

Mechanism Poster Abstract

The mechanism of Li₂S conversion into sulphur

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Lithium-sulphur battery shows promising results for the future storage devices in the electric vehicles. Their drawback is mainly connected with a fast capacity fading which involves a multistep reaction process with at least 2–3 equilibrium states with different soluble lithium polysulphides [1]. Different strategies were designed to solve this problem. One is to synthesized micro/meso- porous host nanostructures for sulphur [2] or to prepare new type of separators that effectively separate the anode and cathode side [3]. Another way is to use Li₂S as a cathode material instead of sulphur [4]. However, Li₂S is an insulator and it is considered electrochemically inactive. It was found that an over potential activation is needed in the first charge process for Li₂S to become active [5].

Here we show a possibility of having a direct conversion of Li₂S into sulphur. Two independent in operando measurements (XAS and UV/VIS) showed for this system direct oxidation of Li₂S into sulphur with almost negligible formation of polysulphides at potentials above 2.5 V vs. Li/Li⁺. Furthermore, the Li₂S oxidation mechanism depends on the relative amount of soluble sulphur in the electrolyte. By controlling the type and the amount of electrolyte within the encapsulating carbon shell or the electrochemical conditions it is thereby possible to control the reaction mechanism of Li₂S into sulphur.

References

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