

DMEA

SBIR 12.2 PROPOSAL SUBMISSION INSTRUCTIONS

INTRODUCTION

The Defense Microelectronics Activity (DMEA) SBIR Program is implemented, administrated, and managed by the DMEA Program Control Division. If you have any questions regarding the administration of the DMEA SBIR Program, please contact the DMEA SBIR Program Manager (PM), Mr. Kevin Rankin, kevin.rankin@dmea.osd.mil.

For general inquiries or problems with electronic submission, contact the DoD SBIR Help Desk at 1-866-724-7457 (1-866-SBIRHLP) between 8:00 am to 5:00 pm ET. For questions about the topic during the pre-solicitation period (24 April 2012 through 23 May 2012) contact the Topic Authors listed under each topic on the <http://www.dodsbir.net> Web site prior to the solicitation. 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 \$150,000.

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 assure 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 front section of this solicitation 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. DMEA accepts Phase I proposals not exceeding \$150,000. The technical period of performance for the Phase I should be no more than 6 months. DMEA will evaluate and select Phase I proposals using the evaluation criteria contained in para 4.2 of the DoD Solicitation 12.2 preface. 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.

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 3.5.b(7) of the program solicitation.

It is mandatory that the ENTIRE Technical Proposal, DoD Proposal Cover Sheet, Cost Proposal, and the Company Commercialization Report are submitted electronically through the DoD SBIR Web site at <http://www.dodsbir.net/submission>. If you have any questions or problems with the electronic proposal submission contact the DoD SBIR Helpdesk at 1-866-724-7457.

This COMPLETE electronic proposal submission includes the submission of the Cover Sheets, Cost Proposal, Company Commercialization Report, the ENTIRE Technical Proposal and any appendices via the DoD Submission site. The DoD proposal submission site <http://www.dodsbir.net/submission> will lead

you through the process for submitting your technical proposal and all of the section electronically. Each of these documents is submitted separately through the Web site. Your proposal submission must be submitted via the submission site on or before the 6:00 am deadline on 27 June 2012. Proposal submissions received after the closing date and time will not be considered.

PHASE II GUIDELINES

DMEA 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. 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 \$1,000,000. Fast Track will be for \$1,000,000 maximum, unless specified by the DMEA SBIR PM.

PHASE II PROPOSAL SUBMISSION

All Phase II proposals must have a complete electronic submission. Complete electronic submission includes the submission of cover sheets, cost proposal, company commercialization report, the entire technical proposal, and any appendices via the DoD submission site (<http://www.dodsbir.net/submission>). The DoD proposal submission site 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 Web site. Your proposal must be submitted via the submission site on or before the DMEA-specified deadline or it will not be considered.

DMEA will evaluate Phase II proposals based on the Phase II evaluation criteria listed in paragraph 4.3 of the solicitation preface.

COST PROPOSAL GUIDELINES

The on-line cost proposal 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 i below) on how funds will be used if the contract is awarded. Include the itemized cost proposal information (a through i below) as an appendix in your technical proposal. The itemized cost proposal information (a through i below) will not count against the 25-page limit.

- 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 teased 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. Direct / Indirect Rates: If a recent Defense Contract Audit Agency (DCAA) audit has been done, provide a copy and / or point of contact for the DCAA.
- f. 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.
- g. 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.
- h. 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.

NOTE: The Small Business Administration has issued the following guidance:

“Agencies participating in the SBIR Program will not issue SBIR contracts to small business firms that include provisions for subcontracting any portion of that contract award back to the originating agency or any other Federal Government agency.” See Section 2.6 of the DoD program solicitation as well as the DoD preface reference 3.5(b)(9) for more details. This mandate, however, may be waived by the SBA, as detailed in 3.5(b)(9).

Support subcontract costs with copies of the subcontract agreements. The supporting agreement documents must adequately describe the work to be performed (i.e., cost proposal). At the very least, a statement of work with a corresponding detailed cost proposal for each planned subcontract must be provided.

- i. 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 FAST TRACK DATES AND REQUIREMENTS

The complete Fast Track application must be received by DMEA 120 days from the Phase I award start date. The Phase II proposal must be submitted within 180 days of the Phase I award start date. Any Fast Track applications or proposals not meeting these dates may be declined. All Fast Track applications and required information must have a complete electronic submission. The DoD proposal submission site <http://www.dodsbir.net/submission> will lead you through the process of submitting your technical proposal and all of the sections electronically. Each of these documents is submitted separately through the Web site. Your proposal must be submitted via the submission site on or before the DMEA-specified deadline or will not be considered.

