Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.
NAVAIR SPR-2025-0705

Topic # N231-012
Technology Development Strategy for the Design of Passive and Semi-passive Underwater Acoustic Metamaterial Filters
TDA Research, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: Air Anti-Submarine Warfare Systems (PMA-264)

Transition Target: PMA-264

TPOC: (301) 757-4816

Other Transition Opportunities: Submarine Acoustic Systems (PMS-401)
Maritime Surveillance Systems (PMS-485)

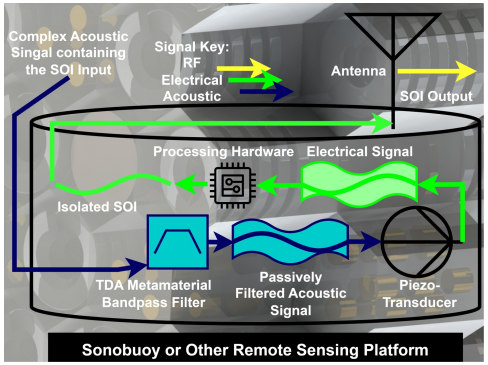

Image developed at TDA 2025

Notes: TDA's acoustic metamaterial (MM) serves as an entirely passive (non-powered) bandpass filtering co-processor in the signal processing chain used on anti-submarine warfare (ASW) receiving platforms. The technology is targeted for use on Air Deployable Active Receiver (ADAR) sonobuoys, which receive complex acoustic signals and isolate the signal of interest (SOI). TDA's iterative development process allows the MM acoustic filter passband to be tuned during design. This allows for easy transition of the technology to other underwater signal processing applications.

WHAT

Operational Need and Improvement: Improving the sensitivity and signal processing capabilities of ASW platforms eases detection of quieter submersibles in noisier ocean environments. One key platform, sonobuoys, are single use devices which are produced in large volumes to support ASW operations. Minor reductions of the unit production cost translates into significant savings in annual procurement costs. TDA is developing a low cost, passive acoustic MM filter to improve the sensitivity and co-processing capability aboard the sonobuoy while reducing the cost of fabrication.

Specifications Required: The MM filter technology must be able to be integrated with exiting ASW platforms. The integrated MM will provide a 10X reduction in the signal to noise ratio and a 1000X reduction in the amount of signals received by the piezoelectric hydrophone element which need to undergo analog to digital conversion.

Technology Developed: TDA is developing low-cost MMs consisting of polymer embedded structures. Materials are designed and tuned for pass band behavior using an iterative process of fabrication, testing in a hydrostatic chamber, and simulation. The method allows the technology to be adapted for other water based acoustic filtration applications with variable frequency ranges and operational depths.

Warfighter Value: TDA's MM filter enables enhanced acoustic sensitivity and reduction of signal post processing time onboard ADAR sonobuoys. This will benefit ASW operations with faster and higher confidence target lock and tracking. The low-cost passive acoustic filter will result in savings during procurement by replacing complex and costly digital signal processing hardware.

WHEN

Contract Number: N68335-24-C-0507 **Ending on:** Mar 16, 2027

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Hydrostatic test results	Low	Measurement of acoustic standing waves at variable test pressure	3	4th QTR FY24
Simulation-physical test harmonization	Medium	Simulated MM transmission loss results agree with apparatus tests	4	4th QTR FY25
Computational optimization output	Medium	MM transmission loss profile demonstrates bandpass filtration	5	3rd QTR FY26
Design for sonobuoy integration	Medium	MM form factor meets sonobuoy hydrophone size envelope	6	3rd QTR FY26
Operational environment testing	Low	Band pass filtration demonstrated in open water environment	7	2nd QTR FY27

HOW

Projected Business Model: TDA will license the technology to Government prime sonobuoy manufacturers such as Ultra Maritime, Sparton, and LM. As regularly mass procured ASW devices, integration of the MMs in sonobuoys will provide a steady demand for TDA's passive filtration technology.

Company Objectives: TDA Research - We Tackle Difficult Problems.
Our team develops cutting edge chemical processes, materials, and hardware for customers in the defense, aerospace, energy, and chemical industries. Our research results in commercialized technologies. Partner with us today to address your most challenging technological issues!

Potential Commercial Applications: TDA's MM bandpass filter technology has applications in other underwater acoustic receiving applications. It is particularly advantageous for low power devices since the MM's processing capabilities are completely passive, requiring no electrical energy. The target platform for the technology, sonobuoys, are regularly purchased by PMA-264 for ASW activities.

Contact: Girish Srinivas, PhD, MBA, CEO, Project PI
gsrinivas@tda.com (303) 748-7153