

Supporting Information

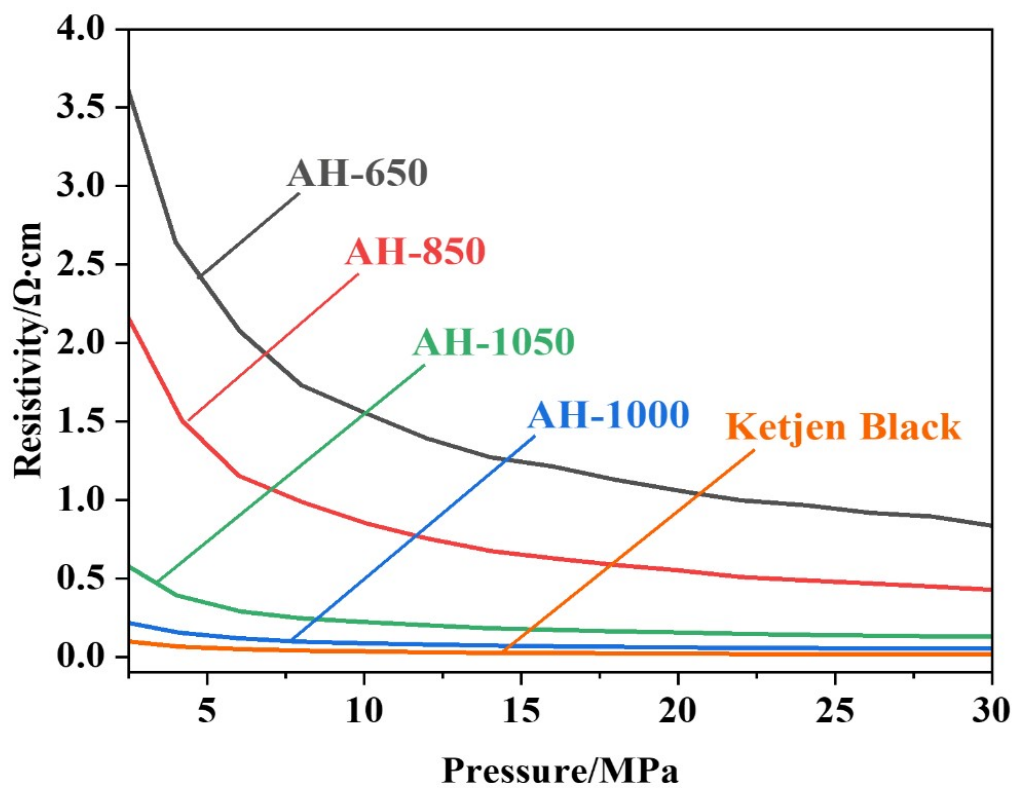


Fig. S1. Resistivity comparison of AH-650, AH-850, AH-1000, AH-1050, and Ketjen Black under different pressures. This supplementary comparison shows that the cattle-manure-derived carbons remain less conductive than the commercial conductive carbon reference.

