

**MISSILE DEFENSE AGENCY (MDA)
SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PROGRAM
STTR 11.A Supplemental Proposal Submission Instructions**

INTRODUCTION

The MDA SBIR/STTR Program is implemented, administrated and managed by the MDA SBIR/STTR Program Management Office (PMO), located within the Advanced Technology (DV) Directorate. Specific questions pertaining to the MDA SBIR/STTR Program should be submitted to:

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If you have any questions regarding the administration of the MDA SBIR/STTR Program please call (256) 955-2020 or e-mail: sbirsttr@mda.mil.

Additional information on the MDA SBIR/STTR Program can be found on the MDA SBIR/STTR home page at <http://www.mdasbir.com/>. Information regarding the MDA mission and programs can be found at <http://www.mda.mil>.

Proposals not conforming to the terms of this Solicitation will not be considered. MDA reserves the right to limit awards under any topic, and only those proposals of superior scientific and technical quality will be funded. Only Government personnel will evaluate proposals.

Questions about SBIR/STTR and Solicitation Topics

For general inquiries or problems with the electronic submission process, contact the DoD Help Desk at 1-866-724-7457 (1-866-SBIRHLP) (8:00 am to 5:00 pm EST). For technical questions about the topic during the pre-solicitation period (27 January 2011 through 27 February 2011), contact the Topic Authors listed under each topic on the <http://www.dodsbir.net> Web site by 27 February 2011. Please Note: During the pre-release period, you may talk directly with the Topic Authors to ask technical questions about the topics. Their names, phone numbers, and e-mail addresses are listed within each solicitation topic. For reasons of competitive fairness, direct communication between proposers and topic authors is not allowed after 27 February 2011. Beginning 28 February, for technical questions you must use the SITIS system www.dodsbir.net/sitis. You may submit written questions about solicitation topics through the [SBIR/STTR Interactive Topic Information System \(SITIS\)](#), in which the questioner and respondent remain anonymous and all questions and answers are posted electronically for general viewing until the solicitation closes. All proposers are advised to monitor SITIS during the solicitation period for questions and answers, and other significant information, relevant to the SBIR/STTR topic under which they are proposing. Further information about SITIS is located in the DoD Solicitation Section 1.5(c)(2).

Federally Funded Research and Development Centers (FFRDCs) and Support Contractors:

Only Government personnel will evaluate proposals. In some circumstances, non-government, technical personnel from the following Federally Funded Research and Development Centers (FFRDCs) and support contractors will provide advisory and assistance services to MDA, including providing technical analyses of proposals submitted against MDA topics and of applications submitted to the MDA Phase II Transition Program.

FFRDCs: The Aerospace Corporation, Massachusetts Institute of Technology Lincoln Laboratory, Oak Ridge National Laboratory.

Universities / Non-Profit Organizations: Draper Laboratory, Institute of Defense Analyses, Johns Hopkins University Applied Physics Laboratory (JHU/APL), Utah State University Space Dynamics Laboratory, Aerospace Corporation, MITRE Corporation, University of Connecticut, Sandia National Laboratory.

Support Contractor Organizations: BAE Systems, The Boeing Company, Booz Allen Hamilton, Cobham Analytic Services (Sparta, Inc), CACI International, Inc., Computer Sciences Corporation (CSC), deciBel Research, Inc., Dynamic Research Corporation, Inc., ERC, Inc., General Dynamics Information Technology, L-3 Communications Corporation, Lockheed Martin, MacAulay Brown, Inc., Millennium Engineering and Integration, Inc., Modern Technology Solutions, Inc., Northrop Grumman, Paradigm Technologies, Photon Research Associates, Inc. (Raytheon), QuinetiQ North America, Radiance Technology, Raytheon Company, Schafer Corporation, Science Applications International Corporation (SAIC), SYColeman Corporation, United International Engineering, Universal Technology Corporation.

Individual support contractors from these organizations will be authorized access to only those portions of the proposal data and discussions that are necessary to enable them to perform their respective duties. These organizations are expressly prohibited from rating proposals or making recommendations for award selection. In accomplishing their duties related to the source selection process, employees of the aforementioned organizations may require access to proprietary information contained in the offerors' proposals.

