Department of the Navy SBIR/STTR Transition Program

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2/20/25

Topic # N231-D02
SiC/SiC Produced by R3 Conversion
Advanced Ceramics Manufacturing, LLC

WHO

SYSCOM: SSP

Sponsoring Program: Navy Strategic Systems Programs

Transition Target: This technology addresses the Navy's need for an agile manufacturing process for CMCs to be used in thermal protection systems (TPS), flight bodies, propulsion systems, and hypersonic applications.

TPOC: SSP.SBIR@ssp.navy.mil

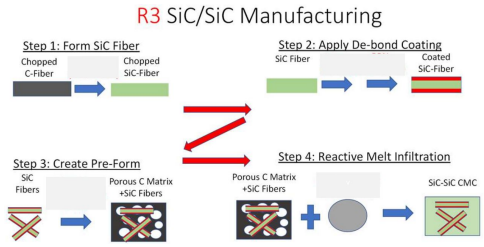

Image courtesy of Advanced Ceramic Manufacturing, LLC

Other Transition Opportunities: Preliminary development is under way with precursor materials provided by a potential customer. It is to demonstrate the feasibility and efficiency of the ACM developed process with existing systems.
The need for additional domestic sources of high temperature CMCs exists in commercial and aftermarket composite industry as well. Supply chain risks and lead times will be reduced.

Notes: Advanced Ceramics Manufacturing, LLC and/or Advanced Ceramics Manufacturing (ACM)
Ceramic Matrix Composite (CMC)
Silicon Carbide/Silicon Carbide (SiC/SiC)

CUSTOMER BENEFITS:
Domestically sourced raw materials and processing
More reliable supply chain
Most efficient processing to achieve CMC performance

WHAT

Operational Need and Improvement: The Navy relies on CMCs for thermal protection systems, flight bodies, propulsion systems, and hypersonic applications. The demand for increased speed and maneuverability requires high strength materials with the ability to survive at higher temperatures in oxidizing environments. Silicon carbide reinforced silicon carbide (SiC/SiC) is one material of particular interest because of its mechanical strength, fracture toughness, and strength to weight ratio. The superior performance is even seen at temperatures in excess of 1500 degrees C and highly corrosive environments.

Specifications Required: Maturation of new SiC / SiC processing
Characterization of R3 CMC properties
Demonstration of sub-scale components
Pathways to scale future production

Technology Developed: Processing methods for precursor and raw materials, development of SiC structures, development of SiC/SiC composite systems, demonstrated performance in relevant environments.

Warfighter Value: Will provide a domestically sourced raw material and processing with shorter, more reliable supply chain

WHEN

Contract Number: N64267-24-C-0049 **Ending on:** May 29, 2025

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Maturation of new Silicon Carbide (SiC) / Silicon Carbide (SiC) processing	Low	Implementation of a robust process with well understood influences	6	3rd QTR FY25
Characterization of R3 Ceramic Matrix Composite (CMC) properties	Low	Robust processed CMC SiC/SiC tested in a relevant environment	6	3rd QTR FY25
Demonstration of sub-scale components	Medium	Optimized process created sub-scale parts made and shown to have critical performance in the relevant environment	6	3rd QTR FY25
Pathways to scale future production	Medium	Identification key manufacturing needs to develop appropriately scaled components for critical applications (i.e. staffing, equipment, raw materials, processing)	4	3rd QTR FY25

HOW

Projected Business Model: The development by Advanced Ceramics Manufacturing will help address the need for CMCs by easing raw material supply chains and vertical integration of CMC manufacturing steps. Advanced Ceramics Manufacturing's process development will allow the direct sale of CMCs for Navy applications and the marketing of processing methods and approaches to domestic suppliers of CMC for DoD and commercial applications.

Company Objectives: Maturation of new SiC / SiC processing
Characterization of R3 CMC properties
Demonstration of sub-scale components
Pathways to scale future production

Potential Commercial Applications: Aerospace and military
Aircraft engines, body flaps, shrouds, space shuttle shielding, turbine blades, bullet proof armor

Energy and power
Heat exchangers, burner components, carburizing furnaces, power turbines, turbine blades, immersion burner tubes, heating elements,

Mechanical and chemical
Wear resistant part, cutting tools, mechanical seals, filtration media, separation media, high performance braking systems

Contact: Kenneth Knittel, Engineer/Business Development
KKnittel@acmtucson.com (520) 260-7298