

Electronic supporting information

Caramel treats-like sisal fiber derived interconnected carbon nanosheets/MoS₂/polyaniline hybrid as advanced electrode materials in lithium-ion batteries

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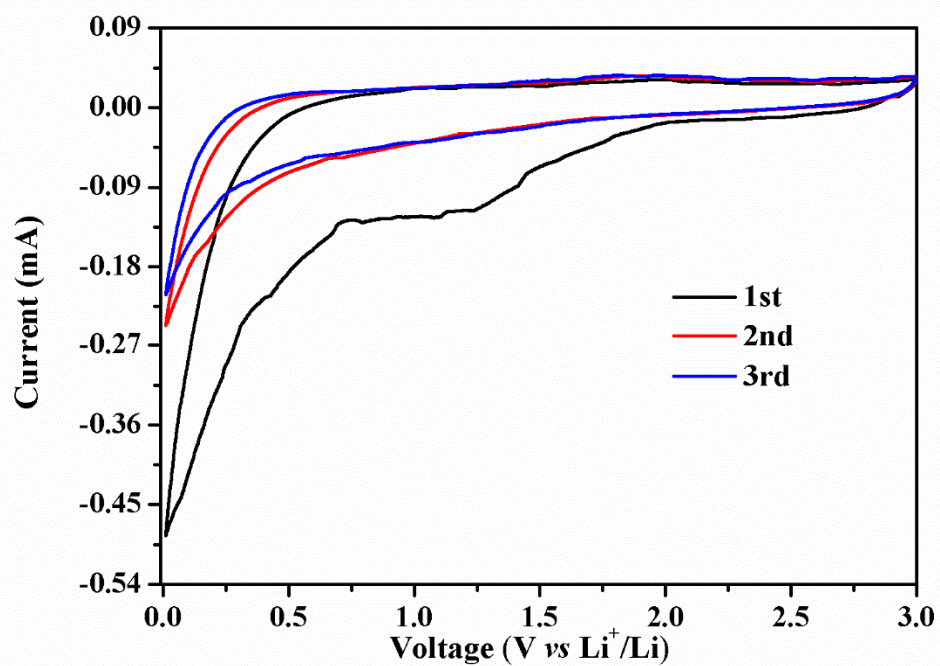


Figure S1 Cyclic voltammograms of the ICNs/PANI electrodes at a scan rate of 0.2 mV/s

