement of work should provide an explicit, detailed description of the activities planned during the Phase II Option, if exercised. Include how and where the work will be carried out, a schedule of major events and the final product to be delivered. The methods planned to achieve each objective or task should be discussed explicitly and in detail.

(4) **Related Work.** Describe significant activities directly related to the proposed effort, including any conducted by the PI, the proposer, consultants or others. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The proposal must persuade reviewers of the proposer's awareness of the state of the art in the specific topic. Describe previous work not directly related to the proposed effort but similar.
Provide the following: (1) short description, (2) client for which work was performed (including individual to be contacted and phone number) and (3) date of completion.

(5) **Relationship with Future Research or Research and Development.**
   a) State the anticipated results of the proposed approach if the project is successful.
   b) Discuss the significance of the Phase II effort in providing a foundation for Phase III research and development or commercialization effort.

(6) **Key Personnel.** Identify key personnel who will be involved in the Phase II effort including information on directly related education and experience. A concise resume of the PI, including a list of relevant publications (if any), must be included. All resumes count toward the page limitation. Identify any foreign nationals you expect to be involved on this project.

(7) **Foreign Citizens.** Identify any foreign citizens or individuals holding dual citizenship expected to be involved on this project as a direct employee, subcontractor, or consultant. For these individuals, please specify their country of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project. Supplemental information provided in response to this paragraph will be protected in accordance with the Privacy Act (5 U.S.C. 552a), if applicable, and the Freedom of Information Act (5 U.S.C. 552(b)(6)).

(8) **Facilities/Equipment.** Describe available instrumentation and physical facilities necessary to carry out the Phase II effort. Items of equipment to be purchased (as detailed in the cost proposal) shall be justified under this section. Also state whether or not the facilities where the proposed work will be performed meet environmental laws and regulations of federal, state (name) and local Governments for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices and handling and storage of toxic and hazardous materials.

(9) **Subcontractors/Consultants.** Involvement of a university or other subcontractors or consultants in the project may be appropriate. If such involvement is intended, it should be identified and described according to the Cost Breakdown Guidance. Please refer to section 4 of the DoD BAA for detailed eligibility requirements as it pertains to the use of subcontractors/consultants.

(10) **Prior, Current or Pending Support of Similar Proposals or Awards.** If a proposal submitted in response to this topic is substantially the same as another proposal that was funded, is now being funded, or is pending with another Federal Agency, or another or the same DoD Component, you must reveal this on the Proposal Cover Sheet and provide the following information:
   a) Name and address of the Federal Agency(s) or DoD Component to which a proposal was submitted, will be submitted, or from which an award is expected or has been received.
   b) Date of proposal submission or date of award.
   c) Title of proposal.
   d) Name and title of the PI for each proposal submitted or award received.
Title, number, and date of BAA(s) or announcement(s) under which the proposal was submitted, will be submitted, or under which award is expected or has been received.

If award was received, state contract number.

Specify the applicable topics for each proposal submitted or award received.

Note: If this does not apply, state in the proposal "No prior, current, or pending support for proposed work."

(11) Commercialization Strategy. Discuss key activities to achieve commercialization of the funded research into a product or non-R&D service with widespread commercial use – including private sector and/or military markets. Note that the commercialization strategy is separate from the Commercialization Report required in Volume 4. The strategy addresses how you propose to commercialize this research, while the Company Commercialization Report covers what you have done to commercialize the results of past Phase II awards.

The commercialization strategy must address the following questions:

a) What DoD Program and/or private sector requirement does the technology propose to support?

b) What customer base will the technology support, and what is the estimated market size?

c) What is the estimated cost and timeline to bring the technology to market to include projected funding amount and associated sources?

d) What marketing strategy, activities, timeline, and resources will be used to enhance commercialization efforts?

e) Who are your competitors, and describe the value proposition and competitive advantage over the competition?

D. Content of the Cost Volume (Volume 3)

Complete the Cost Volume by using the on-line cost volume form on the Defense SBIR/STTR Innovation Portal (DSIP). Some items in the Cost Breakdown Guidance may not apply to the proposed project. If that is the case, there is no need to provide information on each and every item. What matters is that enough information be provided to allow us to understand how you plan to use the requested funds if a contract is awarded.

