NSF Future Manufacturing Webinar (NSF 23-550)

February 10, 2023

Bill Olbricht ENG/CBET

Andy Wells ENG/CMMI

Funding opportunity page: https://beta.nsf.gov/funding/opportunities/future-manufacturing-fm

Proposals due April 19, 2023

Why Future Manufacturing?

- National Strategy: support fundamental research to enable sustainable new manufacturing technologies & education to grow production & employment in America's manufacturing sector
- CHIPS & Science: supports microelectronics manufacturing, additive, AI/ML, and more
- Executive Order: Biomanufacturing processes, equity, infrastructure

NATIONAL STRATEGY FOR ADVANCED MANUFACTURING

A Report by the
SUBCOMMITTEE ON ADVANCED MANUFACTURING
COMMITTEE ON TECHNOLOGY
of the
NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

October 2022

THE WHITE HOUSE

SEPTEMBER 12, 2022

Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy

Public Law 117–167
117th Congress

An Act

Making appropriations for Legislative Branch for the fiscal year ending September 30, 2022, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. TABLE OF CONTENTS.

The table of contents for this Act is as follows:

Sec. 1. Table of contents.
Sec. 2. References.

DIVISION A—CHIPS ACT OF 2022

Future Manufacturing will involve new:

- Materials, chemicals, semiconductor & quantum devices and integrated systems
- Chemical and biological processes & integration
- Semiconductor manufacturing techniques
- Integration of systems & synthetic biology & bioprocessing
- Supply chains
- Process design and control
- Sensing & modeling
- Data mining and predictive analytics
- Modalities of work & human factors

Results will help:

- Enhance U.S. manufacturing leadership
- Expand job opportunities for a diverse STEM workforce
- Minimize environmental impact
- Address social challenges
- Speed the product evolution cycle

Future Manufacturing awards support:

- Fundamental **research** *and*
- **Education** of a future workforce to
- Catalyze **new** manufacturing approaches which
- Eliminate scientific technological, educational, economic, and social **barriers** that limit current manufacturing

Expected results

- When realized in practice, results should lead to:
  - Formation of new industries and organization structures
  - New manufacturing capabilities among a broad range of producers
  - Enhanced U.S. competitiveness in development and production
  - Economic growth
  - Education of a diverse range of students and other workforce participants with the skills required for leadership in Future Manufacturing
  - Strengthened connections between employers and educational organizations

Future Manufacturing distinctions from other programs

- **New** transformative capabilities
  - Significant change from current practice
- Not improvements or incremental changes to existing processes
  - Complementary to Advanced Manufacturing
- Very low Technical Readiness Level https://www.nasa.gov/pdf/458490main_TRL_Definitions.pdf
- **Larger-scale** programs
  - intellectual merit and broader impacts commensurate with the size of the award
- **Multidisciplinary** teams and a **convergence** research approach

NSF participants in this solicitation

- Directorate for Engineering
- Directorate for Mathematical and Physical Sciences
- Directorate for Biological Sciences
- Directorate for STEM Education
- Directorate for Computer and Information Science and Engineering
- Directorate for Social, Behavioral and Economic Sciences
- Directorate for Technology, Innovation and Partnerships
- Office of International Science and Engineering
- Office of Integrative Activities

Research must be in ≥1 of these 3 thrust areas

- Cyber Manufacturing
  - Intersection of computing, networking, sensing, AI & manufacturing
- Eco Manufacturing
  - Holistic manufacturing processes/lifecycles
- Biomanufacturing
  - Biologically-based production and bio-based technologies

Award tracks

- **Research Grant** (FMRG): Fundamental, multidisciplinary, and integrative research and education
  - 4 years, $750k/yr
  - Larger teams doing convergence research
- **Seed Grant** (FMSG): Teambuilding, concept development, and research initiation
  - 2 years, $250k/yr
  - Possibly leading to future FMRG proposals

- Title must contain track and *primary* thrust name, e.g., FMSG: Bio:
- A person may be PI/co-PI/Sr Personnel on only one proposal per track
  - Check that your co-PIs/subawardees aren't participating in another proposal