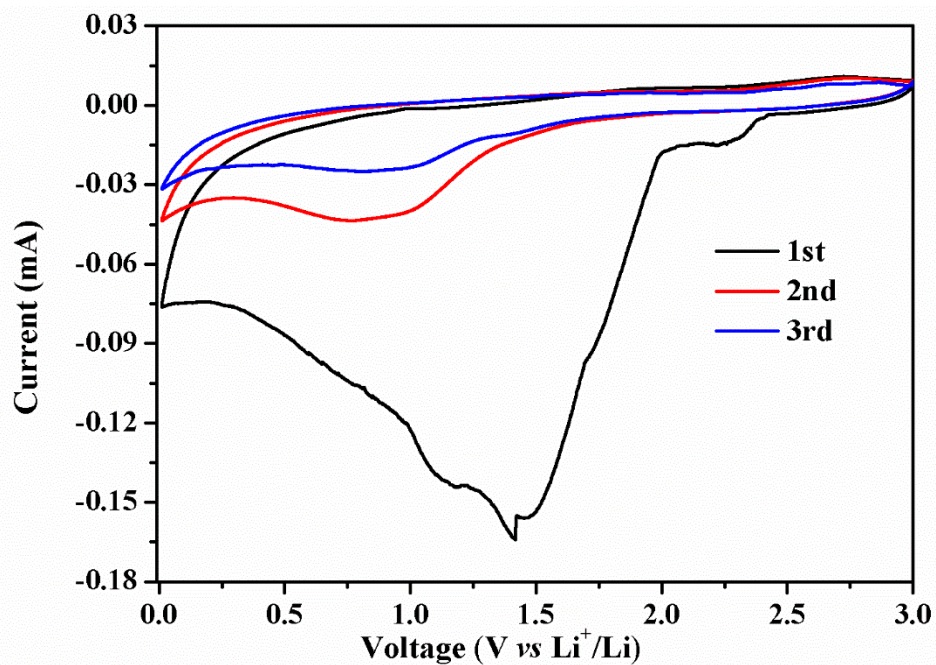


Figure S2 Cyclic voltammograms of the PANI electrodes at a scan rate of 0.2 mV/s

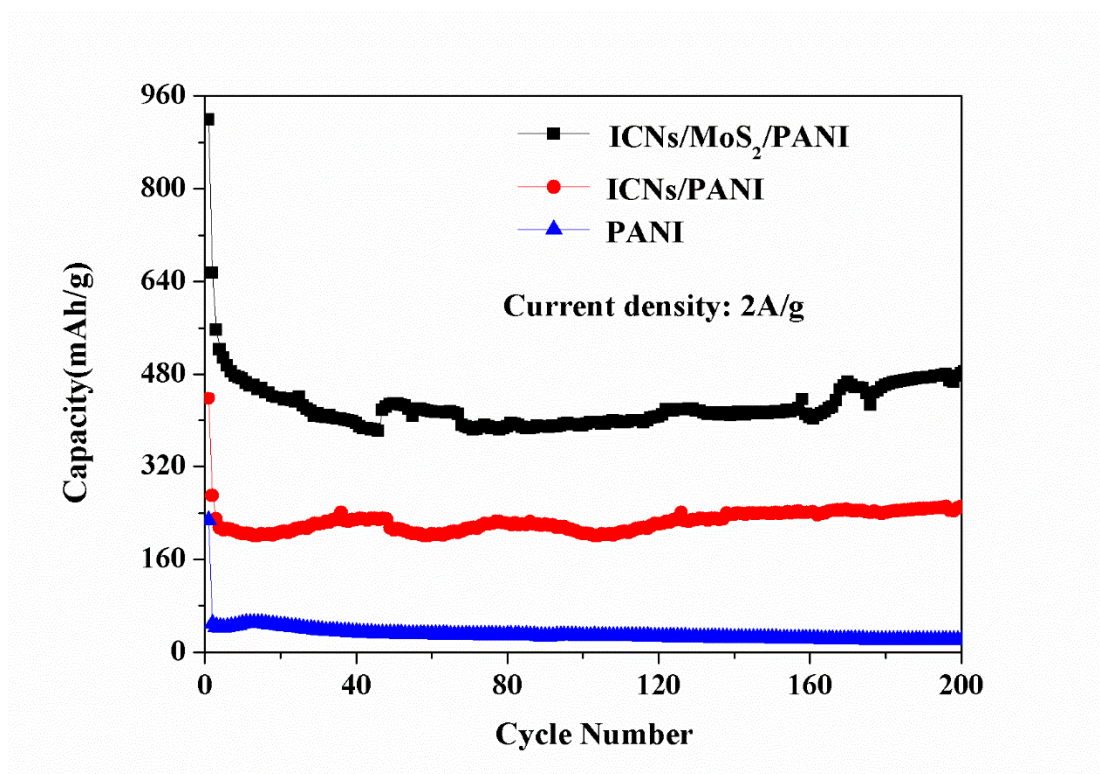


Figure S3 Cycling performance of the ICNs/MoS₂/PANI hybrid, ICNs/PANI and PANI at a current density of 2A/g for 200 cycles

