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PROCEEDINGS

Ultrasound Overcomes Dendrite Puncture in Aqueous Zinc Batteries

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ABSTRACT

Aqueous zinc batteries have attracted wide interest due to the high safety of the non-flammable electrolyte. However, the inhomogeneous metal plating during the charging and discharging process generates uncontrollable dendrite growth on the anode surface, which seriously threatens the performance and lifetime of the battery. Herein, we provide a physical method to fragment zinc dendrites by using ultrasound to induce cavitation effects in the electrolyte, which can effectively improve the dielectric structure defects inside the battery and reduce the risk of short circuit. The experimental results show that the roughness and height of zinc deposits decreased by 96% and 91.8%, respectively, and the surface structure became more uniform after ultrasound. Ultimately, we integrated the capacity and coulombic efficiency of Cu||Zn half-cells and demonstrated that ultrasound enhanced the cell structure while maintaining capacity performance. Our findings demonstrate that it is possible to enhance material structure, maintain capacity performance, and improve cell safety using ultrasound technology.

KEYWORDS

Aqueous zinc batteries; ultrasound; dendrite; cavitation

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