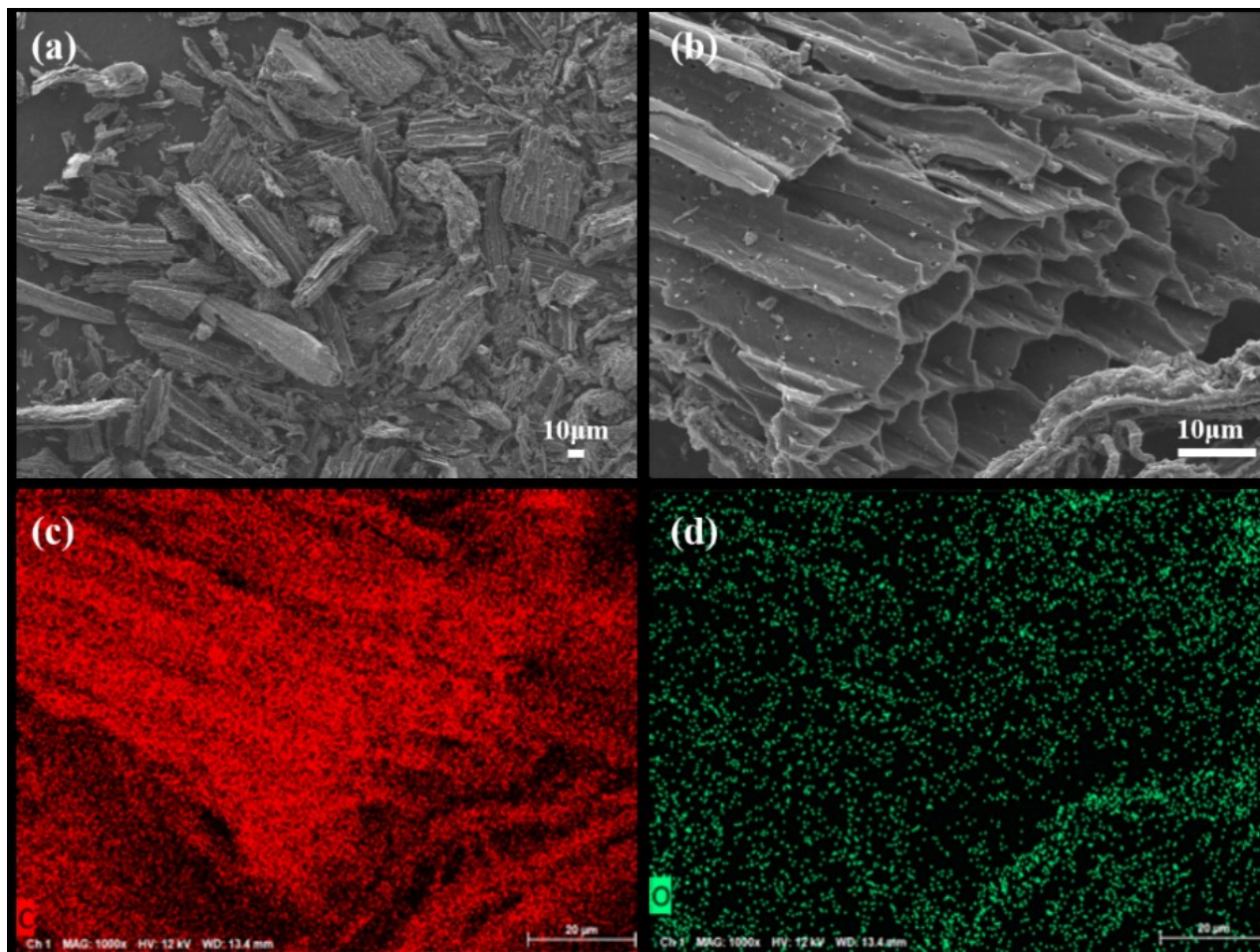


Fig. S2. SEM images and EDS elemental mapping of AH-1000, showing the morphology and the spatial distributions of C and O in the selected region. The mapping data are used as auxiliary evidence for elemental distribution, while the composition and chemical states are discussed mainly based on EA and XPS.

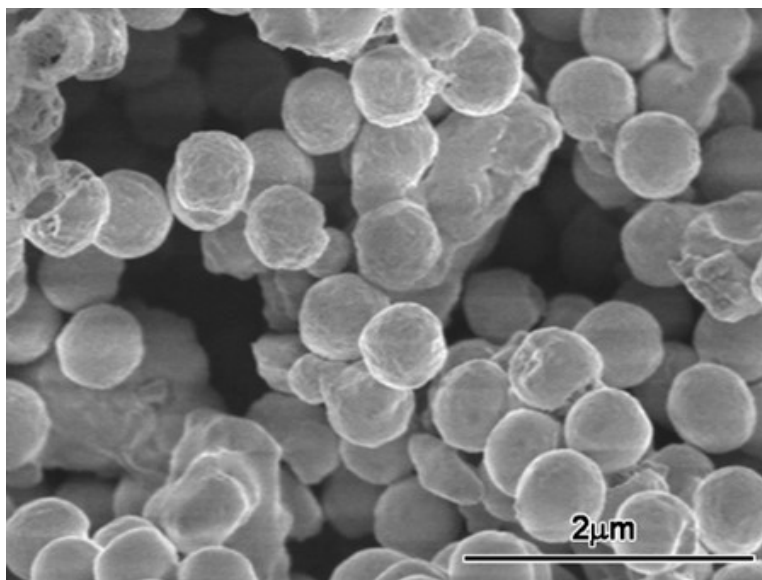


Fig. S3. SEM images of the prepared nano-sulfur obtained by the acid-induced precipitation process.

Preparation of nano-sulfur:

Nano-sulfur was prepared through an acid-induced precipitation process. Briefly, 200 mL of $\text{Na}_2\text{S}_2\text{O}_3$ aqueous solution (0.1 mol L^{-1}) was added to 0.111 g of polyvinylpyrrolidone (PVP, $M_w \approx 40,000$) and stirred for 30 min until complete dissolution. Then, 20 mL of HCl solution (1 mol L^{-1}) was slowly added dropwise into the above solution, with the total addition time controlled within 3 min. After stirring for 2 h, the solid product was collected by vacuum filtration, thoroughly washed with deionized water, and dried at $60 \text{ }^\circ\text{C}$ to obtain nano-sulfur.