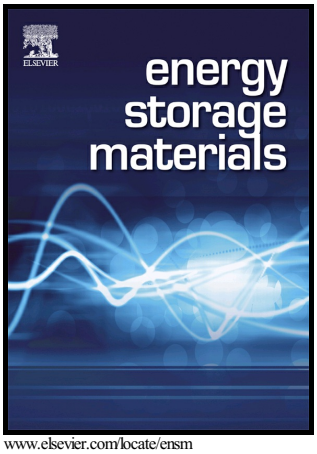

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A Reversible Nonaqueous Room-temperature Potassium-Sulfur Chemistry for Electrochemical Energy Storage

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ABSTRACT

Earth-abundant element potassium (K) exhibiting a low reduction potential and a high gravimetric capacity is an ideal anode material for the development of low-cost and high-energy batteries. We present herein a mechanistic study of a reversible room-temperature nonaqueous potassium-sulfur (K-S) chemistry and demonstrate a rechargeable K-S cell. Electrochemical and spectroscopic studies reveal that the discharge-charge of the K-S couple involves transition processes of potassium polysulfide species, resembling that of the lithium-sulfur chemistry. Through the design of a proper cathode-separator assembly, a deep discharge of the K-S cell with a high utilization of sulfur cathode is accessible.

Graphical abstract