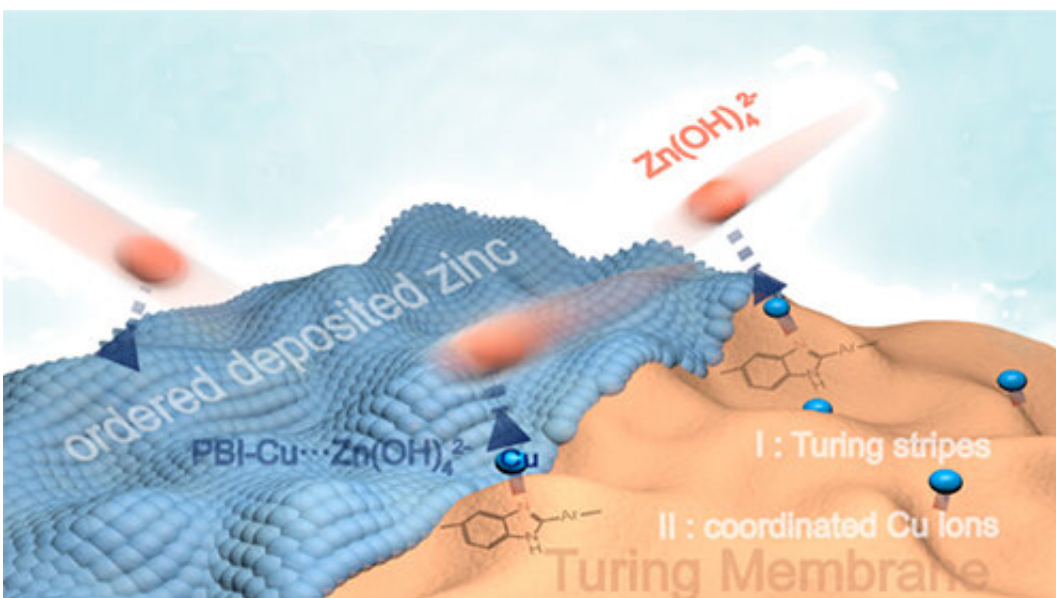


# Turing membrane to improve performance of zinc-based batteries

August 19 2021, by Li Yuan



Dendrite-free zinc-based battery with high areal capacity developed via the region-induced deposition effect of Turing membrane. Credit: Wu Jine

Zinc-based batteries are promising options for energy storage devices owing to their low cost and high energy density. However, they have serious dendrite issues, especially at high areal capacities and current densities.

Recently, a research team led by Prof. Li Xianfeng from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences developed novel membranes for [zinc](#)-based batteries, achieving

uniform zinc deposition with high areal capacity and current density.

This work was published in *Journal of the American Chemical Society* on July 27.

"We proposed a novel [membrane](#) featuring ordered undulating stripes called Turing Patterns, which can effectively suppress zinc dendrites and improve ion conductivity," said Prof. Li.

The crests and troughs in the proposed membrane could effectively adjust the  $\text{Zn}(\text{OH})_4^{2-}$  distribution and provide more zinc deposition space. The coordinated Cu ions during membrane formation could interact with  $\text{Zn}(\text{OH})_4^{2-}$ , further smoothing zinc deposition.

The researchers found that even at a high current density of  $80 \text{ mA cm}^{-2}$ , the Turing membrane enabled an alkaline zinc-iron flow battery (AZIFB) to work stably with an ultrahigh areal capacity of  $160 \text{ mAh cm}^{-2}$  for approximately 110 cycles, showing an energy efficiency of 90.10%. This is by far the highest value ever reported among zinc-based batteries with such a high [current density](#).

**More information:** Jine Wu et al, Dendrite-Free Zinc-Based Battery with High Areal Capacity via the Region-Induced Deposition Effect of Turing Membrane, *Journal of the American Chemical Society* (2021).  
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