

Request for Information (RFI)

13-RFI-0001

Lightweight and Modern Metals Manufacturing Innovation (LM3I)

Proposed Institute

1. Disclaimer

This announcement constitutes a Request for Information (RFI) for the purpose of determining market capability of sources or obtaining information. It does not constitute a Request for Proposals (RFP), a Request for Quote (RFQ), or an indication that the Government will contract for any of the items and/or services discussed in this notice. Any formal solicitation that may subsequently be issued will be announced separately through Grants.gov and/or Federal Business Opportunities (FedBizOpps). Information on the specific topics of interest is provided in the following sections of this announcement. Neither ONR nor any other part of the federal government will be responsible for any cost incurred by responders in furnishing this information.

2. Background and General Intent

The President has launched a major, new initiative focused on strengthening the innovation, performance, competitiveness, and job-creating power of U.S. manufacturing called the National Network for Manufacturing Innovation (NNMI). Key design tenets for the NNMI are captured within *National Network for Manufacturing Innovation: A Preliminary Design*, a report issued by the White House National Science and Technology Council on January 16, 2013.ⁱ In support of this initiative, the Department of Defense established the National Additive Manufacturing Innovation Institute (NAMII) that utilizes a multi-agency, “whole of Government,” approach to serve as a national model for innovation and technology advancement. Based upon the success of the pilot institute, the President has challenged the Federal Agencies to develop concepts for three new centers in Fiscal Years (FY) 13-14 to develop and scale critical technologies to manufacturing readiness levels (MRL) 4-7. This RFI relates to one of the proposed new centers: the Lightweight and Modern Metals Manufacturing Innovation (LM3I) Institute. ONR is issuing this RFI in collaboration with the OSD Deputy Assistant Secretary of Defense, Manufacturing and Industrial Base Policy (MIBP).

Advancing a systems-level approach to the design and manufacturing of lightweight components and structures is of great importance to the Department of Defense (DoD), Department of Energy (DoE), and other government agencies, because of their role in achieving enhanced system performance, greater energy efficiency, and lower life-cycle cost. It is also a priority of the Administration’s Materials Genome Initiative, which the President announced on June 24, 2011. The government has made significant investments to reduce the cost of lightweight metals, intended for demanding critical applications. The cost of necessary scale-up and certification requirements, however, hinder the implementation of those materials. These critical applications

have stringent requirements for reliability, which in turn place demands on the ability to control carefully the production of the materials to enable optimized, predictable material performance. Consequently, the design of new alloy systems requires years of expensive investments. These strict reliability requirements, coupled with a hyper-competitive global marketplace for metals, drove U.S. industry to choose production efficiency over expansion into new applications and markets. Until recently, this has resulted in a significant reduction in new alloy development and applications, particularly in lightweight metals. New structural alloys face tremendous barriers to application driven largely by a lack of design guides and certifications as well as cost and scale-up challenges. To accelerate time to market and leverage fully these new lightweight and novel metals, an **integrated approach** is required which includes systems engineering coupled with design of materials and advanced manufacturing.

Integrated Computational Materials Engineering (ICME) is the integration of materials information, captured in computational tools, with engineering product performance analysis and manufacturing-process simulation. Employing this powerful emergent field, many groups have demonstrated the possibility of halving the overall time and cost needed to design new alloys and their processing and manufacturing into commercially viable components and systems. The recent successes and future paths for exploitation are discussed in the National Research Council report entitled *Integrated Computational Materials Engineering: A Transformational Discipline for Improved Competitiveness and National Security*.ⁱⁱ The design and manufacturing of lightweight systems, however, is not a mere matter of substituting a new lightweight material. The design of the material, and the design of the associated manufacturing processes for targeted components, must be an integral element of the system design and development process. For a detailed discussion related to military applications, see the report of the National Research Council entitled *Application of Lightweighting Technology to Military Vehicles, Vessels, and Aircraft*.ⁱⁱⁱ By integrating the emerging capabilities in materials design, and in process design, with the design of new lightweight components and products, the speed at which products enter the marketplace can be increased, at competitive price points, and drive global competitiveness. The intent of the proposed LM3I Institute is to bring together materials designers, materials suppliers, product designers, and manufacturers to collaborate on the design, production and commercialization of affordable, manufacturable, lightweight systems. The scope of metals manufacturing considerations may include metal reduction technologies; through casting, forming, and system assembly operations; end-of-life recycling and recovery by implementing the fundamental precepts of an ICME process.

