Clean Technology

AMPHIPHILIC COMPLEXING AGENTS FOR IMPROVED MEMBRANE COMPATIBILITY AND STABILITY OF REDOX SPECIES

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The Invention

UW-Madison researchers have developed a technique for addressing the issue of crossover in flow batteries by dissolving water soluble Zwitterionic trapper molecules (ZITs) in the electrolyte with the negatively charged active species. Structurally, ZITs are an inner salt consisting of anionic (i.e., sulfate) and organic cationic (i.e., ammonium) moieties. These ZITs improve performance through multiple mechanisms. First, upon charging of the cathodic redox species, they become "soft" anions with electrostatic affinity to the soft ZIT organic cation. The ZIT "traps" the anionic active material, increases the effective size of the charged redox species, and provides a dangling, covalently bonded anionic moiety. This promotes size exclusion and charge repulsion with cation exchange membranes. Second, the ZIT is able to prevent phase separation of the charged redox species by acting as a mediator between the soft anionic active material and the aqueous solution. This phase separation affects both the performance and engineering of bromide and iodide flow battery technologies. Thirds, as the ZIT itself is charged, it can act as a supporting electrolyte salt during battery cycling to provide adequate solution conductivity during cycling. Thus, ZITs may be able to enhance the cycling stability and energy density capability of various flow battery technologies.

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