Expanded Hydrated Vanadate for Aqueous Zinc-ion Batteries

This technology offers a battery incorporating cathode made from the cation-stabilized expanded hydrated vanadate to increase a stable structure and enable practical use of vanadium oxides in batteries.

What is the Problem?

Hydrated vanadium pentoxide is a promising cathode for aqueous zinc ion batteries because of the high specific capacity as high as 400 mAh/g. However, it suffers from structural degradation and self-discharge. Currently, alkali and alkaline cations are introduced into the interplanar of vanadium pentoxide to expand the lattice spacing to enhance the reaction kinetics and improve the rate capability and cycling stability. A conductive component like graphene is also used to enhance electrical conductivity. These strategies alleviate cycling degradation and provide fast channels for mass diffusion, but do not overcome the voltage degradation and self-discharge. Cathode materials with improved specific capacity are essential to enabling more productive batteries.

What is the Solution?

The solution is a battery incorporating cathodes made from the cation-stabilized expanded hydrated vanadate. The cationically stabilized vanadate hydrate structure is defined by layers of vanadium oxide separated by a cation and water, which provide spacing and stabilization between the layers.

What Differentiates it from Solutions Available Today?

Vanadium oxides are promising candidates for cathode materials in aqueous zinc-ion batteries with low cost and high capacity, yet requirements for long cycling necessitate the development of increasingly stable structure, which has been lacking in existing research. This solution offers a stable structure, enabling practical use of vanadium oxides in batteries.

Patent Information:

US20220238868A1

References

Technology ID

BDP 8037

Category

Selection of Available Technologies
Cleantech/Energy Storage/Batteries

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