

Topic: N141-072

Reactive Metals International, Inc.

Reactive Metal Composite Materials with Enhanced Ignition/Deflagration Efficiencies

Reactive Metals International, Inc. (RMII), an American owned and operated small business, combined with its co-located sister company MACHI Specialty Chemicals, provide over 30 years of product development and manufacture experience. RMII produces reactive metal and thermitic composite powders capable of providing enhanced, tunable mechanical and thermodynamic performance. RMII has a full suite of in-house analytical capabilities that include projectile impact calorimetry, enabling complete reactive material system development and characterization services through scalable in-house reactive materials production. Component density, impulse, time-on-target, reaction rate, heat of combustion and fragmentation behavior may all be optimized. Defense applications include structural reactive components and additives that enhance lethality / performance in ordnance, propellants and explosives.

Technology Category Alignment:

None

None

None

Contact:

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<http://www.machichemicals.com/>

SYSCOM: ONR

Contract: N00014-16-C-1019

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00014-16-C-1019

Department of the Navy SBIR/STTR Transition Program

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ONR Approval #43-3252-17

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Reactive Metals International, Inc.

WHO

SYSCOM: ONR

Sponsoring Program: Code 35
Division 351: Advanced Reactive
and Energetics Materials Program

Transition Target: ONR Future
Naval Capability

TPOC:

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Other transition opportunities:

AGM/RGM/UGM-84 Harpoon
Missile; 40 mm High Explosive (HE)
Grenade M383, M384, US Air Force
(USAF) Hard and Deeply Buried
Target Defeat System (HDBTDS)
Program; Joint Army Navy NASA Air
Force (JANNAF) Reactive Material
Lethality Program; Army Research
Laboratory (ARL) Weapons and
Materials Research Directorate
(WMRD) Materials for Improved
Lethality Program, Defense Advanced Research Project Agency (DARPA) Reactive Material
Structures (RMS) Program



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WHAT

Operational Need and Improvement: Enhancing blast and momentum effects of ordnance increases operational capability and warfighter safety. Reactive materials are metal and thermite composite powders that cannot be detonated, but are capable of rapidly releasing large amounts of thermodynamic energy. These materials provide energy that exceeds those of traditional explosives and offer the potential to significantly increase blast performance without increasing size or weight. The potential of this class of materials has not been fully realized. Current targeted integrations include the incorporation of high-enthalpy, high-strength, high-density materials into bomb, grenade, and missile structural components, rocket propellants, and explosives.

Specifications Required: High-enthalpy, reactive composite powders that can be incorporated into high-strength, high-density materials. Enhanced reactive metal composites capable of achieving high intensity blast with a high combustion (50-80%) efficiency within a 0.5-15 millisecond (ms) reaction rate.

Technology Developed: RMII has developed metal composite formation protocols that enable reactive metals or thermite mixtures to be processed and manufactured into parts using standard manufacturing techniques; an extensive suite of reactive metal systems that span a wide range of densities, thermal output, static and dynamic properties.

Warfighter Value: This technology enables enhanced operational performance across a spectrum of system platforms. Ordnance reactivity and time-on-target can be designed for specific target defeat.

WHEN

Contract Number: N00014-16-C-1019 **Ending on:** September 1, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Projectile Impact Calorimetry	Med	Built quasi-static pressure analysis apparatus; rapid in-house sample screening	7	July 2014
Impact Combustible Tungsten Composite	High	Phase I Navy evaluation confirmed tungsten combustion to Navy performance specs	4	November 2014
High-Performance Using Low Cost Precursors	High	Impact combustible tungsten composites manufactured using low-cost tungsten precursors	5	September 2015
Thermodynamic - Dynamic Mechanical Study	High	Established the underlying fundamental structural properties that are required for specific thermodynamic and dynamic mechanical function	5	June 2017

HOW

Projected Business Model: The RMII business model leverages research and development (R&D) initiatives to engineer reactive engineered materials (REM) and optimize composite material manufacturing processes. RMII's intent is develop production capability to supply REM to support a broad range of military and aerospace systems products and manufacturers.

Company Objectives: RMII produces reactive engineered materials with specific thermodynamic and or physical properties. RMII would like to be a reactive engineered material supplier to Department of Defense (DoD) prime contractors engaged in ordnance and or propellant manufacturing. RMII intends to grow its business by consistently delivering high quality products ranging from REM development services through REM manufacturing and supply.

Potential Commercial Applications: Reactive engineered materials are ingredients used in enhanced blast ordnance, structural energetic components, propulsion, thermal torch, and reactive bonding in electronic components.

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