Convergence research

- Interdisciplinary teams commensurate with the scope of the proposed research, education plan, and budget
- Effective collaboration among all participants
- We encourage proposals that include evidence of significant participation from:
  - minority-serving institutions
  - primarily undergraduate institutions
  - non-R1 universities
  - community colleges
  - institutions from EPSCoR states
  - individuals with expertise in improving diversity and inclusion

We encourage you to make the most of other institutions, activities, and resources

- Lead by/Partnering with:
  - Minority-Serving Institutions
  - Primarily Undergraduate Institutions
  - Community Colleges/2-yr institutions
  - Institutions in EPSCoR states/territories
- Industrial collaborations
- International collaborations
- Manufacturing USA Institutes
- NSF Engineering Research Centers

- DUE's Advanced Technological Education and Improving Undergraduate STEM Education programs
- Non-Academic Research Internships for Graduate Students
- Research Experiences for Undergraduates or Teachers
- Engineering education programs such as PFE, RFE, REIF, RED

Timeline

- Proposals due by April 19, 2023, 5pm local time:
  - For multiple institutions: one proposal with sub-awards, no collaborative proposals permitted
  - **Must submit through Research.gov or Grants.gov, not FastLane**
- Aim to make awards by end of September

Required Project Description sections

(See solicitation for details about each section. 15 page limit for either track.)

- Research description
  - Rationale, approach, plans
  - Must include results from prior NSF support for all PIs or proposal will be returned
- Enabling future manufacturing
  - Significant changes from practice, industrial/social/economic/education impacts
  - Put in a global context (publications, centers of excellence, translation to practice, etc.)
- Scope and scale (FMRG only)
  - Justify the resources requested
- Project management and collaboration plan (FMRG only)
  - Describe roles, institutions, contributions, coordination
- Education and workforce development activities
  - Basis for training future diverse workforce, integration of research & education
  - FMRG: 3-page supplement; FMSG: in Project Description

Merit Review Criteria (see solicitation for details)

- Intellectual Merit
- Broader Impacts
- FM-specific criteria for all proposals:
  - Eliminates barriers that limit manufacturing today and catalyzes new manufacturing capabilities
- FM-specific criteria for FMRG proposals only:
  - Educational activities will equip people with the skills for Future Manufacturing and broaden recruitment, inclusion, and participation
  - Anticipates effects of Future Manufacturing on the economy, environment, labor force, industry and/or society at large, including in a global context
  - Multidisciplinary team composition appropriate, and activities integrated among all team members
- FMRG reviewers may include educational & social science experts to complement the technical experts

Conditions of award (see solicitation for details)

- Mandatory kickoff meeting for all PIs & co-PIs
- Annual awardee meeting thereafter, at least 1 PI per award must attend
- Be sure to include cost of attendance in your budget

When preparing a proposal, ask yourself:

- Is it Future?
  - Eliminates barriers that limit manufacturing today: not incremental, not “now”
  - Catalyzes new manufacturing capabilities
- Is it Manufacturing?
  - Focus on manufacturing processes or systems
  - Not just new materials
- Does it involve fundamental research?
  - Not development or optimization
  - Produces knowledge and understanding that’s generalizable
- Does it fit one or more of the three thrusts?
  - Cyber, Eco, Bio

For more information:

- Funding opportunity page with links to solicitation and announcements: https://beta.nsf.gov/funding/opportunities/future-manufacturing-fm
- The FAQ list from 2021 is still relevant: https://www.nsf.gov/pubs/2021/nsf21061/nsf21061.jsp
- Email FutureManufacturing@nsf.gov with general questions
- Contact program officers listed in the solicitation regarding specific areas of research/education
- See previous awards: https://www.nsf.gov/awardsearch, keywords FMRG & FMSG

- A recording and transcript of the webinar, along with the slides, will be accessible from the event page shortly after conclusion of the webinar

Q&A

Funding opportunity page:

https://beta.nsf.gov/funding/opportunities/future-manufacturing-fm