

NAVY Transition Assistance Program

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NEED & CUSTOMER REQUIREMENT

Need: Missile nosecones must withstand very hostile conditions and yet be transparent to the electronics placed behind them. Successful materials have been made from Pyroceram (a material much like CorningWare cookware), fused silica (good thermally and electrically, but soft) and composite materials (carbon-carbon). These have been fine for past generations of slower missiles, but the Pyroceram is no longer available and the fused silica and composites will not survive Mach 4-6 long duration flight conditions.

Value to the Warfighter: Improved radome materials enable increased performance (range and speed) with the dual benefit of improved rain erosion performance and high temperature capability for high speed/hypersonic missiles.

Operational Gap: Current radome materials will not stand the environment that next generation missiles will present.

Customer Specifications: Must withstand the heating effects of a high-speed/hypersonic vehicle (stagnation temperatures up to 2,700 F) associated with high-speed/hypersonic flight and high dynamic pressures (2000-12000 lbs/sq ft); protecting guidance sensors at speeds of Mach 4 to Mach 6 at altitudes above 40 kft at cruise for 15 minutes.

Technology Description: Advanced Cerametrics, Inc (ACI) has developed a new ceramic material to compete directly with the very high priced reaction bonded silicon nitride (RBSN) and obsolete Pyroceram radomes. ACI has built on earlier work done by NAVSEA to develop a repeatable and inexpensive process to produce radomes from barium aluminosilicate (BAS) using high temperature eutectic BAS fiber as a reinforcement for the BAS matrix ceramics and then, in order to make a sandwich structure, backfilling with an aluminum phosphate coating for erosion resistance and dielectric enhancement.

TECHNOLOGY DEVELOPMENT MILESTONES (SBIR/STTR)

Milestone	TRL	Risk	Measure of Success	TRL Date
Production of Thermal Shock Resistance BAS Material for Radome	5	Low	Achieving Monoclinic Celsian Phase, Identified by XRD	12/2007
Manufacture BAS Fiber	6	Low	Made Spools of Fiber	03/2008
Optimize Material for Low Dielectric Constant and High Strength	6	Moderate	Manufacture Compositions and Test	04/2010
Evaluate Preliminary Mechanical and Dielectric Properties	7	Moderate	Strength>100 MPa, K<6.5	12/2010
Develop a Process to Manufacture Fiber Composite Radome	8	Moderate	Manufacture Composite Radome Prototypes	04/2011

Open contract: N00014-09-C-0081 ending 03/29/2011

N07-094 - Advanced Cerametrics, Inc.

RF Guidance Sensor Windows for High-Speed and Hypersonic Air Vehicles

SPONSORSHIP of original SBIR/STTR Topic

SYSCOM: ONR - SBIR

Transition Target: Next Generation Missiles for Anti-ship Cruise Missile (ASCM) Defense

Original Sponsoring Program: Revolutionary Approach To Time-critical Long Range Strike (RATTLRS)

TPOC Phone Number:
(760) 939-3958

Note:
With Corning's discontinuance of production of the Pyroceram radomes, a supply gap is likely to occur in a few years.



TECHNOLOGY TRANSITION OPPORTUNITIES (PHASE III)

Other Potential Applications:

Other platforms of interest include supersonic air-to-surface tactical, medium-range air-to-ground and short-range air-to-air missiles and precision-guided projectiles (railgun).

Business Model:

ACI is a commercial manufacturer of ceramics and fibrous ceramic products and has been in business for over 60 years. In that time the company has established relationships with many other industries and the company will use these ties to gain entry to the first tier of customers for these strong, very high temperature composites.

Objective:

Develop an advanced ceramic composite radome material with improved thermal shock, high temperature dielectric, and erosion properties for next generation tactical missiles.