U.S. DEPARTMENT OF

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

ADVANCED MATERIALS & MANUFACTURING TECHNOLOGIES OFFICE

Next Generation Materials and Processes (NGMP)

Huijuan Dai Program Manager May 16, 2023

Objective of the NGMP Program - Why

AMMTO Mission: We Inspire People and Drive Innovation to Transform Materials and Manufacturing for America's Energy Future.



NGMP Program

• Objective: Support AMMTO mission through development of novel materials and manufacturing processes.

• Priorities:

- Clean Energy Transition and Economy-wide Decarbonization
 - Emissions during the use phase are driven by materials usage properties, which in turn are shaped by manufacturing processes.
 - Novel manufacturing methods can improve material performance and contribute to reduction of transportation and industrial emissions.
 - Smart manufacturing, coupled with cybersecurity, increases system-level energy efficiency, throughput, and improves product quality.
- Manufacturing Competitiveness and Domestic Production of Clean Energy Technologies
 - Material innovations are needed to improve clean energy technology efficiency, durability, and cost-effectiveness.
 - Process improvements are needed to increase cost competitiveness of domestic clean energy technologies.
 - Advancements are needed to facilitate the development and deployment of smart manufacturing technologies to increase U.S. competitiveness and strengthen the resilience of domestic supply chains.
- People Inspiration and Educational Workforce Development
 - National Strategy for Smart Manufacturing
 - Experiential learning center and training unit through our Institutes and Consortia to grow and diversify the U.S. advanced manufacturing workforce.

NGMP Program Team - Who



Huijuan Dai Program Manager



Blake Marshall

Technology Manager

- Additive manufacturing of composite materials
- Lead the polymers and composites additive work at MDF and University of Maine as well as related R&D projects



Christopher Hovanec

Technology Manager

- Metals manufacturing
- Lead metal additive manufacturing at MDF and the near net shape castings and forgings as well as related R&D projects



John Winkel

Technology Manager

- Composites
- Manage IACMI, CFTF, R&D projects, and the Large Wind FOA



Sudarsan Rachuri

Technology Manager

- Smart manufacturing and cyber-security
- Manage CESMII and CYMANII
- Develop the National Strategy for Smart Manufacturing

Alaa Elwany

Fellow, Prof. Texas A&M

- Additive manufacturing and smart manufacturing
- Support MDF, metals manufacturing, and internal and national strategy development

Steve Shooter

Fellow, Prof. George Washington

- Policy, automation, additive and smart manufacturing, system interoperability
- Support MDF, CESMII, and EWD efforts



Tina Kaarsberg Technology Manager • Conductivity-enhanced

materials and processes





Brian Valentine Technology Manager

Materials in harsh
environment conditions



Paul Syers Technology Manager • HPC4Mfg



NGMP Program Overview - What



Enhance Material Properties and Energy Efficiency of Manufacturing, Improve the Resiliency of Domestic Supply Chains

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Digital Manufacturing - 2023 Priorities (\$13M)

Prior Investments





- Portfolio has emphasized technology and resource development for a broad community to increase accessibility to smart and cybersecure manufacturing.
- Portfolio has also included High-Performance Computing for Manufacturing.

FY23 Focus

- Completion of the National Plan for Smart Manufacturing.
- Strengthen integration between CESMII, CYMANII, and other AMMTO efforts
 - Smart manufacturing and cybersecurity are cross-cutting and could be more fully utilized across the office
- Use CESMII renewal as an opportunity to reassess focus and fill in gaps identified in the National Plan, where appropriate.

Look Ahead

- Affordable access to Smart Manufacturing Technologies for SMMs.
- Strong connection between smart manufacturing, cybersecurity, and other aspects of sustainable manufacturing.
- Resilient and secure supply chains in US Manufacturing.
- System level optimization of manufacturing enterprise using smart manufacturing technologies.

Advanced Materials and Processes - 2023 Priorities (\$77M)

Prior Investments



- Portfolio has also included:
 - Materials for harsh service conditions
 - Roll-to-Roll Consortium

FY23 Focus

- Build momentum from prior investments
 - CABLE prize success has led to the development of the thermally conductive material topic
 - Have developed a phased strategy for University of Maine, which is now poised to have more impact and accelerate progress
- Continue to focus on the unique role of AMMTO in developing manufacturing capabilities.
 - Advancing the frontier of manufacturing
 - Enabler for application-specific work
 - Focus on manufacturing competitiveness
- Finalize investment strategies for CFTF and materials for harsh service conditions

Look Ahead

- Implemented strategies to optimize impact of long-term investments (e.g., MDF, CFTF)
 - Internally and externally vetted
 - Clear entry and exit / transition strategies for technologies
- Established identity: AMMTO relied upon for materials and manufacturing technologies through connections and transitions to partner EERE offices

NGMP Program's Ecosystem



Built a Great Foundation and are Poised to Adapt to the Changing World

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NGMP Program's Development Vision

Strategy Changes to Align with AMMTO Mission

- Improve impact and cost competitiveness of clean energy technologies
- Evolve from Consortia vs R&D Projects focus to technology focus
- Focus on strengthening domestic supply chains to support America's clean energy transition

"By the end of this decade, the global market for clean energy and carbon reduction technologies is going to reach \$23 trillion – at a minimum – and so we want to corner that market by building clean energy supply chains and solutions here, sourced in America with American labor." Secretary Granholm, 2021

Path Forward

- Prioritize NGMP budget to emphasize smart/digital manufacturing
- Advance materials and processes technology to meet the performance requirements for clean energy economy
- Mechanism on new emerging investment areas: e.g. data informed materials design

Welcome for Suggestions \Im

