Department of the Navy SBIR/STTR Transition Program

Topic # N16A-T008

Novel Separator Materials for Achieving High Energy/Power Density, Safe, Long-Lasting Lithium-ion Batteries for Navy Aircraft Applications.

Oceanit Laboratories, Inc.

WHO

SYSCOM: NAVAIR

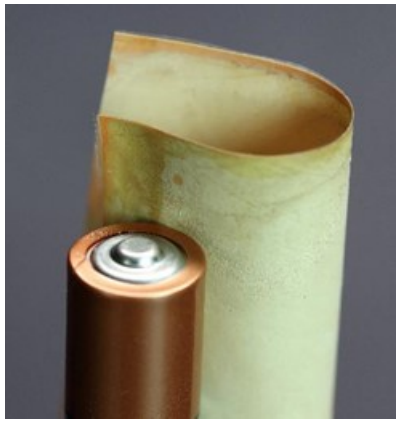
Sponsoring Program: Navy and Marine Corps Small Tactical Unmanned Aircraft Systems Program (PMA) 263

Transition Target: Unmanned Air Systems (UAS), F/A-18E/F Super Hornet, and F-35 Lightning II

TPOC:
(607)346-0236

Other transition opportunities: Other military UAS platforms, MQ-8 Fire Scout Aircraft

Notes: The image shows Oceanit's nanostructured separator materials for high safety and performance of Lithium-ion batteries.



WHAT

Operational Need and Improvement: Over the last two decades, lithium-ion batteries technology has been used in the defense sector for unmanned aerial systems and unmanned underwater vehicles applications. Due to recent improvements in density and cost, lithium-ion battery technology has become a viable technology across a new range of civil and defense applications. Fire safety is a major concern in emerging use cases of lithium-ion batteries, including the consumer electronics, automotive, aviation, and marine sectors. A safer lithium-ion battery made possible using new separator technology with higher thermal stability to prevent thermal-run-away reactions is critical for adopting lithium-ion batteries for military aviation platforms and portable wearable technologies.

Specifications Required: The battery developed with a nanofiber separator will meet the PMA263 unmanned aerial platforms requirements (28 volts and 10 ampere hour and all safety requirements of Naval Sea Systems Command (NAVSEA) S9310.

Technology Developed: Oceanit developed a new class of nanostructured polymer separators with controllable porosity, conductivity, and excellent thermal stability (up to 200 degree Celsius) for lithium-ion batteries. Oceanit is leveraging an in-house electrospinning manufacturing facility for producing nano-fiber non-woven polymer films. This manufacturing method results in a 50 percent increase in porosity and ionic conductivity. The nano-fiber polymer system has superior thermal stability (up to 200 degree Celsius) and durability than the state-of-the-art tri-layer polyolefin separator.

Warfighter Value: The technology enables safer lithium-ion batteries for various military applications. As the Department of Defense (DOD) modernizes the current force and prepared for multi-domain operations, the quantity and capabilities of soldier wearable technologies are expected to increase significantly. Lithium-ion batteries are the most common solutions for portable energy storage for these devices to operate. Lithium-ion batteries' high energy density and rechargeability at low cost make them very attractive for portable applications. Advanced separator technology can solve the final problem – safety – in lithium-ion batteries and usher in a new wave of Lithium-ion Battery technology for the military.

WHEN

Contract Number: N68335-18-C-0164 **Ending on:** December 3, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Cell Fabrication & Testing	Low	Quality control, capacity and cycleability of cells	6	TBD
Module Fabrication & Testing	Med	Module meet electrical, thermal and safety requirements for packing	6	TBD
Prototype Assembly and Quality Control	Med	Prototype battery module meet and quality NAVSEA S9310 and Military Performance (MIL-PRF) standards	6	TBD
Battery Testing per NAVSEA 9010	Med	Successful completion of testing and validation testing at Naval Surface Warfare Center (NSWC)	7	TBD

HOW

Projected Business Model: Oceanit's primary business model establishes corporate co-development agreements with major industry partners using its process referred to as FAST (Facilitated collaboration, Assess value-proposition, Scale-up and Transfer). Using this process, Oceanit significantly de-risks technology by working directly with industry stakeholders that comprise significant market share. Once mature, Oceanit then licenses the technology to interested stakeholders in a mutually beneficial partnership.

Company Objectives: We anticipate the Navy Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) Transition Program (STP) forum will facilitate connections with Government and industry decision-makers with needs for safer lithium-ion batteries. Our short-term objective is to secure the Phase 2.5 agreement with NAVAIR and at least one other DOD program office. The developed technology is a battery system component, so the long-term objective is to qualify the requirements and certifications so that it can be integrated into military applications.

Potential Commercial Applications: Oceanit's advanced separator technology provides a unique benefit to any application requiring a high degree of safety in the commercial sphere. Wearable electronics, tactical devices, unmanned aerial vehicles, and portable electronics are all avenues that Oceanit is exploring. At scale, Oceanit aims to become an industry leader in supplying safer lithium-ion batteries to consumer electronics and electronic vehicles.

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