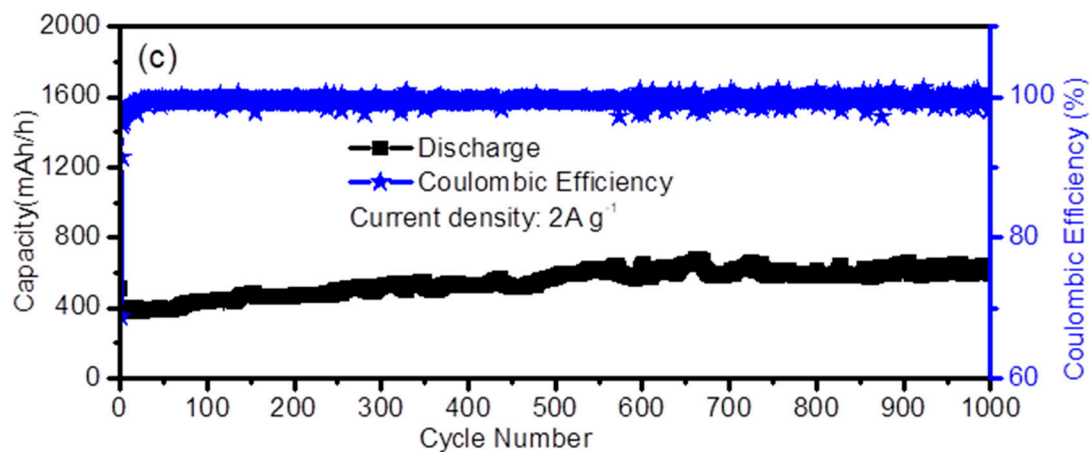


Figure S4 Cycling performance and Coloumbic efficiency of the ICNs/MoS₂/PANI hybrid at a current density of 2A/g for 1000 cycles

The preparation of interconnected carbon nanosheets(ICNs):

The sisal fibers derived ICNs were prepared through two stages, which illustrated in Figure S5.

First, we prepared tubular cell-fibers from sisal fibers (SFs). The SFs were supplied by Guangxi Sisal Group Co., Ltd. The maize-yellow SFs were washed with deionized water to remove the impurities, cut into small pieces (~2cm in length) and dried in the oven at 80°C. And then the SFs were treated by hydrothermal reaction. 5.0g of SFs, 70mL of 2.5M potassium hydroxide (KOH) solution were placed in a 100-mL Teflon-lined stainless steel autoclave. The mixture solution was heated at 160°C for 14h, and cooled to room temperature. The tawny prepared materials were collected and washed by deionized water until the pH decreased to 7, dried in the oven at 80°C, and the tubular cell-fibers can be obtained. The morphological structure of the ICNs is shown in Figure S6.

Second, we prepared the ICNs from tubular cell-fibers. The tubular cell-fibers were immersed in KOH solutions, in which the weight ratio of KOH to tubular cell-fibers is 2.5. The solution was stirred for 30 min, and dried in an oven at 70°C. Then the dry mixture was placed in a nickel boat for carbonization at 400°C for 2 h, and for activation at 850°C for 1h. The heating rate going from room temperature to 400 and 850°C was 3°C min⁻¹ under nitrogen atmosphere. The resulting sample was collected,

grinded fully, and thoroughly washed with 3 M hydrochloric acid (HCl) solution, and then washed with deionized water until the pH decreased to 7. The samples were finally dried at 60°C in the oven, and the ICNs were prepared completely.

Preparation of PANI:

PANI is prepared by in-situ oxidative polymerization of aniline monomer using ammonium persulfate ((NH₄)₂S₂O₈, APS) as an oxidizing agent. Usually, 2 mL of aniline is added to 70 mL of 1.5 M H₂SO₄ under vigorous magnetic stirring, stirred vigorously for 2 h, and then a molar ratio of APS is used to add a ratio of 1:0.5 (aniline: APS) to the solution, and at room temperature The reaction was continued for another 12 hours while stirring.

Preparation of ICNs/PANI:

This hybrid was prepared by in situ oxidative polymerization of aniline monomers on ICNs/PANI using ammonium persulfate ((NH₄)₂S₂O₈, APS) as oxidizer. Typically, 50 mg of precursor ICNs and 70 mL of 1.5 M H₂SO₄ were added in a flask with vigorous magnetic stirring for 15 min, and then 0.045 mL aniline was injected into the solution, continued vigorous stirring for 2 h, then APS with a molar ratio of 1:0.5 (aniline: APS) was added into the solution, and reacting for another 12 h under constant stirring at room temperature.