(1) List all key personnel by name as well as by number of hours dedicated to the project as direct labor.

(2) While special tooling and test equipment and material cost may be included, the inclusion of equipment and material will be carefully reviewed relative to need and appropriateness for the work proposed. The purchase of special tooling and test equipment must, in the opinion of the Component Contracting Officer, be advantageous to the Government and should be related directly to the specific topic. These may include such items as innovative instrumentation 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 title to the contractor would be more cost effective than recovery of the equipment by the DoD Component.

(3) Cost for travel funds must be justified and related to the needs of the project.

(4) Cost sharing is permitted for proposals under this BAA; however, cost sharing is not required nor
will it be an evaluation factor.

(5) A Phase II Option should be fully costed separately from the Base approach.

(6) All subcontractor costs and consultant costs must be detailed at the same level as prime contractor costs in regard to labor, travel, equipment, etc. Provide detailed substantiation of subcontractor costs in your cost proposal. Enter this information in the Explanatory Material section of the on-line cost proposal form.

If the proposal is selected for a potential award, you must be prepared to submit further documentation to the Component Contracting Officer to substantiate costs (e.g., an explanation of cost estimates for equipment, materials, and consultants or subcontractors). For more information about cost proposals and accounting standards, see http://www.dcaa.mil. Click on “Guidance” and then click on “Audit Process Overview Information for Contractors.”

E. Company Commercialization Report (Volume 4) The Company Commercialization Report (CCR) will NOT be available during the 20.3 BAA cycle. No Commercialization Achievement Index (CAI) will be generated. The CCR will be available for future DoD BAA cycles.

METHOD OF SELECTION AND EVALUATION CRITERIA
Phase II proposals will be evaluated based on the criteria outlined in section 8 of the DoD 20.3 SBIR BAA Instructions.
OSD JSSAP SBIR 20.3 Topic Index

OSD203-D003 High Temperature, Corrosion, Erosion, and Wear Resistant Coatings for Small Arms Barrels and Suppressors
Objective: Develop and demonstrate a high temperature, corrosion, and wear resistant coating / plating for use on small caliber weapon system barrels and signature suppressors.

Description: Small caliber weapon system barrels and signature suppressors operate in a high temperature, chemically corrosive, and high mechanical wear environment. This environment leads to rapid deterioration of substrate materials and ultimately, failure of the barrel or signature suppressor to meet performance requirements. In extreme cases, the combination of extreme environments can cause catastrophic failure of the weapon system component, resulting in injury to the operator. Future weapon systems are anticipated to further push the extremes with a combination of hotter flame temperature and more chemically corrosive propellants, higher pressures, and harder projectiles. Traditionally, the bore of small caliber barrels are plated with hard chrome, however the chrome application process results in environmentally hazardous byproducts. Additionally, hard chrome does not sufficiently perform under the required conditions, and is not applicable to all materials.

There is a need for the development of coatings / plating for barrel bores and signature suppressor internal surfaces which can perform / remain adhered under extreme temperatures, and which prevent chemical and mechanical corrosion associated with small arms firing. Proposed coatings / plating shall be compatible chemically, thermally, and mechanically with a variety of materials, both traditional and novel, that may be used for barrels and signature suppressors. Proposed coating / plating materials and application processes shall be compatible with small caliber barrel bores as small as 5.56mm in diameter, and signature suppressors with numerous deep hidden features. Additionally, proposed coatings / plating shall prevent buildup / fouling of carbon as well as gilding metals that are commonly found in gas systems, and suppressors after extended firing. Further, application processes shall take into account the requirements of the coated / plated components in the small arms system – the application processes shall not adversely affect the substrate material in ways that may affect performance, including dimensional changes or effects on material properties, such as strength or fatigue life. Non-line of sight application is required in order to apply the coating or plating to the internal surfaces of the bore and signature suppressor.