The information required by DMEA is the same as the information required under the DoD Fast Track described in the front part of this solicitation. Phase I interim funding is not guaranteed. If awarded, it is expected that interim funding will generally not exceed \$30,000. Selection and award of a Fast Track proposal is not mandated and DMEA retains the discretion not to select or fund any Fast Track proposal.

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 \$500,000 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.

PHASE I PROPOSAL SUBMISSION CHECKLIST:

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

____1. Your Technical Proposal, the DoD Cover Sheet, the DoD Company Commercialization Report (required even if your firm has no prior SBIRs), and the Cost Proposal have been submitted electronically through the DoD submission site by 6:00 am ET on 27 June 2012.

____2. The Phase I proposal does not exceed \$150,000.

DMEA SBIR 12.2 Topic Index

DMEA-122-001 High Speed, High Resolution X-ray System for Inspecting Integrated Circuits

DMEA SBIR 12.2 Topic Descriptions

DMEA-122-001 TITLE: High Speed, High Resolution X-ray System for Inspecting Integrated Circuits

TECHNOLOGY AREAS: Sensors, Electronics

OBJECTIVE: Develop an affordable x-ray microscope system for use in performing integrated circuit (IC) reverse engineering.

DESCRIPTION: X-ray microscopy using a synchrotron as the x-ray source has been demonstrated to be an extremely valuable tool in the performance of high throughput integrated circuit evaluation and reverse engineering efforts. However, synchrotron x-ray sources are prohibitively expensive (approximately \$1B) for commercial and government applications. While affordable non-synchrotron sources have also been successfully demonstrated, the evaluation time using these systems is unacceptably slow (approximately 1- year). Prior metrics indicate the ability to image several thousand gates using non-synchrotron sources, but that this would take close to a year to accomplish. An x-ray microscopy system that is affordable (less than \$2M) and has acceptable throughput (less than 40 hours per image) is required for timely integrated circuit evaluation and reverse engineering efforts.

PHASE I: Perform a study to evaluate the feasibility of constructing an x-ray microscope system that is capable of generating x-ray images in sufficient detail to allow the identification of all of the individual interconnects and gates within a 1mm X 1mm, 100 nm nine-layer metal integrated circuit using a stand-alone non-synchrotron x-ray source. Demonstrate, through analysis, that the time required to collect such images will be less than 40 hours and that the resolution of the microscope will be better than 100nm.

PHASE II: Develop and demonstrate a prototype x-ray microscope system that is capable of generating x-ray images in sufficient detail to allow the identification of individual interconnects and gates within a 1mm two-layer metal integrated circuit using a stand-alone non-synchrotron x-ray source. The time required to image all layers of an IC must not exceed 40 hours.

PHASE III: Optimize the design of the prototype microscope system in Phase II and demonstrate the system's ability to meet throughput (40 hours) and resolution (100 nm) metrics in Phase I.

POTENTIAL DUAL USE APPLICATIONS: This technology, when proven, will allow for the development of low cost x-ray systems usable for the detailed inspection of gates and interconnects within integrated circuits. At the present time, these inspections can only be performed with the use of an extremely expensive synchrotron x-ray source.

REFERENCES:

1. Dong Woo Chang, Bora Kim, Jae Hoon Shin, Young Min Yun, Jung Ho Je, Yeu Kuang Hwu, Jung Hee Yoon, Ye Kyung Seong, Real time observation of mouse fetal skeleton using a high resolution X-ray synchrotron, J. Vet. Sci (2011), 12(2) 107-113
2. L.A. Bakaleynikov, E.Yu. Flegontova, E. Zolotoyabko, Combined X-ray-electron imaging techniques: Limitations on lateral resolution, Journal of Electron Spectroscopy and Related Phenomena 151 (2005) 97-104
3. S. Gunther, B. Kaulich, L. Gregoratti, M. Kiskinova, Photoelectron Microscopy and Application in Surface and Materials Science, Progress in Surface Science & (2002) 187-260
4. Akihisa Takeuchi, Kentaro Uesugi, Hidekazu Takano, and Yoshio Suzuki, Submicrometer three-dimensional imaging with hard x-ray imaging microtomography, Rev. Sci. Instrum. Volume 73 Number 12 (2002) 4246-4249

KEYWORDS: Photoemission, x-ray microscopy