Pursuant to [FAR 9.505-4](#), the MDA contracts with these support contractors include a clause which requires them to (1) protect the offerors' information from unauthorized use or disclosure for as long as it remains proprietary and (2) refrain from using the information for any purpose other than that for which it was furnished. In addition, MDA requires the employees of those support contractors that provide technical analysis to the SBIR/STTR Program to execute non-disclosure agreements. These agreements will remain on file with the MDA SBIR/STTR PMO.

Conflicts of Interest

You must avoid any actual or potential organizational conflicts of interest (OCI) while participating in any MDA-funded contracts, regardless of whether it was awarded by MDA. You must report to the MDA SBIR/STTR Program Office via e-mail any potential OCI before submitting your proposal or application. The MDA SBIR/STTR Program Office will review and coordinate any possible solutions or mitigation to the potential conflict with the contracting officer. If you do not make a timely and full disclosure and obtain clearance from the contracting officer, MDA may reject your proposal or application, or terminate any awarded contracts for default. See [FAR Subpart 9.5](#) for more information on organizational conflicts of interest.

PHASE I GUIDELINES

MDA intends for the Phase I effort to determine the merit and technical feasibility of the concept. Only UNCLASSIFIED proposals will be entertained. Phase I proposals may be submitted for an amount normally not to exceed \$100,000 and a Phase I Option not to exceed \$50,000.

A list of the topics currently eligible for proposal submission is included in Section 8, below, followed by full topic descriptions. These are the only topics for which proposals will be accepted at this time. The topics originated from the MDA Programs and are directly linked to their core research and development requirements.

Please ensure that your mailing address, e-mail address, and point of contact (Corporate Official) listed in the proposal are current and accurate. MDA cannot be responsible for notification to a company that provides incorrect information or changes such information after proposal submission.

USE OF FOREIGN NATIONALS

A foreign national is any person who is NOT a citizen or national of the United States, a lawful permanent resident, or a protected individual as defined by 8 U.S.C. 1324b(a)(3) – refer to Section 2.15 at the front of this solicitation for definitions of “lawful permanent resident” and “protected individual.”

ALL offerors proposing to use foreign nationals MUST disclose this information regardless of whether the topic is subject to ITAR restrictions. If the offeror proposes to use foreign nationals: Identify the foreign national(s) you expect to be involved on this project as a direct employee, subcontractor or consultant and their country of origin. For these individuals, please specify the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project. You may be asked to provide additional information during negotiations in order to verify the foreign citizen’s eligibility to participate on a contract issued as a result of this solicitation.

Proposals submitted with a foreign national listed will be subject to security review during the contract negotiation process (if selected for award). If the security review disqualifies a foreign national from participating in the proposed work, the contractor may propose a suitable replacement. In the event a proposed foreign person is found ineligible to perform proposed work, the contracting officer will advise the offeror of any disqualifications but may not disclose the underlying rationale.

ITAR RESTRICTIONS

The technology within some MDA topics is restricted under the International Traffic in Arms Regulation (ITAR), which controls the export and import of defense-related material and services. You must ensure that your firm complies with all applicable ITAR provisions. Please refer to the following URL for additional information: <http://www.pmdtc.state.gov/compliance/index.html>.

Proposals submitted to ITAR restricted topics will be subject to security review during the contract negotiation process (if selected for award). In the event a firm is found ineligible to perform proposed work, the contracting officer will advise the offeror of any disqualifications but may not disclose the underlying rationale.

PHASE I PROPOSAL SUBMISSION

The DoD SBIR/STTR Proposal Submission system (available at <http://www.dodsbir.net/submission>) will lead you through the preparation and submission of your proposal. Read the front section of the DoD

solicitation, including Section 3.5, for detailed instructions on proposal format and program requirements. Proposals not conforming to the terms of this solicitation will not be considered.

