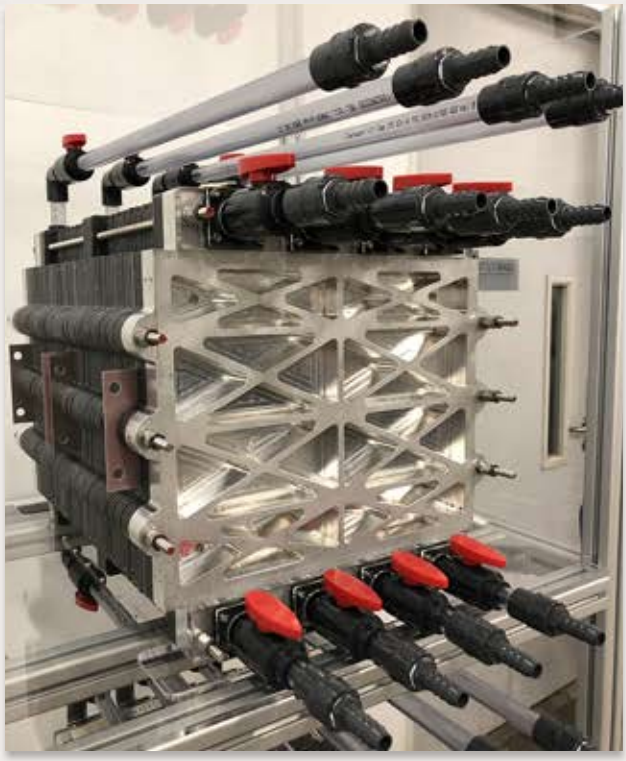
Redox Flow Battery: A Large-scale Energy Storage Technology for Near Term Deployment

Technology Overview

Rapid increase presence of intermittent renewable energy systems as well as an imbalance of electricity demand over a diurnal cycle requires an efficient and cost effective grid-level integrated energy storage system. Redox flow batteries (RFBs) are regarded as promising energy storage devices due to their features of separable energy and power capacity. However, redox flow batteries have lower energy densities than integrated cell architectures. Many studies have been done to improve the energy efficiency of RFBs, among them, reducing shunt current loss and internal resistance are most effective. This invention introduces a novel engineering design to minimize the shunt current through increasing the conductive path without increasing maintenance cost or assembly complexity and reduce bulk resistance with no significant increase in flow resistance, obtaining uniform flow throughout the battery cell and improving the overall system efficiency.



Features & Specifications

1. Extra flexibility to optimize the system performance and minimize shunt current;
2. Convenient to adjust the length of the flow channels on the manifold sets according to specific operating conditions;
3. Easily assembly compared to industry product;
4. Reduce bulk resistance with no significant increase of flow resistance;
5. More uniform electrolyte flow paths to improve the overall system efficiency.

Customer Benefits

The customer benefits of this modular bipolar plate and novel flow frame for redox flow battery include better stack performance, low shunt current / parasitic current loss, low maintenance cost, robust sealing, and a simplified assembly process. Due to these advantages, the energy efficiency and cost effectiveness of this new system is remarkably better.

Potential Applications

This redox flow battery is deployable for both grid-level power and energy applications, such as all vanadium, vanadium/bromine, iron/chromium, bromine/polysulfide, lithium redox flow batteries, depending on the electrolytes supplied to the first and second active reaction compartments.

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