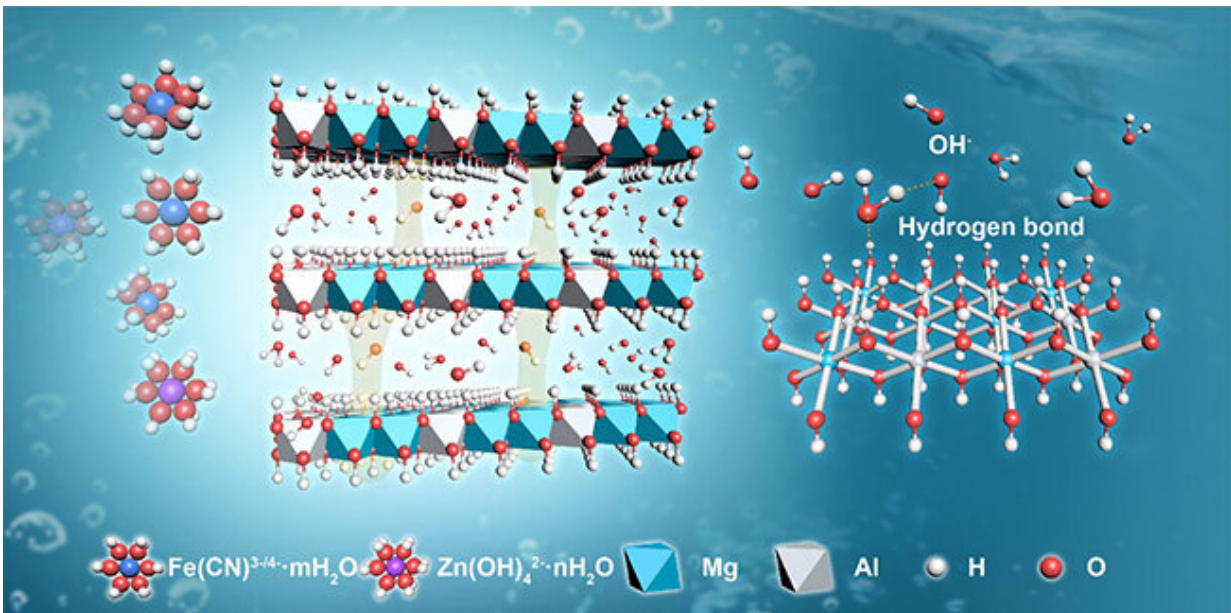


New ion-conducting membrane improves alkaline-zinc iron flow batteries

June 11 2021, by Li Yuan



Selective ions transport and the hydroxide ions transport in LDHs. Credit: HU Jing

Alkaline zinc-iron flow batteries (AZIFB) are suitable for stationary energy storage applications due to advantages of high open-cell voltage, low cost, and environmental friendliness. However, they suffer from zinc dendrite accumulation and relatively low operation current density.

Recently, a research group led by Prof. Li Xianfeng from the Dalian

Institute of Chemical Physics (DICP) of the Chinese Academy of Science (CAS) developed layered double hydroxide (LDH) [membrane](#) with high hydroxide conductivity and [ion selectivity](#) for alkaline-zinc iron flow batteries.

The study was published in *Nature Communications* on June 7.

In order to enhance the operating [current density](#) of AZIFB, the researchers added LDHs nano materials into the AZIFB and designed a LDHs-based composite membrane with high performance. High selectivity and superb hydroxide ion conductivity were achieved through the combination of the well-defined interlayer gallery with a strong hydrogen bond network along 2D surfaces.

They identified that surface -OH groups of LDHs layer could assist the conduction of OH^- by promoting proton transfer away from one water molecule to the original OH^- .

Because of the high ionic conductivity, the LDHs-based membrane enabled the AZIFB to operate at 200 mA cm^{-2} , along with an energy efficiency of 82.36%.

"This study offers a new insight to design and manufacture [high-performance](#) membranes for AZIFB," said Prof. Li.

More information: Jing Hu et al, Layered double hydroxide membrane with high hydroxide conductivity and ion selectivity for energy storage device, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-23721-9](https://doi.org/10.1038/s41467-021-23721-9)

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