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A Step Toward Solid-state Electrochemical Energy Storage Device

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Since the discovery of Li-ion batteries in 1991, they have become ubiquitous in various applications owing to their high energy density and reasonable cyclability. However, due to the limited global resources of lithium, there has been growing interest not only in Li-ion batteries but also in Na-ion batteries. Currently both types rely on liquid organic electrolytes, which, despite their excellent performance, pose significant safety concerns.

In response to these challenges, we have developed a novel composite solid-state organic/inorganic electrolyte specifically for Na-ion batteries. This innovation addresses the safety issues associated with liquid electrolytes. To mitigate the space charge at the electrode-electrolyte interface, we incorporated a ferroelectric thin layer into the electrolyte design. The Na-ion battery utilizing this ferroelectric-tailored electrolyte has demonstrated remarkable enhancements in charge/discharge cyclability and improved safety performance. This advancement marks a significant step forward in the development of safer and more efficient battery technologies beyond traditional Li-ion systems.