You must submit the ENTIRE technical proposal, DoD Proposal Cover Sheet, Cost Proposal, and the Company Commercialization Report electronically through the DoD SBIR/STTR Web site at www.dodsbir.net/submission/SignIn.asp. If you have any questions or problems with the electronic proposal submission, contact the DoD SBIR/STTR Helpdesk at 1-866-724-7457. Refer to Section 3.0 of the DoD solicitation for complete instructions and requirements.

MAXIMUM PAGE LIMIT FOR MDA IS 20 PAGES

Only proposals submitted via the Submission Web site on or before the deadline of 6:00 a.m. (EST) on 30 March 2011 will be processed. **Please Note:** The maximum page limit for your technical proposal is twenty (20) pages. Any pages submitted beyond this, will not be evaluated. Your cost proposal and Company Commercialization Report DO NOT count toward your maximum page limit. The proposal coversheets DO count toward your maximum page limit.

PHASE I OPTION MUST BE INCLUDED AS PART OF PHASE I PROPOSAL

MDA is now implementing the use of a Phase I Option that **may be exercised at MDA'S sole discretion** to fund interim Phase I activities while a Phase II proposal is being evaluated and if selected, the contract is being negotiated. Only Phase I efforts invited to propose for a Phase II award through MDA's competitive process will be eligible for MDA to exercise the Phase I Option, if MDA so chooses. The Phase I Option, which **must** be included as part of the Phase I proposal, covers activities over a period of up to six months, if exercised, and should describe appropriate initial Phase II activities that may lead to the successful demonstration of a product or technology. The Phase I Option must be included within the 20-page limit for the Phase I proposal.

A firm-fixed-price Phase I Cost Proposal (\$150,000 maximum, including option) must be submitted in detail online. Proposers that participate in this Solicitation must complete the Phase I Cost Proposal not to exceed the maximum dollar amount of \$100,000 and a Phase I Option Cost Proposal (if applicable) not to exceed the maximum dollar amount of \$50,000. Phase I and Phase I Option costs must be shown separately but may be presented side-by-side on a single Cost Proposal. The Cost Proposal DOES NOT count toward the 20-page Phase I proposal limitation.

PHASE I PROPOSAL SUBMISSION CHECKLIST

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

1. The following have been submitted electronically through the DoD submission site by 6:00 a.m. (EST) 30 March 2011.

_____ a. DoD Proposal Cover Sheet

_____ b. Technical Proposal (**DOES NOT EXCEED 20 PAGES**): *Any pages submitted beyond this will not be evaluated. Your cost proposal and Company Commercialization Report DO NOT count toward your maximum page limit. The proposal coversheets DO count toward your maximum page limit.*

- _____ d. Cooperative R&D: For the purposes of the STTR Program this means research and development conducted jointly by a small business concern and a research institution in which not less than 40% of the work is performed by the small business concern, and not less than 30% of the work is performed by the research institution.
- _____ e. If proposing to use foreign nationals; identify the foreign national(s) you expect to be involved on this project, country of origin, the type of visa or work permit under which they are performing and level of involvement.
- _____ f. DoD Company Commercialization Report (required even if your firm has no prior SBIRs/STTRs).
- _____ g. Cost Proposal (**Online cost proposal form is REQUIRED by MDA**)

_____ **2. The Phase I proposed cost plus option does not exceed \$150,000.**

MDA PROPOSAL EVALUATIONS

MDA will evaluate and select Phase I proposals using scientific review criteria based upon technical merit and other criteria as discussed in this solicitation document. MDA reserves the right to award no, one, or more than one contract under any topic. MDA is not responsible for any money expended by the proposer before award of any contract. Due to limited funding, MDA reserves the right to limit awards under any topic and only proposals considered to be of superior quality will be funded.

MDA will utilize the Phase I Evaluation criteria in Section 4.2 of the DoD solicitation, including potential benefit to the Ballistic Missile Defense System (BMDS) in assessing and selecting for award those proposals offering the best value to the Government.