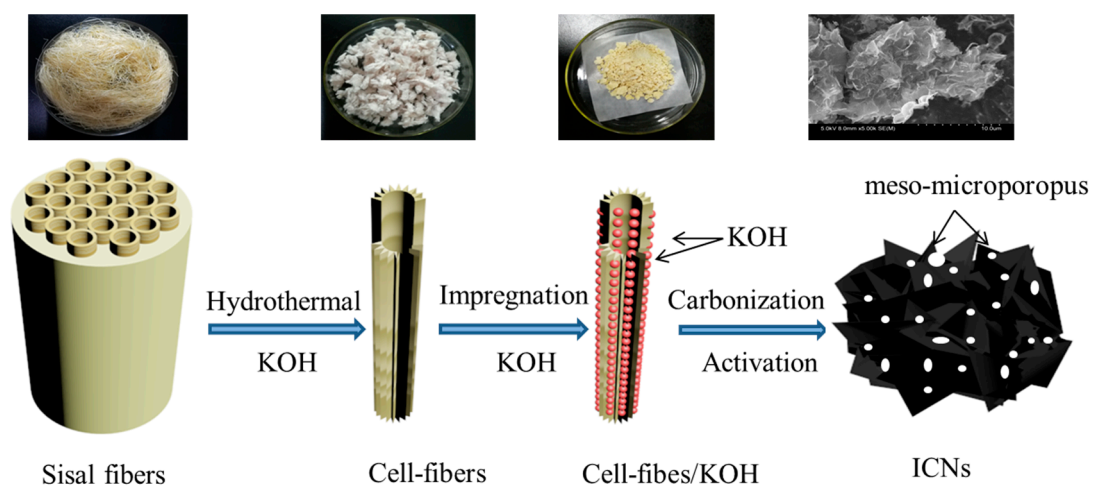


Figure S5 The Schematic illustration of the synthesis procedure of ICNs

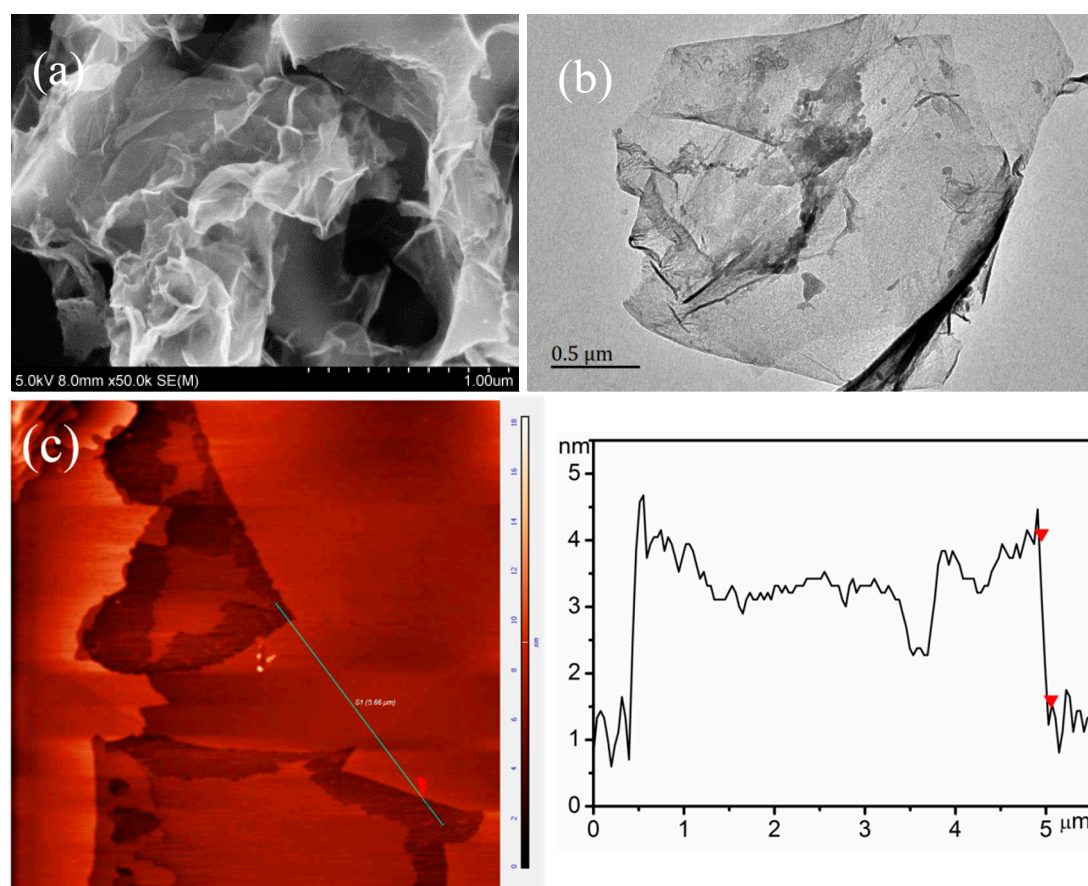


Figure S6 (a) SEM (b) TEM and (c) AFM images of ICNs