

Highly Homogeneous Sodium Superoxide Growth in Na–O₂ Batteries Enabled by a Hybrid Electrolyte

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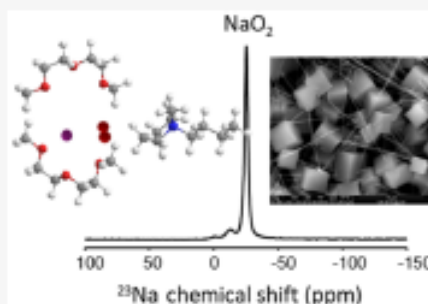


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ABSTRACT: Energy storage is a major challenge for modern society, with batteries being the prevalent technology of choice. Within this area, sodium oxygen (Na–O₂) batteries have the capability to make a step change, thanks to their high theoretical energy density. In order to facilitate their use, the development of electrolytes is critical to overcome certain limitations that arise because of the technology's unique chemistry, particularly relating to the stability of superoxide species. In this study, we have demonstrated the importance of selecting a suitable electrolyte to facilitate both a highly homogeneous distribution of the discharge products and to minimize the formation of undesirable reaction products. The combination of pyrrolidinium-based ionic liquid and diglyme can dramatically change the cell performance. The effect of sodium salt concentration as well as the amount of diglyme and *N*-butyl-*N*-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide, [C₄mpyr][TFSI], in Na–O₂ batteries has also been comprehensively studied by combination of experimental and simulation techniques.



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