

A low-cost, high-energy density and long-cycle life potassium-sulfur (K-S) battery for grid-scale energy storage

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Here we report a novel potassium-sulfur battery with K⁺-conducting beta-alumina as the solid electrolyte. Our studies indicate that liquid potassium exhibits much better wettability on the surface of beta-alumina compared to liquid sodium at lower temperatures. Based on this observation, we develop a potassium-sulfur battery that can operate at as low as 150°C with excellent performance. In particular, the battery shows excellent cycle life with negligible capacity fade in 1000 cycles because of the dense ceramic membrane. This study demonstrates a new battery with a high energy density, long cycle life, low cost and high safety, which is ideal for grid-scale energy storage.



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