The concentrated electrolyte also provides a wider electrochemical stability window that allows for a higher operating voltage. By constructing two different Zn batteries using completely different cathode materials, Wang and colleagues convincingly demonstrated a clear correlation between the superior electrochemical performance and the Zn solvation structure. A Zn–LiMn₂O₄ hybrid full cell shows good capacity retention of 83.8% for 500 cycles without inactive Zn build up on the anode. The Coulombic efficiency of the full cell is nearly 100%, indicating high reversibility. A Zn–O₂ battery using a porous carbon substrate as the oxygen cathode demonstrated excellent performance, which has only been achieved in non-aqueous

It is interesting to note that such performance was achieved without an advanced catalyst on the oxygen-cathode side. With an optimized O_2 cathode further improvements, such as capacity retention (longer cycling life) and rate capability (power density) can be expected. Moreover, it would be worthwhile to explore the possibility of replacing expensive TFSI salts with more economically feasible lower costing salts, such as lithium trifluoromethanesulfonate and NaClO_4 , and how this may affect the Zn^{2+} solvation-sheath. In addition, investigation of the solid-electrolyte interphase and how it forms in an aqueous electrolyte in Zn batteries could also be pursued.

to solving the major problems of aqueous Zn batteries, and could impact other aqueous or non-aqueous multivalence cation systems with similar reversibility challenges, such as Mg- and Al-based batteries. A much more difficult challenge, however, is Li-metal anode irreversibility associated with poor Coulombic efficiency and the dendritic growth problem⁷. Potentially, this study may help provide insight into solving this longstanding problem.

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