The focus of the LM3I Institute will be on the integrated design and manufacturing of lightweight components and structures for commercial and defense applications, and the verification of those designs through pilot production and validation through experimental testing. The LM3I Institute will work in collaboration with industry, academia, and government in four key areas:

1. Rapidly maturing and demonstrating production scale-up of existing, innovative, lightweight alloys;
2. Shortening the time necessary to design, integrate, and evaluate novel, affordable, metals, including lightweight alloys and third generation steels into new products;

3. Develop more affordable, competitive, automated manufacturing processes relevant to lightweight and modern metals; and
4. Develop the tools, skills and knowledge base within the materials design and manufacturing workforce to use an ICME infrastructure efficiently and effectively.

The long-term goals are to create market expansion and new consumers of lightweight products, along with partnerships with automotive, aerospace, energy, defense and recreational equipment industries that enable maturation and scale-up of modern metals to maintain global cost competitiveness for U.S. industries, and technological leadership for National Security. To that end, all technological approaches offered must envisage a credible path to market. In the following section, the ONR requests concepts that would enable partnerships to develop new products and processes matured to MRL 4-7 that can impact commercial production.

3. Specific Information of Interest

Should a solicitation be released at a later date, the ONR plans a special competition limited to U.S. nonprofit organizations and Universities. However, the lead nonprofit organization would have to leverage an industry-wide technology base and be expected to partner with the full range of national, state and, local stakeholders such as industry, institutions of higher education, government research organizations, career and technical institutions, professional and industry associations, other nonprofits, unions, etc. Any resulting award for the LM3I Institute is anticipated to be a Cooperative Agreement, with cost sharing from nonfederal sources desired to match federal funding. Responses to this RFI should include the type of organization of the responder, e.g. whether the organization is a nonprofit, small business, large business, etc. For organizations identifying themselves as small business, the size standard used should be 500 employees. The NAICS code for this potential effort is 541712 — Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology).

At this time, the ONR requests information from industry, academia, and nonprofit organizations associated with the assumptions and plans for the proposed LM3I Institute. The ONR requests strongly information that:

- Defines clearly the role(s) the Institute can provide in assisting to identify, define, and mature the alloys, products, and manufacturing technologies necessary to improve performance in sectors of the economy to include commercial and military ground, sea, and air vehicles, as well as power and energy;
- Identifies current technical and business limitations in the area of lightweight metal alloys, corresponding primary and alternative manufacturing processes for making them affordable and available in the marketplace, and models for addressing these limitations;
- Recommends specific technology foci that the Institute could pursue and would support commercialization;
- Describes how the Institute and its partners can leverage effectively technical infrastructure, expertise and workforce – to include privately-held facilities, government-

owned user facilities, and the products of other research, development, and demonstration (RD&D) activities – to support the mission of the Institute;

- Presents specific programs for workforce training, retraining and development that incorporate the existing K-12, community college, and university infrastructure to enhance their role in strengthening the domestic manufacturing economy;
- Explains possible funding and service models for self sustainment beyond the initial federal funding period and relevant assumptions or conditions; and
- Includes general comments and observations about the various models for public-private partnerships, and the management, organization and governance of these entities.

Consistent with the NNMI Preliminary Design, the Government envisions that the Institute will address the following elements. Additional information and comments on the Institute as outlined below are encouraged.

3.1 Institute Management

The Government envisions the LM3I Institute as a public/private partnership for the development and commercialization of new technologies. The role of this Institute is to bring government, industry, and academia together in an environment where joint development and commercialization of alloys, processes, and products can occur. The Institute will be responsible for attracting industry investment to match government-funded investments. The Institute will have substantial autonomy from its partner organizations and institutions, and the ONR envisions that the Institute will have an independent Board of Directors with strong industry representation. The Government seeks a creative model for public/private partnerships that goes beyond what has existed previously. The ONR plans to award the LM3I Institute as a Cooperative Agreement to a nonprofit organization. The Government will have a well-defined role that includes oversight and stewardship of public funds committed to the Institute, as well as providing advice on overall Institute objectives and providing appropriate supervisory and policy guidelines.