MDA will use the Phase II Evaluation criteria in Section 4.3 of the DoD solicitation, including potential benefit to BMDS and ability to transition the technology into an identified BMDS, in inviting, assessing and selecting for award those proposals offering the best value to the Government. In the Phase II Evaluations, Criterion C is more important than Criteria A and B, individually. Criteria A and B are of equal importance.

In Phase I and Phase II, firms with a Commercialization Achievement Index (CAI) at or below the 20th percentile will be penalized in accordance with DoD Section 3.5.d.

Please note that potential benefit to the BMDS will be considered throughout all the evaluation criteria and in the best value trade-off analysis. When combined, the stated evaluation criteria are significantly more important than cost or price. Where technical evaluations are essentially equal in merit, cost or price to the government will be considered in determining the successful offeror.

It cannot be assumed that reviewers are acquainted with the firm or key individuals or any referenced experiments. Technical reviewers will base their conclusions on information contained in the proposal and their personal knowledge. Relevant supporting data such as journal articles, literature, including Government publications, etc., should be contained or referenced in the proposal and will count toward the applicable page limit.

Qualified advocacy letters will count towards the proposal page limit and will be evaluated towards criterion C. Advocacy letters are not required for Phase I or Phase II. Consistent with Section 3-209 of DoD 5500.7-R, Joint Ethics Regulation, which as a general rule prohibits endorsement and preferential

treatment of a non-federal entity, product, service or enterprise by DoD or DoD employees in their official capacities, letters from government personnel will NOT be considered during the evaluation process.

A qualified advocacy letter is from a relevant commercial procuring organization(s) working with MDA, articulating their pull for the technology (i.e., what BMDS need the technology supports and why it is important to fund it), and possible commitment to provide additional funding and/or insert the technology in their acquisition/sustainment program. This letter should be included as the last page of your technical upload. Advocacy letters which are mailed, faxed, or e-mailed separately will NOT be considered.

INFORMATION ON PROPOSAL STATUS

The Principal Investigator (PI) and Corporate Official (CO) indicated on the Proposal Coversheet will be notified by e-mail regarding proposal selection or non - selection. If your proposal is tentatively selected to receive an MDA award, the PI and CO will receive a single notification. If your proposal is not selected for an MDA award, the PI and CO may receive up to two messages. The first message will provide notification that your proposal has not been selected for an MDA award and provide information regarding the ability to request a proposal debriefing. The second message will contain debrief status information (if requested), or information regarding the debrief request. **Small Businesses will receive a notification for each proposal submitted. Please read each notification carefully and note the proposal number and topic number referenced.**

IMPORTANT: We anticipate having all the proposals evaluated and our Phase I contract decisions in the June 2011 timeframe. All questions concerning the evaluation and selection process should be directed to the MDA SBIR/STTR PMO.

All communication from the MDA SBIR/STTR PMO will originate from the sbirsttr@mda.mil e-mail address. Please white-list this address in your company's spam filters to ensure timely receipt of communications from our office.

MDA SUBMISSION OF FINAL REPORTS

All final reports will be submitted in accordance with the Contract Data Requirements List (CDRL) of the resulting contract. Refer to Section 5.3 of the DoD Solicitation for additional requirements.

PHASE II GUIDELINES

This Solicitation solicits Phase I proposals. For Phase II, no separate solicitation will be issued and no unsolicited proposals will be accepted. Only those firms that were awarded Phase I contracts may be invited to submit a Phase II proposal. MDA makes no commitments to any offeror for the invitation of a Phase II proposal. Phase II is the prototype/demonstration of the technology that was found feasible in Phase I. Only those successful Phase I efforts that are **invited** to submit a Phase II proposal will be eligible to submit a Phase II proposal. MDA does encourage, but does not require, partnership and outside investment as part of discussions with MDA sponsors for potential Phase II invitation. Invitations to submit a Phase II proposal will be made by the MDA SBIR/STTR PMO.

Please Note: You may only propose up to the total cost for which you are invited. Contract structure for the Phase II contract is at the discretion of the contracting officer after negotiations with the small business.

The MDA SBIR/STTR PMO does not provide “debriefs” for firms who were not invited to submit a Phase II proposal.

