

WHO

SYSCOM: NAVSEA
Sponsoring Program: Mine Warfare Program Office (PMS 495)
Transition Target: Barracuda Mine Neutralizer UUV System
TPOC: theodore.n.smallow.civ@us.navy.mil

Other Transition Opportunities:
 The Lithium metal technology can be extended to sonobuoys, medical implants, space applications, emergency power source for lighting, handheld devices, and Unmanned Aerial Vehicles

Notes:
 This program is demonstrating the production of a high energy density battery that operates over a wide temperature range and extended storage time.



WHAT

Operational Need and Improvement:
 The battery being developed delivers increased operating times over commercial off the shelf batteries at all temperatures. In addition, Imperia's high active coated materials technology and low flammability electrolyte results in safer batteries.

Specifications Required:

- Fit within the specified dimensions and weight while meeting all shock, thermal and vibration requirements
- Deliver the required energy of each mission profile after storage at all conditions
- Excellent storage life
- Safe for Navy use (verify through UN 38.3 certification and S9310 testing)

Technology Developed:
 The battery being developed delivers increased operating times over commercial off the shelf batteries at all temperatures. This is achieved by combining:

- Proprietary lithium metal cell design and cell conditioning techniques enabling a high energy and power density design with rechargeable capability.
- Patented High Active (HA) coating technology enables designs that maximize the energy and power density while reducing cost.
- Low flammability electrolyte increases lithium metal battery safety during operation and storage.
- BMS and packaging capable of meeting demanding shock and vibration requirements.

Warfighter Value:

- Safer energy storage system for storage and operation on shipboard environment
- Increased mission capability leading to more flexible CONOPS, longer mission duration and improved vehicle effectiveness.
- Adaptable technology platform can incorporate materials developed in the future for electric vehicles and similar large-scale markets.

WHEN

Contract Number: N68335-23-C-0229 **Ending on:** May 17, 2024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Develop high energy Lithium metal cell design	Low	Demonstrate electrochemical performance in lithium metal cell.	7	1st QTR FY23
Demonstrate recharging capability in lithium metal cells.	Low	Demonstrate > 5 cycles in Lithium metal cells.	5	1st QTR FY23
Complete battery packaging and Battery Management System (BMS) designs	Low	Demonstrate and complete quality check and fit test with battery, packaging, and BMS components in-house.	5	4th QTR FY23
Demonstrate battery scale-up fabrication	Low	Demonstrate battery and components meet the required specification	5	4th QTR FY23
System level demonstration	Low	Construct a battery prototype and demonstrate performance at low temperatures.	6	4th QTR FY23
Safety assessment	Medium	Characterize safety of the cell and battery through Navy 'S9310 safety assessment.	6	3rd QTR FY24

HOW

Projected Business Model:
 PSI has a dedicated battery manufacturing facility in Wilmington, MA capable of producing 1 MWh of specialty Li-ion batteries per year. At this facility, under the Imperia Batteries brand name Imperia brand batteries are tailored specifically to provide an optimum combination of battery performance by balancing energy density, power density, cycle life, safety, and cost. As a domestic supplier, we provide a traceable and verifiable manufacturing process govern by ISO9001 quality management system. This ensures that each cell and battery is manufactured with known, tested chemicals and verified processes. We are committed to working with our customers to deliver custom high performance energy storage solutions for their applications.

Company Objectives:
 PSI develops advanced technologies and products for the military, aerospace, industrial process, energy, telecommunications, environmental, and medical markets. PSI is strongly committed to developing products and services based on innovative technologies to support the missions of the Department of Defense. The Imperia Batteries division is focused on the design, fabrication and delivery of safe, high energy and power storage solutions for DOD customers.

Potential Commercial Applications:
 The technology could increase storage life and safety during storage for all commercial and DOD applications.

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