

One-Step Carbonization Synthesis of Hollow Carbon Nanococoons with Multimodal Pores and their Enhanced Electrochemical Performance for Supercapacitor

Jianan Zhang,^a Kaixi Wang,^a Shaojun Guo,^{*b} Shoupei Wang,^a Zhiqiang Liang,^c Zhimin Chen,^a Jianwei Fu,^a and Qun Xu^{*a}

^aCollege of Materials Science and Engineering, Zhengzhou University, Zhengzhou 450052, P. R. China. Fax: (+86)371-67767827; Tel: (+86)371-6776782; E-mail: qunxu@zzu.edu.cn

^bPhysical Chemistry and Applied Spectroscopy, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, United States; E-mail: shaojun.guo.nano@gmail.com

^cKey Laboratory of Inorganic Synthesis and Preparative Chemistry, College of Chemistry, Jilin University, Changchun 130012, P. R. China.

Figures

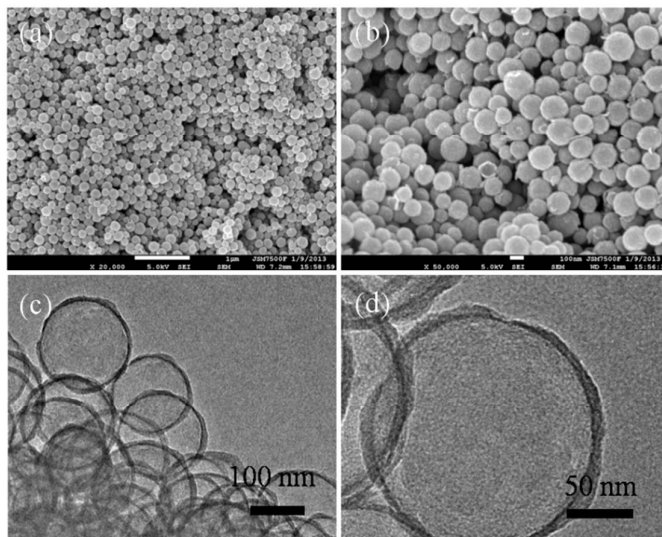


Fig. S1 SEM (a, b) and TEM (c, d) images of HCNs at different magnifications.

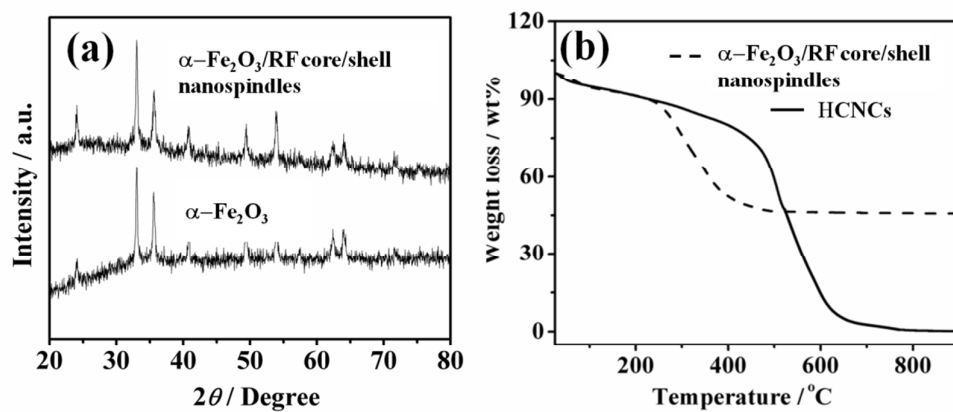


Fig. S2 (a) XRD patterns of spindle $\alpha\text{-Fe}_2\text{O}_3$ and $\alpha\text{-Fe}_2\text{O}_3/\text{RF}$ core/shell nanospindles, respectively. (b) TGA curves of HCNCs and $\alpha\text{-Fe}_2\text{O}_3/\text{RF}$ core/shell nanospindles under air atmosphere with a heating rate of $10\text{ }^\circ\text{C min}^{-1}$, respectively.

