Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2019-768

Topic # N162-092
All Solid-State Batteries for Navy Applications
Storagenergy Technologies, Inc.

WHO

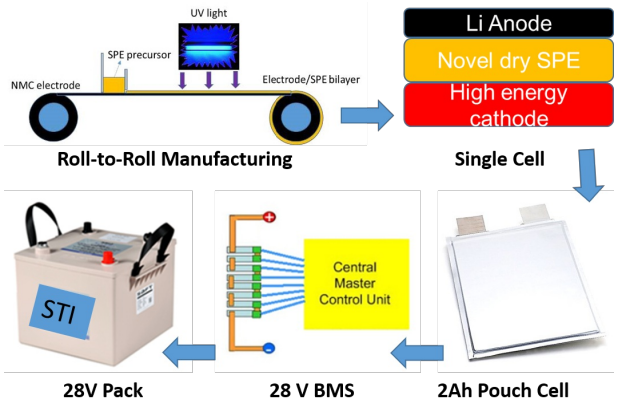
SYSCOM: NAVAIR

Sponsoring Program: AIR 4.0T (Chief Technology Office) and endorsed by PMA 265 (F/A-18)

Transition Target: PMA 265

TPOC:
(301)342-5788

Other transition opportunities: The proposed ASSBs can widely used for numerous DoD platforms, including aircraft power, unmanned aerial vehicles (UAVs), soldier power, munitions, and other applications.



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Notes: Centralized BMS: Real-time information on cell life and condition; deactivate a failing cell, monitor temperatures, send reports and alerts, shut down the pack if an error is detected

28V Pack: A fully functional ASSB prototype product with 28 V and 4Ah will be demonstrated

STI: Storeagenergy Technologies, Inc.
BMS: Battery Management System
ASR: Area Specific Resistance
SPE: Solid Polymer Electrolyte

WHAT

Operational Need and Improvement:
The demand for higher power, higher energy, and longer lasting batteries for naval aircraft continues to increase. The US Navy seeks a reliable all solid-state battery (ASSB) with enhanced safety and performance features by incorporating novel solid-state electrolytes. Advancements in lithium ion battery technology has reached an impasse due to safety hazards associated with the organic liquid electrolytes which are flammable, volatile, and corrosive.

Specifications Required:
The ASSB should demonstrate > 200 Wh/kg, > 1500 W/kg, low self-discharge (i.e., < 5 % per month), long calendar life (i.e., > 6 years), good cycle life (i.e., > 6000 cycles at 100 % depth of discharge), diagnostic and prognostic capabilities, and meet other operational, environmental, and electrical requirements outlined in MIL-PRF-29595, MIL-STD-461, MIL-STD-810, MIL-STD-704, and S9310. Aside from achieving the performance goals outlined above, the top factors for the PMA are improve safety, reduce weight and size, increase cycle life, and increase emergency power time.

Technology Developed:
Ultra-thin and high conductivity (>1 mS/cm at room temperature) solid polymer electrolyte (SPE) membrane, high loading/energy cathodes, compatible anodes.

Warfighter Value:
Improved safety over organic liquid electrolytes in batteries
Reduced battery size
Higher battery power
Reduced weight
Longer cycle life

WHEN

Contract Number: N68335-18-C-0293 **Ending on:** January 31, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Fabricate and test cathode/thin SPE bilayer	Low	Successsfully demonstrated cathode/thin SPE bilayer in laboratory environment	4	April 2019
Demonstrate large format cell with capacity of 0.5Ah	Low	Successfully demonstrated 500 mAh ASSB large cel in a laboratory environment	4	July 2019
Demonstrate large format cell with capacity of 2Ah	Med	Demonstrate 2.0-Ah ASSB pouch cell in a laboratory environment	4	January 2020
Demonstrate a ASSB module plus Module Management System (MMS)	Med	Successfully demonstrate a battery module plus MMS in a relevant environment	5	August 2020
Demonstrate prognostic and diagnostic design of BMS	Low	Successfully provide real-time prognostic & diagnostic information in a relevant environment	5	August 2020
Demonstrate a fully functional ASSB prototype plus BMS, >4Ah and 28V	Med	Successfully demonstrate ASSB Prototype Product in a relevant environment	6	January 2021

HOW

Projected Business Model:
Storagenergy is a R&D business, our technology-to-market strategy is based on licensing the patents and the “Intellectual Property (IP)” that we develop. Our preferred licensing strategy is to grant licenses to electrode suppliers and battery manufacturers for fields-of-use defined by their respective materials chemistries, and to allow them to specify equipment and materials from suppliers of their choice. For our first SPE supplier and ASSB manufacturer customer, we will work with their equipment and materials suppliers extensively to transfer the necessary know-how. It may be necessary to offer a time-limited exclusive license to the SPE and/or ASSB customers for them to take on the risks associated with being a first adopter, but our aim is ultimately to license our IP to multiple players.

Company Objectives:
Storagenergy will focus its efforts toward commercializing our advanced SPE and ASSB with battery manufacturers and membrane suppliers.

Potential Commercial Applications:
The commercial potential for our solid-state battery is endless as it can be used in virtually every sector of the $50 billion/year rechargeable battery market. This includes all consumer electronics, electric vehicles, charging stations, wind and solar energy storage facilities, and the smart grid concept. We believe that Storagenergy’s All Solid State Battery will have a dramatic impact on the growth, profitability and international competitiveness of the U.S. battery industry and has the potential to create a significant number of high-tech manufacturing jobs in the United States.

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