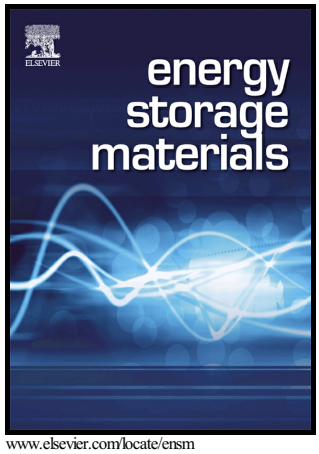


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# A Li-ion sulfur full cell with ambient resistant Al-Li alloy anode

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**Abstract**

Lithium (Li) metal as anode for Li-S batteries has encountered some issues, eg., dendrite formation and ambient instability, both of which imposed safety problems on the operation and manufacturing of Li metal sulfur batteries. Exploring safer Li metal replacement is thus of fundamental and technical importance for enabling Li-metal-free sulfur batteries. Aluminium (Al) is an appealing Li-alloy anode material for the sake of its high capacity, natural abundance, and safety. Pairing Al-Li alloy with sulfur (S) could be a promising strategy to achieve high-energy rechargeable batteries with improved safety. Herein we show the suppressed dendrite growth and the enhanced ambient stability of Al-Li alloy anode. A Li-metal-free Li-ion sulfur battery was assembled with an Al-Li alloy anode, a sulfurized polyacrylonitrile cathode and a carbonate electrolyte. This Li-ion sulfur full cell exhibited good reversibility and stability, with a slow decaying rate at 0.09% per cycle. The specific energy of the full cell based on the total weight of active materials is estimated to be in a range of 589~762 Wh/kg.