salt-battery

11/30/2022

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This webpage QR code

Salt Battery

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Salt battery membrane free with low cost materials below 10 USD per kWh using NaCl and organic electrolyte

PDF Version of the webpage (first pages)

Salt Water Flow Battery

Salt battery membrane free with low cost materials below 10 USD per kWh using NaCl and organic electrolyte.

Flow provide affordable and scalable solutions for stationary energy storage.

This type system has a theoretical capacity of 755 mAh/g.

Please see the link below for a spreadsheet on the salt flow battery.

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Tax Credits

Home Based Flow Battery: 10-100 kW
$35 x 10 kW = $350
$35 x 100 kW = $3,500

Commercial Flow Battery: 4 MW
$35 x 4,000 kW = $140,000

Utility Scale Flow Battery Bank:
$35 x 4,000 kW x 100 = $14,000,000

Note: The credit would apply to components produced and sold after December 31, 2022, and would begin to phase out starting in 2030. Access: Electrochemical cell comprised of one or more positive electrodes and one or more negative electrodes, with an energy density of not less than 100 watt-hours per liter (.1 kW/L), and capable of storing at least 20 watt-hours of energy.

What is Brine

What is brine?
In general, brine is any solution with an extremely high concentration of salts, such as sodium chloride, which can occur either naturally (as with seawater, deep-water ocean pools, salt lakes, producer water from oil and gas drilling) or as a byproduct of industry. These byproducts, or brine waste streams, are typically highly concentrated salt solutions that, in some cases, contain more than twice the amount of concentrated salts than natural brine solutions.

Brine waste streams can also be highly concentrated with total dissolved solids (TDS), such as waste streams in many chemical manufacturing processes, and they can be some of the most challenging to treat or discharge because their composition and purification requirements are dynamic and complex.

Some examples of brine waste created as a byproduct of industry include:

-cooling tower and boiler effluent
-reverse osmosis (RO) and ion exchange waste/reject streams
-produced water from extracting oil and natural gas
chlor-alkali and chemical plant waste
-acid rock and mine drainage
-food preservation and manufacturing waste streams
-desalination waste from potable water creation
irrigation runoff

Our novel solution is treating this solution considered and expensive headache, into a battery technology system.

Elon Musk and Tesla even think that recovery of lithium from brine is worth patenting. However, they are not the first to do so. (1962 Lithium from Brine Patent)

Battery Technology: With the advent of the new USA tax credits for producing and selling batteries ($35/kW) we are focussing on a simple flow battery using shipping containers as the modular electrolyte storage units with tax credits up to $140,000 per system. We are focussing on the salt battery. This battery can be used for both thermal and electrical storage applications. We call it the Cogeneration Battery or Cogen Battery.
We are also looking into converting salt based water conditioners to simultaneously produce power.

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Shipping Container Electrolyte Modular Storage

Our concept of using modular shipping containers allows shipping and deployment in a standardized methodology.

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Modular Block Electrodes

Our patented modular blocks allow ease in maintenance and replacement of electrodes.

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Water in Salt Electrolytes

Water in Salt Electrolytes (WIS) are a progress towards various non-lithium aqueous rechargeable metal-ion batteries (ARMIBs). Reference article link below.

In traditional salt-in-water (SIW) electrolytes, the water molecules enormously outnumber the salts, and are relatively free to form hydrogen bonding networks. Thus, a large amount of water molecules will separate or solubilize (or corrode) the electrode material (Dubouis et al., 2018; Huang et al., 2019a). With the salt concentration increasing, the tighter solvation shell associated with WIS electrolytes can be formed. Meanwhile, the freedom water solvent molecules display a lower mobility. They turn out to be preferentially solvated by metal ions, and thus less available to separate salt anions. Accordingly, the water-water hydrogen bonds are replaced by water-ion-bonding interactions, enhancing the interactions between cations and anions, which can further widen the stable working windows of electrolytes (Azov et al., 2018).

It is well-known that electrolytes as ionic transport intermediates, with their inherent ionic conductivity, mobility, interfacial characteristics, and other properties, play a critical role in enhancing the cycle performances. Designing and optimizing a functional electrolyte with a stable electrode/electrolyte interfaces has to be considered as an essential way to achieve a superior electrochemical performance in aqueous batteries.

Meanwhile, the weak oxidation resistance of electrolytes and the insufficient passivation on the surface of negative electrodes leads to modest reversible capacities, especially at the initial cycle, or in the high-voltage (>4.0 V) operation windows, which limits the huge development of APIBs (Hosaka et al., 2018). Therefore, it is essential to fit the high energy APIBs to purposefully explore suitable electrolytes.

Electrolytes, as ionic transport intermediates with inherent ionic conductivity, mobility, interfacial characteristics, and other properties, play a critical role in enhancing the cycle performances, rate capacity, and safety of batteries. WIS electrolytes with highly concentrated salt solutions specifically can expand electrochemical potential windows of aqueous devices up to about 3 V and result in low solvent (water molecules) activities and high chemical stabilities (restraining side reactions). Moreover, the formation of stable SEI film also endows the cells with a high energy density and excellent cycling stability. This mini review mainly focuses on the WIS electrolytes for ARMIBs and summarizes the recent investigation of WIS electrolytes in non-lithium monovalent (Na, K) and multivalent (Zn, Mg, Al) ion batteries.

(full article reference below)

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