Supporting Information

**β-FeOOH interlayer with abundant oxygen vacancy towards boosting catalytic effect for lithium sulfur batteries**

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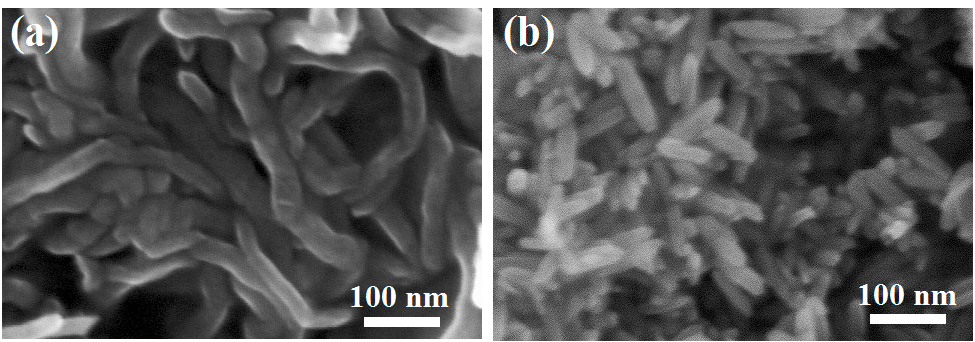


Figure S1. SEM images of (a) CNTs and (b) bare FeOOH sticks.

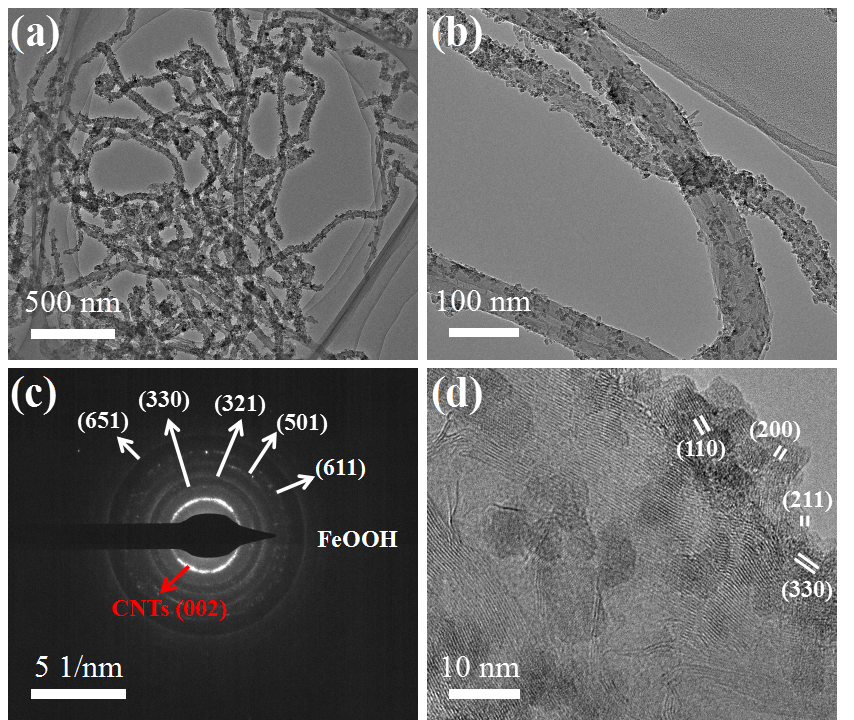


Figure S2. High and low-maganification TEM images of CNTs@FeOOH-II compounds and the corresponding SAED.

