High-Performance Body Armor-Integrated, Multi-functional Batteries for Dismounted Soldier

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Abstract: *CRG is developing a high performance, fail-safe, multifunctional, conformal battery with integrated ballistic capability that can be worn with small arms protective insert (SAPI) hard body armor plates for improved weight reduction on the dismounted soldier.*

A significant number of military assets, including multiple types of soldier-worn systems, rely heavily on power provided by rechargeable batteries. As the capabilities of these systems increase, there is an ever-increasing need for batteries with more electrical energy. Along with the increasing need for additional batteries to support these growing energy demands comes added weight, mounting space limitations, and restricted body movement for the dismounted soldier. Soldiers can carry in excess of 30 lbs. of batteries, such as the BB-2590 and Conformal Wearable Battery (CWB), to support a single mission in addition to the SAPI hard body armor weight. To further enhance the safety and protection of the warfighter, while seeking to provide further advancements in weight and space reduction without sacrificing energy storage, a more closely coupled body armor and energy storage solution is needed.

CRG's approach to meet this need is a conformal battery design which can be installed with SAPI hard body armor in existing plate carrier vests without modification. CRG's battery pack design is a thin, conformal package with ballistic capability built into a lightweight battery case. Safety is of utmost concern as this is a body-worn device, so the battery pack includes temperature monitoring and fail-safe capabilities should a ballistics event occur.

The system-level specific energy objective is to exceed 150-200 Wh/kg including the battery cells, control electronics, structural ballistic case, and connector. CRG is currently optimizing the design for weight, volume, ballistic protection, and ruggedization to support operations in a wide range of environmental conditions. Successful demonstration will show a significant weight and space reduction on the soldier compared to current soldier-worn battery solutions.