

Liquid flow battery group of the Institute of Chemical Physics in Rotterdam the Netherlands

Are flow batteries the future of energy storage?

Realizing decarbonization and sustainable energy supply by the integration of variable renewable energies has become an important direction for energy development. Flow batteries (FBs) are currently one of the most promising technologies for large-scale energy storage. This review aims to provide a comprehensive overview of the current state of the art in flow battery technology. ChemSocRev - Highlights from 2023

How redox chemistry has evolved in flow batteries?

From the zinc-bromide battery to the alkaline quinone flow battery, the evolution of RFBs mirrors the advancement of redox chemistry itself, from metal-centred reactions to organic molecular designs⁵⁷. A range of novel redox species and design concepts have been proposed and developed for next-generation flow batteries in recent years.

When were flow batteries invented?

Flow batteries were first proposed in the early 1880s and have since undergone many developments¹¹. Figure 1a illustrates the general configuration of conventional RFBs and basic working principles. RFBs work in a distinctly different fashion to Li-ion batteries.

How can a flow battery increase energy density?

To increase energy density, metal deposition chemistry, with low redox potentials and high capacity, can be adapted to combine with the flow battery (Fig. 1b); these technologies are called hybrid RFBs¹². For example, Li-metal-based flow batteries can achieve a voltage of over 3 V, which is beneficial for high-energy systems.

The theoretical basis of liquid-solid two-phase chemical reaction (LTCR) for improving the energy density of flow batteries was first described based on ...

Energy storage is crucial in this effort, but adoption is hindered by current battery technologies due to low energy density, slow charging, and safety issues. A novel liquid metal ...

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Abstract. This paper aims to introduce the working principle, application fields, and future development prospects of liquid flow batteries. Fluid flow battery is an energy storage ...

Redox Flow Batteries (RFBs) are a versatile and scalable option for energy storage, essential for balancing renewable energy sources and grid stability. This chapter explores the ...

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