The Institute's management and partners will have the responsibility of developing new research, development, and design activities; attracting new industrial partners; actively engaging with subject matter and educational experts; developing a strong Intellectual Property Management Plan; establishing programs and facilitating easy access for educational and workforce development activities; and obtaining industrial support (direct or in-kind) for the activities of the Institute. The Government's intent is for the Institute to be self-supporting financially within five years.

3.2 Technical Focus

The Institute will be responsible for a facility — or a coherent, coordinated collection of distributed facilities — where collaborative research, development, design, prototyping, pilot manufacturing, and workforce development can take place. The ONR envisions funding the Institute through a series of focused projects, specified as tasks to the Cooperative Agreement that will utilize these facilities and support additional RD&D efforts related to the Institute mission. Leveraging existing technical resources, educational and workforce development programs, and other federal investments to complement and support the Institute mission are encouraged.

3.3 Technology Transition

Research and design problems that the DoD has interest in scaling to MRL 4-7 include, but are not limited to, the design of low-cost titanium components and assemblies for small boats and riverine craft; low-cost armor and chassis structures for ground vehicles; lightweight, high reliability propulsion and drive trains for ground vehicles; and lightweight weapons systems. The DoD anticipates that the DoE shares interests in the areas of lightweight vehicle structures using advanced high-strength steels; applications utilizing advanced alloys (aluminum- and magnesium-based alloys and processing) and novel materials architectures (metallic foams, cellular structures, etc) that reduce system weight; and materials for lightweight high-efficiency engines. Other potential areas include lightweight components for such diverse applications as wind turbines, and rail transport systems. The DoD also envisions that other government agencies will have similar research and design problems of interest for the LM3I Institute.

These research and design problems present practical objectives that can lead to new products for market expansion. They also allow engineers and researchers to address the core technology challenges associated with lightweight design in an integrated manner, developing and using the best practice of ICME. The ONR has identified tentatively four of these core materials and manufacturing technology areas of interest for the LM3I Institute. These are: (1) new/novel alloys; (2), primary metal manufacturing processes; (3) secondary manufacturing processes; and (4) development of products exploiting lightweight metals. The ONR recognizes that a critical component of transition includes education and workforce development. Further, the ONR acknowledges that this list is not inclusive, and that another categorization of the core technologies may offer superior utility.

RFI responses should identify and address how an organization can pursue all of these areas in an integrated manner as part of an LM3I Institute's operations.

4. Submission Instructions and Formatting Requirements

Responses to this RFI should be provided to the technical point of contact identified below by 5:00 PM Eastern Time **June 3, 2013**. Any response received after this date will also be considered but may not be included in initial reporting or assessments.

The responses should be eight pages or less with a maximum file size of 10MB. Offerors should provide the RFI responses in either Microsoft Word versions 2000-2007 (.doc or .docx) or Adobe Acrobat versions 6-8 (.pdf) formats — note that ONR prefers the Adobe Acrobat format. All RFI responses must be unclassified. ONR also requests responses not include proprietary information; however any marked proprietary will be handled accordingly. Respondents may make hyperlink references to any prior related work efforts, but must remain aware that any linked information external to the RFI response may not be accessed or read. In addition, the response should include a cover sheet that includes the following:

- RFI number and name;
- Company/organization name and address; and

- Technical point of contact, title, phone number, and email address.

Please name the file LM3I_RFI_*orgname*.doc (or .docx) or LM3I_RFI_*orgname*.pdf, where *orgname* is replaced to provide a unique identifier for the submission. ONR requests that RFI responses be submitted electronically to the email address below. The subject line of the email should read as follows “RFI Response to LM3I - Proposed Institute”. Respondents may submit a paper (or hard-copy) submission to the address below; however, they must remain aware that such a submission may not reach the evaluators in time for action. The Office will not return any responses to this RFI, and is under no obligation to acknowledge receipt of the information received. Questions concerning this announcement shall be submitted in writing via email to the email address below.

5. Questions and Point of Contact

Questions of a technical nature regarding this RFI may be sent to the following Technical Point of Contact:

Name: Dr. William M. Mullins
Title: Program Officer
Office of Naval Research
Division Code: 332
Address: 875 N. Randolph Street, Arlington, VA. 22203
Email Address: william.m.mullins@navy.mil

ⁱ http://www.manufacturing.gov/docs/NNMI_prelim_design.pdf

ⁱⁱ <http://www.nap.edu/catalog/12199.html>

ⁱⁱⁱ http://www.nap.edu/catalog.php?record_id=13277