FERROELECTRIC SEPARATORS FOR SUPPRESSING DENDRITES GROWTH IN RECHARGEABLE BATTERIES

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Inventors: Xudong Wang, Yutao Dong

The Invention

UW-Madison researchers have developed a mesoporous ferroelectric P(VDF-TrFE) separator membrane to provide self-responsive dendrite suppression. This capability was demonstrated using the plating/stripping cycling of an aqueous Zn-ion battery system. When anode protrusions develop as the initial stage of dendrite formation, they will create strain on the separator membrane. Owing to the ferroelectric property, the separator membrane can generate a local internal electric field to offset the high electric field near the protrusion tip when the polarization is aligned at the right direction. This self-responsive offsetting electric field regulates Zn2+ ion diffusion and reduces the growth rate at the protrusion tip. As a result, Zn-Zn symmetric cells with this separator exhibited a long-term cycling lifetime of ~980 h under a current density of 1 mA/cm2 with a capacity of 1 mAh/cm2. In a zinc-sodium vanadium oxide full cell, the ferroelectric separator enabled a prevailing cycling stability with a capacity retention rate of 64% after 6000 cycles under 5 A/g (compared to 19% for the current industry standard glass fiber separator membrane).

Additional Information

For More Information About the Inventors

- Xudong Wang

Tech Fields

- Clean Technology : Energy storage, delivery & resource efficiencies

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867