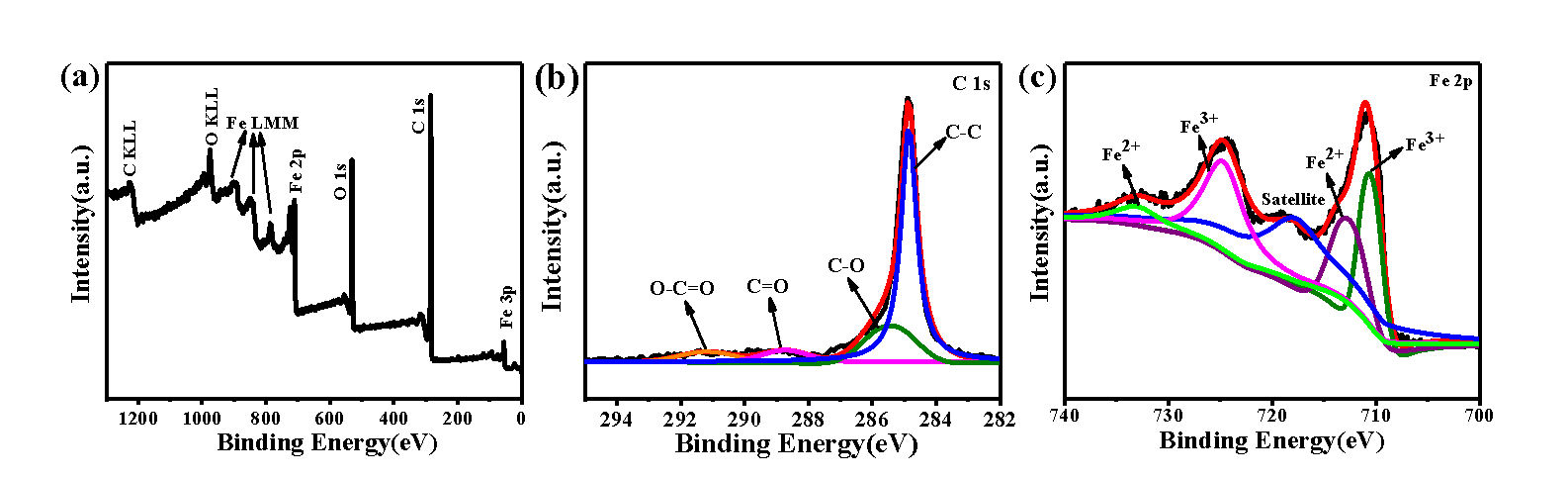


Figure S3. High-resolution XPS spectra of the (a) original XPS survey spectra, (b) C1s and (c) Fe 2p of CNTs@FeOOH-II composite.

