

TITLE: **Robust, Safe, High Power Density Lithium Metal Cells**

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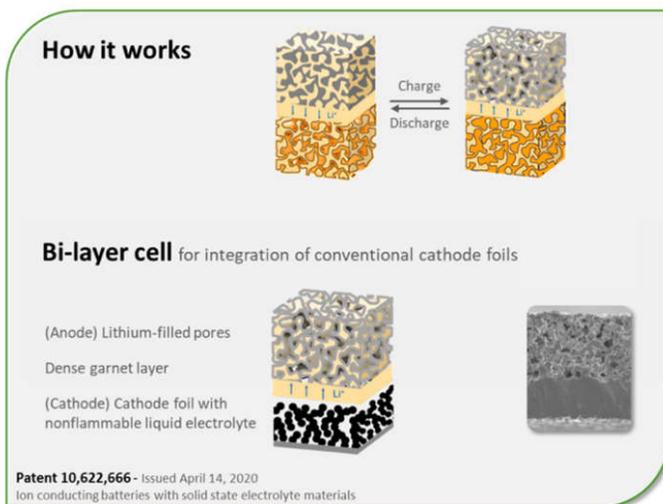
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Ion Storage Systems Technology

Ion Storage Systems' core solid state technology has enabled the development of non-flammable and rate capable lithium metal cells. Ion Storage Systems' batteries can exceed the energy density of any battery on the market today, while simultaneously addressing the safety issues associated with conventional lithium ion and lithium metal batteries. Additionally, our solid-state batteries provide customers with a wide temperature operating range, allowing them to use our batteries in places and ways they could not before.

The unique performance advantages of our technology come from our patented multilayer ceramic electrolyte design, which replaces the separator layer and flammable liquid used in lithium ion cells. Solid state electrolytes are widely known to be non-flammable, and can be stable to lithium metal and high voltages. However, until now, most solid state cells have suffered from limited power capability, energy density, and have had poor performance at room temperature. In contrast, our multilayer ceramic structure has demonstrated lithium metal cycling at very high rates at room temperature, without the formation of dendrites. With a wide electrochemical window, our ceramic is stable to both lithium metal and high voltage cathodes, resulting in high energy density cells.

The ceramic's chemical stability allows for high temperature operation without the degradation and rapid self-discharge seen in conventional lithium ion cells. Our patented structures create cell design flexibility, allowing for the use of both conventional cathode foils and next generation high voltage cathodes. These core technical attributes enable a safe, high energy and power density cell, that is uniquely tunable to a variety of operating conditions and applications.



About Ion Storage Systems

Ion Storage Systems started our journey in the University of Maryland in 2012, applying for our first patent in 2013 and winning the award for Maryland Outstanding Invention of the Year. Exiting the university and forming as an LLC in 2015 we continued development of its core technology winning the LG Chem Battery Challenge and being showcased in the ARPA-E impacts report. Recently ISS added multiple subject matter, battery technology, and commercial experts to its staff to create a world class product development and manufacturing team. We are advancing development and manufacturing of this technology to empower our customers to transform aerospace, defense, consumer electronics, transportation, and grid markets. Our early performance-driven customers will be battery users who have a need that is not met by existing

technologies such as high temperature applications like autoclavable medical devices, long-duration remote missions, or safety critical applications like underwater military vehicles and space-based systems.

Partnering

Cathode ISS cell technology is stable to extremely high voltages, making it uniquely capable of supporting next-generation high voltage cathodes. We are seeking a teammate with strength in cathode development and production, who is commercializing or willing to commercialize a high voltage cathode (4.5 volts and greater). This cathode would be ready for market deployment in parallel with the ISS cell architecture. ISS is open to a variety of partnership structures including licensing or jointly developing chemistries from companies or universities, purchasing cathode powder, or purchasing fabricated cathode foils.

Robust Design As the customer's applications demand extreme durability in the field, ISS intends to find a partner with product design strength for rugged conditions. This partner should have experience with common points of failure in battery packs, design for high temperature conditions, shock/vibration/flex response modelling, and integration of shock mitigation components. ISS is open to partners who would assist in the cell packaging design or partners who would become part of the product fabrication process and supply parts and/or perform an aspect of the manufacturing in their own facilities.

Durability Testing ISS is interested in intensive lab and real-world testing on our packaged cell. Partners should be battery customers who commonly deploy products in high-demand environments such as high temperatures, extreme vibrations, and critical long-term deployments. The ideal partner would be a battery customer with applications that parallel the IARPA technology goals, who could benefit from the successful outcome of this project and be willing to test ISS cells to the most demanding conditions of their applications and IARPA requests.