Interfacial electrochemistry regulation on carbon anodes by an ether-based electrolyte for sodium-ion batteries

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Sodium-ion batteries (SIBs) are reviving and flourishing during last decade, with great potential to be practically applied in large-scale energy storage market. However, the construction of an efficient and stable interface between electrode and electrolyte is still the bottleneck restraining the development of SIBs. The regulation of interfacial electrochemistry is critical to increase the energy density, columbic efficiency and long-term stability of anode materials, especially on most promising carbon anodes.

Recently, we found that ether-based electrolytes are unique to modifying solid electrolyte interphase and largely improve the initial coulombic efficiency (ICE) of high specific surface area carbons (HSSACs). Moreover, after effective decoration with Al_2O_3 nanoclusters, the stability and rate capability of HSSACs can be further enhanced. More profoundly, we proposed that the energy barrier to charge transfer at the interface is a reliable parameter to assess the intricate sodiation dynamics in various anode materials of SIBs including carbon materials, which could definitely guide the design of well-matched novel aprotic electrolytes for carbon anodes and accelerate the commercialization of carbon anodes in metal-ions rechargeable batteries.

References:

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