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Enpower Greentech, Inc.
SoftBank Corp.

The All-Solid-State Battery (ASSB) Breakthrough by Enpower Greentech and SoftBank Corp.

All-Solid-State Batteries Achieve Specific Energy of 300 Wh/kg.

Enpower Greentech Inc. (EGI), together with SoftBank Corp. (SoftBank) has achieved another breakthrough to help the world realize a future with all-solid-state batteries (ASSB). By completely removing liquid electrolytes, the all-solid-state battery promises to unlock ultra-safe, light weight (energy-dense) batteries to power next-generation EV mobility, eVTOL aerial transit and IoT-communications.

This ASSB breakthrough was demonstrated upon successive advancements in EGI's 3.5Ah lithium metal battery (LMB) cells, such as those used to power stratospheric HAPS (High Attitude Platform Station) demonstrations by SoftBank earlier this year.

"Today, we celebrate another success in this core technology that reduces interface resistance between the cathode and solid electrolyte layer while reducing the weight ratio of the solid electrolyte" shares Dr. Che Yong, CTO at EGI. *"These reductions equate to 300Wh/kg specific energy density for the ASSB cell when coupled with EGI's proprietary lithium metal anode."*

Lithium-ion batteries commonly use organic liquid electrolytes for ion conduction. While effective and readily available, the traditional liquid electrolyte suffers from inherent risks that include fire or ignition from punctures or leakage. In contrast, the non-flammable solid electrolyte used in all-solid-state batteries should greatly improve the safety performance, extend lifetime, broaden operating temperatures, and simplify the battery pack design by eliminating the heating and cooling systems.

Dr. Che goes on to explain, *"the reason many have struggled to make major breakthroughs in ASSB technology can be understood by the challenges of constructing stable solid-solid interfaces using right materials and processes. A solid electrolyte must form a secure and stable bond to the active materials while maintaining ionic and electric conductive paths in the cathode; a task which is far easier using liquid electrolytes."* Further he explains, *"there is also the challenge of interface resistance for ion conductivity. Increased resistance can reduce battery capacity, power output, and cycle life. Most solid electrolytes have a higher specific gravity weight than liquid electrolytes and in turn increase the battery mass (which reduces specific energy)."*

To resolve the challenges facing ASSB development and deployment at scale, EGI has reduced cathode and solid electrolyte interface resistance. By reducing the weight ratio of the solid electrolyte to cathode mixture by using a thin solid electrolyte layer to increase the specific energy to 300Wh/kg, effectively matching energy measures boasted by many lithium-ion batteries.

EGI and SoftBank will continue to develop technologies to unlock high-energy advanced battery solutions that power the future. This specific all-solid-state battery (ASSB) developed by EGI promises to be a commercially viable option for mass production.

ASSB cell with specific energy of 300 Wh/kg

Reference: All-Solid-State Batteries (ASSB) are composed from solid materials for all internal components, including a solid electrolyte for ion conduction. Batteries that contain low percentages of liquid components may not be called "ASSB", but may be referred to as solid-state batteries, quasi-solid-state batteries, or semi-solid-state batteries. Compared to solid-state batteries the all-solid-state battery is expected to have a wider range of operating temperatures and voltages, as well as improved lifetime and output power characteristics.