Phase I: Given the direct to Phase II nature of this effort, a determination of Phase I equivalency will be made which will require proof that the proposed coating / plating is sufficiently mature to be funded at a Phase II level. Documentation showing prior work coating / plating of small arms systems and/or components or a related field is required. A report detailing the Phase I equivalent efforts should be included. Phase I equivalent effort documentation shall include some or all of the following:

- Baseline or existing coating / plating properties to be used as starting point for this application, including:
o Coating thickness
o Coating hardness
o Coefficient(s) of friction
o Corrosion resistance
o Color ranges
o Operating temperatures and thermal stability
o Adhesion to substrate
o Chemical compatibility
o Application limitations, including internal diameter limitations, Line of sight or Non-Line of sight, substrate compatibility, etc.

• Baseline or existing coating / plating application parameters, including:
  o Application temperature
  o Application time
  o Other relevant application parameters
• Baseline or existing coating / plating performance, including
  o Description of the system and operating environment that the existing coating is applied to
  o Performance metrics and data in that application
• Cost of the baseline or existing coating / plating
• Estimated or predicted properties of the proposed coating / plating, including:
  o Coating thickness
  o Coating hardness
  o Coefficient(s) of friction
  o Corrosion resistance
  o Color ranges
  o Operating temperatures and thermal stability
  o Adhesion to substrate
  o Chemical compatibility
  o Application limitations, including internal diameter limitations, Line of sight or Non-Line of sight, substrate compatibility, etc.
• Predicted application parameters of the proposed coating / plating, including:
  o Application temperature
  o Application time
  o Other relevant application parameters
• Results of all analyses performed to show that the proposed development process will result in coating / plating that will meet the Government’s needs, including
  o Results of modeling and simulation
  o Results of all analyses, including chemical, thermal, and structural analyses
  o Ability of the coating / plating to be applied to the internal bore of the barrel and internal features of a signature suppressor
  o Overall predicted performance in use as a small caliber bore coating or an internal signature suppressor coating
• Estimated cost of proposed coating / plating

The Offeror is encouraged to provide any other relevant information to substantiate that the proposed coating / plating is at an acceptable stage to be funded at the DP2 level.

PHASE II: The primary deliverables for Phase II shall be:
• Development of one or more coating(s) / plating(s) formulations and associated application processes that meet the Government’s requirements. This deliverable includes all necessary documentation to define the formulation as well as the application process.
A comprehensive report that documents the entirety of the effort. The report shall highlight the development process, results of all analyses performed throughout the development process, results of destructive testing (i.e. coating thickness in sectioned barrels and suppressors), and contractor’s test results in lab (coupon testing) as well as simulated operational environment (live fire testing of coated barrels and/or signature suppressors. The report shall highlight and address any shortcomings in performance, propose potential fixes to these shortcomings, and shall address any anticipated challenges with scaling to full rate production. The report shall also provide estimates of the cost to implement the proposed coating / plating in a production setting.

- Quantity of ten (10) coated / plated coupons sized to be used in the Government-owned small caliber Vented Erosion Simulator (VES).
- One or both of the following:
  - Quantity of five (5) small caliber barrels with coated / plated bores (weapon system / caliber to be determined – barrels may be provided as GFM).
  - Quantity of five (5) signature suppressors with internal features coated / plated (specific suppressor to be determined – suppressor may be provided as GFM).

Upon successful completion of the primary deliverables, an Option Period may be exercised. The primary deliverables for the Option Period will be one or more of the following:

- Additional Science and Technology development of coatings to improve performance in extreme operating regimes
- Application of coating / plating to additional quantities of barrels and/or suppressors that represent either challenging performance requirements or challenging application requirements.

PHASE III DUAL USE APPLICATIONS: Virtually all small caliber weapon systems, commercial and military, would benefit from improved barrel systems. There is a large commercial market for small arms, and much money is spent by individuals upgrading barrels and adding suppressors to their personal firearms. An Offeror would likely need to partner with an OEM barrel or suppressor manufacturer and have this technology offered as part of the item itself, since it is unlikely that existing barrels or suppressors would be able to be coated or plated at a reasonable cost to the consumer.

REFERENCES:

1. Xiaolong Li, Yong Zang, Lei Mu, Yong Lian, Qin Qin, 2020, Erosion analysis of machine gun barrel and lifespan prediction under typical shooting conditions, Wear, Volumes 444–445, 203177, ISSN 0043-1648, https://doi.org/10.1016/j.wear.2019.203177

KEYWORDS: Barrel, suppressor, advanced coating, high temperature, bore erosion, small caliber, small arms