PHASE II PROPOSAL SUBMISSION

Phase II Proposal Submission is by Invitation Only: *A Phase II proposal can be submitted only by a Phase I awardee and only in response to an invitation by MDA.* Invitations are generally issued at or near the Phase I contract completion, with the Phase II proposals generally due one month later. In accordance with SBA policy, MDA reserves the right to negotiate mutually acceptable Phase II proposal submission dates with individual Phase I awardees, accomplish proposal reviews expeditiously, and proceed with Phase II awards. If you have been invited to submit a Phase II proposal, please see the MDA SBIR/STTR Web site <http://www.mdasbir.com/> for further instructions.

Classified proposals are not accepted under the DoD SBIR/STTR Program. Follow Phase II proposal instructions described in Section 3.0 of the program solicitation at www.dodsbir.net/solicitation and specific instructions provided in the Phase II invitation. Each Phase II proposal must contain a proposal cover sheet, technical proposal, cost proposal and a Company Commercialization Report submitted through the DoD Electronic Submission Web site at www.dodsbir.net/submission/SignIn.asp **by the deadline specified in the invitation.**

MDA SBIR/STTR PHASE II TRANSITION PROGRAM

Introduction: To encourage transition of SBIR and STTR projects into the BMDS, the MDA’s Phase II Transition Program provides matching SBIR and STTR funds to expand an existing Phase II contract that attracts investment funds from a DoD acquisition program, a non-SBIR/non-STTR government program or private sector investments. The Phase II Transition Program allows for an existing Phase II SBIR or STTR contract to be extended for up to one year per Phase II Transition application, to perform additional research and development. Phase II Transition matching funds will be provided on a one-for-one basis up to a maximum amount of \$500,000 of SBIR or STTR funds in accordance with DoD Phase II Enhancement policy at Section 4.6 of the DoD Solicitation. Phase II Transition funding can only be applied to an active DoD Phase II SBIR or STTR contract.

The funds provided by the DoD acquisition program or a non-SBIR/non-STTR government program may be obligated on the Phase II contract as a modification prior to or concurrent with the modification adding MDA SBIR or STTR funds, OR may be obligated under a separate contract. Private sector funds must be from an “outside investor” which may include such entities as another company or an investor. It does not include the owners or family members, or affiliates of the small business (13 CFR 121.103).

Background: It is important that all technology development programs in MDA map to a BMDS improvement and, after a period of development and maturity, are transitionable to targeted BMDS end users. End user is defined as the element, component or product manager to which it is intended to transition the technology. Because of this, it is important that your Phase II contract be at or approaching a Technology Readiness Level of either 5 or 6.

Current guidance and instructions may be found at <http://www.mdasbir.com>.

2011.A KEY DATES (PROJECTION)

MDA SBIR/STTR Industry Day	May 17-19, 2011 *
Solicitation Pre-release	January 27 – February 27, 2011
Solicitation Opens	February 28 – March 30, 2011
Phase I Evaluations	April – June 2011 *
Phase I Selections	June 2011 *
Letters Distributed	June 2011 *
Contract Award Goal	August 2011 *

*This information is listed for GENERAL REFERENCE ONLY at the time of publication of this solicitation. This date is subject to update/change.

MDA STTR 11.A Topic Index

MDA11-T001	Develop Accelerated High Power RF MEMs Switch and Phase Shifter Reliability Test Methodologies
MDA11-T002	Defect Reduction Techniques for Large Format Infrared Detector Materials

MDA STTR 11.A Topic Descriptions

MDA11-T001 TITLE: Develop Accelerated High Power RF MEMs Switch and Phase Shifter Reliability Test Methodologies

TECHNOLOGY AREAS: Sensors, Electronics

ACQUISITION PROGRAM: MDA/SNI

OBJECTIVE: This topic seeks to identify and develop high-power Radio Frequency Micro Electro-Mechanical Systems (RF-MEMS) accelerated reliability test methodologies to reduce technology acceptance time for switched phase shifters that utilize capacitive or contact RF MEMS switches. Currently, life testing conducted on RF MEMS switching devices requires significant time and cost due to a lack of physics-based test acceleration methodology. Identification of acceleration protocols, beyond currently conducted real-time life testing approaches, is required to shorten the test time required and accelerate acceptance of these technologies by government programs. The development of an acceptable physics-based model and accelerated test methodology would significantly reduce the cost and time required for system qualification and insertion of high-power RF-MEMS switches and phase shifters for Radar/Electronics Warfare (EW) phased array applications.