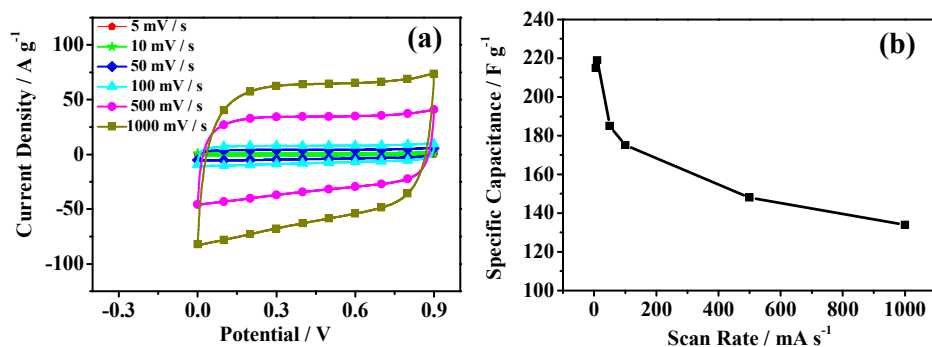


Fig. S3 Cyclic voltammograms (a) and specific capacitances (vs. scan rate) (b) of HCNCs. The test electrodes were prepared by loading a slurry consisting of 80 wt % active materials, 10 wt % carbon black, and 10 wt % poly(tetrafluoroethylene) (used as a binder, PTFE 60 wt% dispersion in H_2O , Sigma-Aldrich) on a nickel foam ($1 \times 1\text{ cm}^2$, $1.5 \times 1.5\text{ cm}^2$) and dried at $60\text{ }^\circ\text{C}$ for 24 h. As-made electrodes were pressed at a pressure of 10 MPa for 1 min and further dried in a vacuum oven at $60\text{ }^\circ\text{C}$ overnight. The loading mass of the active materials is 2 mg. The electrolyte was 2.0 M KOH aqueous solution.

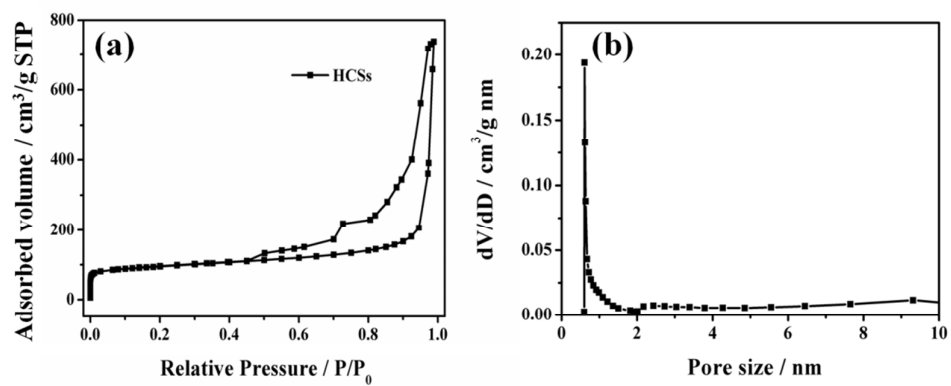


Fig. S4 (a) N_2 sorption isotherms and (b) the BJH pore size distribution curves of HCSs.

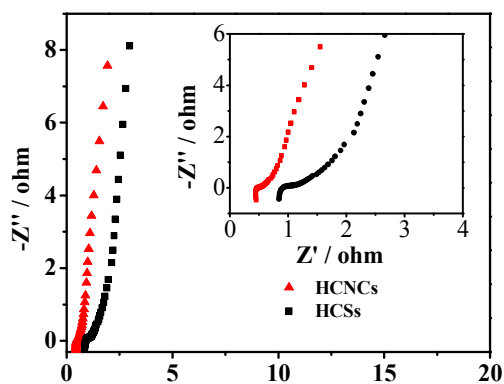


Fig. S5 Electrochemical impedance spectra of HCNCs and HCSs measured in the frequency range of 10 mHz to 10 kHz at the open circuit voltage with an alternate current amplitude of 5 mV.