

演 題 : Na-ion batteries for large scale applications:
challenges and opportunities

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要 旨 : With the ever-increasing demands of modern societies, energy generation, storage, and distribution are becoming increasingly important research fields. Currently, one of the most promising areas of research and development is Sodium ion Battery (SiB) technology, which has a range of potential applications but remains particularly suited for use in stationary systems.

Here we will discuss SiB systems in terms of what may be considered its three most significant components: anodes, electrolytes, and cathodes. SiB anodes are mainly based on hard carbon materials, due to their attractive combination of low cost and high energy density. However, there has also been interest in other systems, such as intermetallic alloying materials and metal oxides, as well as exploiting specific electrolyte co-solvation effects so as to enable the use of graphite. In general, the SiB research community uses organic electrolytes which are analogous to already existing Lithium ion batteries (LiB). However, recently there has been growing interest in developing new electrolytes which are specifically tailored for use in SiBs, such as optimized liquid and solid electrolytes. At the present time, cathodes are one of the most explored SiB components - with a plethora of options to choose from, including Prussian blue and organic materials. However, the most promising are polyanionic and layered materials, with their good combinations of electrochemical performance, low cost, stability and available constituents. Although interest in SiB technology has only relatively new, when compared to LiBs, it has been already developed at the prototyping level.

A general overview of the most interesting electrode and electrolyte materials for Na-ion batteries paying special attention to those related to the current prototypes will be presented. By examining this topic in detail, it will be shown that there exists a strong drive to exploit this technology and that there are a wide range of opportunities to develop new and improved SiB technologies.

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