DESCRIPTION: High power radar and EW modules are required for Electronically Scanned Arrays (ESAs) to provide significant system performance improvements. These modules, from a system perspective, are a major portion of the system cost and they provide thermal and reliability challenges to designers and manufacturers that must be overcome to provide effective ESA solutions. RF MEMS switches and phase shifters have been under development to provide phase control in some ESA architectures. These devices offer the potential of low insertion loss, ultra-linear performance and very low operating power. The qualification and adoption of these technologies by programs requires demonstrated reliability, however current real-time testing is costly because it requires significant time to cycle the RF MEMS switches and phase shifters. R&D efforts are required to identify acceleration mechanisms that allow prediction of device lifetime by means of short-term testing. The goal of this program is to perform the research and development needed to establish RF MEMS device accelerated reliability test methodologies applicable to X-Band (8-12 GHz) MEMS devices with output power levels of up to 5W peak, 2W average.

PHASE I: Identify, model and demonstrate innovative material, design, process and testing methods that lead to accelerated high-power RF MEMS reliability testing. This should include physics-based models, equipment improvements, and test procedure standardization/improvement based on experimental results on capacitive or contact RF MEMS switches that lead to at least a 5X test time reduction over current real-time life test methodologies.

PHASE II: Develop and demonstrate a prototype lifetime test methodology for high power RF MEMS switches and phase shifters capable of X-band operation at power levels up to 5W peak, and 2W average that has the test time reduction developed in Phase I. The prototype procedures developed should have dual use/commercial application.

PHASE III: Deliver a prototype test station to the government after conducting validation testing of the lifetime of RF MEMS devices having the performance identified in this topic. Transition the test methodologies developed in Phase II to support an MDA system insertion.

DUAL USE/COMMERCIALIZATION POTENTIAL: RF MEMS switches and phase shifters are being developed for commercial and military applications, these components are enabling higher performance ESA for EW and Radar, and they would find numerous applications in military systems as well as commercial systems, for example, transportation radar systems.

REFERENCES:

1. H. S. Newman, J. L. Ebel, D. Judy, and J. Maciel, "Lifetime Measurements on a High-Reliability RF-MEMS Contact Switch," IEEE Microwave and Wireless Components Letters, Vol. 18, No. 2, 2008.

2. X. Yuan, Z. Peng, J. C. M. Hwang, D. Forehand, and Charles L. Goldsmith, "Acceleration of Dielectric Charging in RF MEMS Capacitive Switches," IEEE Transactions on Device and Materials Reliability, Vol. 6, No. 4, 2006.
3. J. Teti, and F. Darreff, "MEMS 2-bit Phase-Shifter Failure Mode and Reliability Considerations for Large X-Band Arrays," IEEE Trans. Microwave Theory and Tech., Vol. 52, No. 2, pp. 693-701, 2004.

KEYWORDS: RF-MEMS, phase shifters, phased-array radar, switches, accelerated life test, reliability

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MDA11-T002 TITLE: Defect Reduction Techniques for Large Format Infrared Detector Materials

TECHNOLOGY AREAS: Materials/Processes, Sensors, Space Platforms

OBJECTIVE: The overall objective of this effort is to develop innovative solutions to significantly decrease the defect and dislocation sizes and densities in large format ($>25 \text{ cm}^2$) II-VI compound semiconductor infrared detector materials. Emphasis shall be given to detectors operating in the short through mid-long wavelength regime (~ 10 micron cut-off).

