# Proton flow battery system concept

What is a proton flow battery?
The arrangement was originally termed a 'proton flow battery', because in charging mode an inflow of water is needed to provide the source of protons. We have subsequently shortened the name to simply a 'proton battery'. Download : Download high-res image (462KB)

Can a proton flow battery store electricity without formation of hydrogen gas?
6. Conclusions In this paper we have proposed a novel concept for a proton flow battery - a reversible PEM hydrogen fuel cell with an integrated solid-state MH storage electrode that can be used to store and resupply electrical energy without formation of hydrogen gas.

What is a proton battery?
Essentially a proton battery is a reversible PEM fuel cellwith an integrated solid-state electrode for storing hydrogen in atomic form,rather than as molecular gaseous hydrogen in an external cylinder. It is thus a hybrid between a hydrogen-fuel-cell and battery-based system,combining advantages of both system types.

Can a proton flow battery save energy?
Published in the International Journal of Hydrogen Energy (January, 2014), the research found that, in principle, the energy efficiency of the proton flow battery could be as high as that of a lithium ion battery, while storing more energy per unit mass and volume.

Can a reversible PEM fuel cell make a proton flow battery?
The composite electrode is found to have acceptable proton and electron conductivity. This electrode is integrated into a reversible PEM fuel cell to make a 'proton flow battery'. The hydrogen storage and release capacities of the proton flow battery are measured. Tentative proof of the feasibilityof the proton flow battery concept is obtained.

How does a proton flow battery differ from a NiMH battery?
The energy (hydrogen) storage capacity of the proton flow battery can in principle be expanded simply by adding storage material to the hydrogen-side electrode,while that of the NiMH (or lithium ion) battery is limited by the quantities of ionic species in the electrodes and electrolyte.

Since 2011, ESS Tech, based in Wilsonville, Oregon, has innovated based on the concept of all-iron redox flow battery (IFB) and led the commercialization effort of IFB technology. ESS technology development was originally supported by ARPAe and later attracted top-tier investors, such as BASF, Breakthrough Energy Ventures, and SoftBank Energy. In October ...

The proton flow battery concept eliminates the need for the production, storage and recovery of hydrogen gas, which currently limit the 1/3. efficiency of conventional hydrogen-based electrical ...

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As only an inflow of water is needed in the charge mode, and air in discharge mode, the system is called a "proton flow battery". A hydrogen storage electrode was fabricated from a novel...

The aim of this project is to advance proton battery and proton flow reactor technology towards commercialisation, following the end of the ARENA-funded project, "Proton Flow Reactor System" conducted by RMIT University, with Eldor Corporation, Italy, as ...

A novel "proton flow reactor" (PFR) system for producing hydrogenated carbon(C)-based powder for bulk export has been developed. This reactor - a novel and scaled-up extension of RMIT"s innovative proton battery concept - uses electricity from renewables to split water and charge a stream of C-particles in a slurry electrode with the protons produced. The system is zero ...

In principle, the proton flow battery concept combines some of the best features of a hydrogen fuel-cell based energy storage and a battery: higher gravimetric and volumetric energy storage densities at near atmospheric pressure and temperature than both current hydrogen-based systems, and lithium ion and other advanced batteries

the proton flow reactor system. These are the proton flow reactor itself operating in charge and discharge modes, and the storage of hydrogen over time in C-particles with the liquid electrolyte used to charge them with hydrogen removed. The principal evidence obtained to date that the proton flow reactor system concept is technically

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The novel concept developed by researchers at RMIT University advances the potential for hydrogen to replace lithium as an energy source in battery-powered devices. The proton flow battery concept eliminates the need for the production, storage and recovery of hydrogen gas, which currently limit the efficiency of conventional ...

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(Phys ) --Researchers have developed a concept hydrogen battery based simply on storing protons produced by splitting water. The novel concept developed by researchers at RMIT ...

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RMIT University (Australia) researchers have developed a concept battery based on storing protons produced by splitting water--a reversible fuel cell with integrated ...

An innovative concept for integrating a metal hydride storage electrode into a reversible proton exchange membrane (PEM) fuel cell is described and investigated experimentally. This new concept has the potential to increase roundtrip efficiency compared to the conventional hydrogen-based electrical energy storage system by eliminating the intermediate steps of hydrogen gas ...

In this paper we have proposed a novel concept for a proton flow battery - a reversible PEM hydrogen fuel cell with an integrated solid-state MH storage electrode that can ...

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