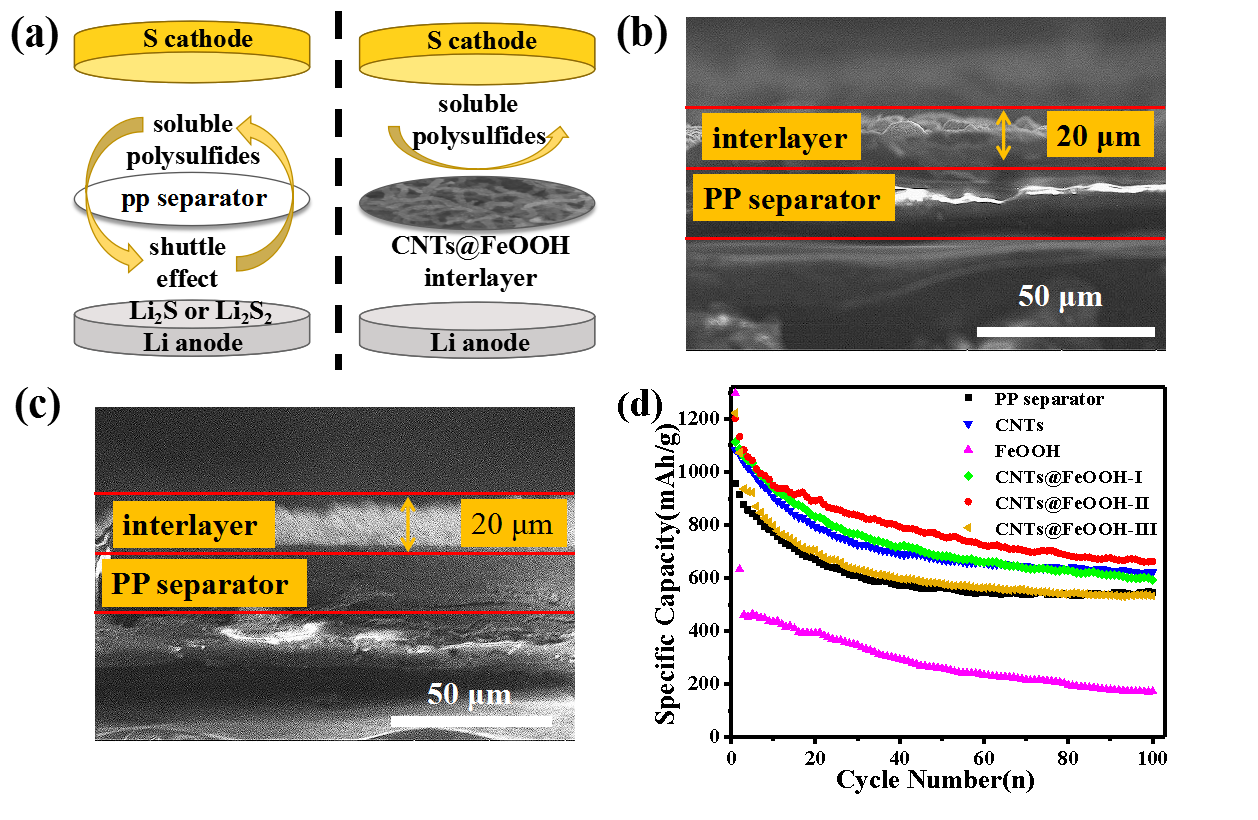


Figure S4. (a) Schematic diagram of conventional and improved Li-S cells; cross section of (b) CNTs@FeOOH-I and (c) CNTs@FeOOH-III interlayer; (d) Cycle performance of batteries with PP, CNTs, FeOOH, and CNTs@FeOOH separator, respectively, at 320 mA g-1.

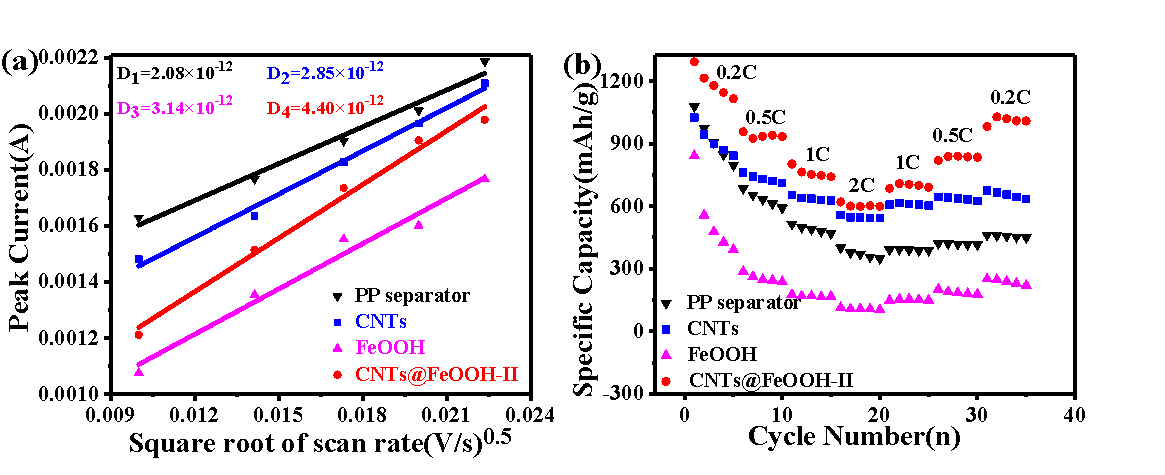
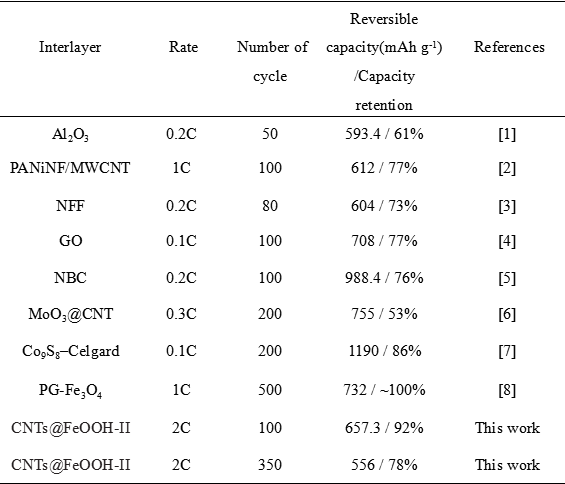


Figure S5. (a) The corresponding relationship between the square root of the scan rate V0.5 and peak current Ip of CNTs@FeOOH-II in a voltage range of 1.7–2.8 V vs. Li+/Li. (b) rate capability of four kinds of separator.

**Table S1** Comparison of the Li-S batteries with different functional interlayer, with results from this work and from the literature



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