DESCRIPTION: The Missile Defense Agency (MDA) is interested in technology developments in support of advanced space sensor systems. Space-based sensors operate in low background environments where the minimization of noise is paramount to mission operation. Sensor bands from the short through mid-long wavelength infrared (IR) wavelengths are of interest. Large format infrared focal plane arrays based on mercury cadmium telluride (MCT) have been demonstrated at $>25 \text{ cm}^2$ with acceptably low levels of defects and dislocations when grown on lattice-matched cadmium zinc telluride (CZT). However, MCT grown on less costly, alternative substrates such as Si exhibit significantly higher numbers of dislocations and defects, despite the use of multiple buffer layers. Dislocations and defects in infrared detector materials are manifested as noise, defective pixels, and current leakage, limiting the FPA operability characteristics. They also propagate with thermal cycling, limiting the service lifetimes of infrared focal plane arrays. These defects and dislocations are highly influenced by non-optimal surface interfaces, with contributing factors such as lattice mismatch, surface roughness, coefficient of thermal expansion mismatch, and the presence of an oxide layer. The Ballistic Missile Defense System (BMDS) requires reliable, high performance, high sensitivity and low noise space-based sensors which are affordable and producible. Atomic hydrogen passivation of substrates prior to epitaxial growth, and/or detector and cap layers prior to passivation may be a viable solution for reducing defects. Innovative methods such as, but not limited to atomic hydrogen etching, are being sought to affordably reduce dislocations and defects in IR detector materials.

An offeror may submit multiple proposals with unique approaches.

PHASE I: Identify and investigate unique process designs and/or production process changes or additions suitable for IR detector fabrication that will result in a significant reduction in defect and dislocation size and densities, while retaining or enhancing performance and operational lifetimes. Hydrogenation of interfaces has been proposed as a potential concept; other approaches are encouraged. Theoretical and experimental proof-of-concept, including stability of the process during processing and thermal cycling shall be demonstrated and documented. A deliverable detector (discrete or array) or design available to the government for additional characterization is highly desirable. Offerors are strongly encouraged to work with infrared component contractors to help ensure applicability of their efforts and begin work towards technology transition, either by license or service.

PHASE II: Using the resulting process, techniques, and/or process changes or additions developed in Phase I, verify and optimize these changes in a prototype fashion, on or off a product line to demonstrate the feasibility and efficacy of the technique. The contractor should keep in mind the goal of commercialization of this innovation for the Phase III effort, to which end they should have working relationships with, and support from, infrared component contractors.

PHASE III: Either solely, or in partnership with a suitable production foundry, implement, test and verify in full scale the Phase II demonstration item as an economically viable production technique. Demonstration would include, but not be limited to, demonstration in a real product line with the resulting IR detector / focal plane array testable in a system level test-bed against system performance criteria. This demonstration should show near-term application to BMDS systems, subsystems, or components.

DUAL USE/COMMERCIALIZATION POTENTIAL: Innovations developed under this topic will benefit both DoD and commercial space, airborne, and terrestrial programs. Possible uses for these products and techniques include surveillance, astronomy, mapping, weather monitoring, and earth resource monitoring. Enhancements to imaging quality and higher product yields show significant potential for increased applications.

REFERENCES:

1. K.S. Ziemer, C.D. Stinespring, L.S. Hirsch, and T.H. Myers, "Characterization of Atomic Hydrogen-Etched HgCdTe Surfaces", Journal of Crystal Growth, Vol. 191, pp. 594-598, 1998.
2. L.S.Hirsch, K.S. Ziemer, M.R. Richards-Babb, C.D. Stinespring, T.H. Myers, and T. Colin, "The Use of Atomic Hydrogen for Low Temperature Oxide Removal from HgCdTe", Journal of Electronic Materials, Vol. 27, No. 6, pp. 651-656, 1998.
3. L.S.Hirsch, Zhonghai Yu, S.L. Buczkowski, and T.H. Myers, "The Use of Atomic Hydrogen for Substrate Cleaning for Subsequent Growth of II-VI Semiconductors", Journal of Electronic Materials, Vol. 26, No. 6, pp. 534-541, 1997.

KEYWORDS: infrared detector, defect, dislocation

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