

Supporting Information for

A superior low-cost amorphous carbon anode made from pitch and lignin for sodium-ion batteries

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Author contributions

Y.-S. H. conceived and designed this work; Y. M. L. performed all the synthesis and electrochemical experiments; Y. M. L. and Y.-S. H. wrote the paper; all the authors participated in analysis of the experimental data and discussions of the results as well as preparing the paper.

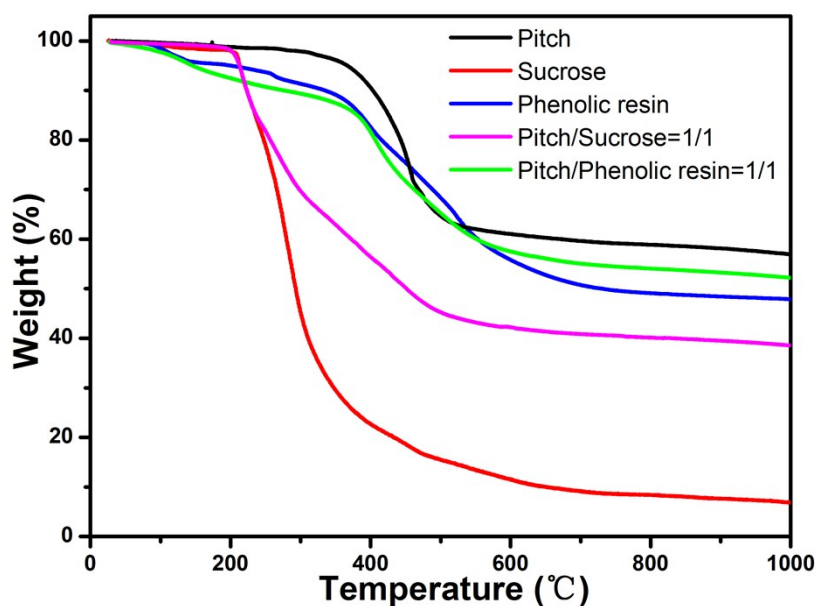


Fig. S1 TGA data of pitch, sucrose, phenolic resin and the mixture of pitch and them with a mass ratio of 1/1.

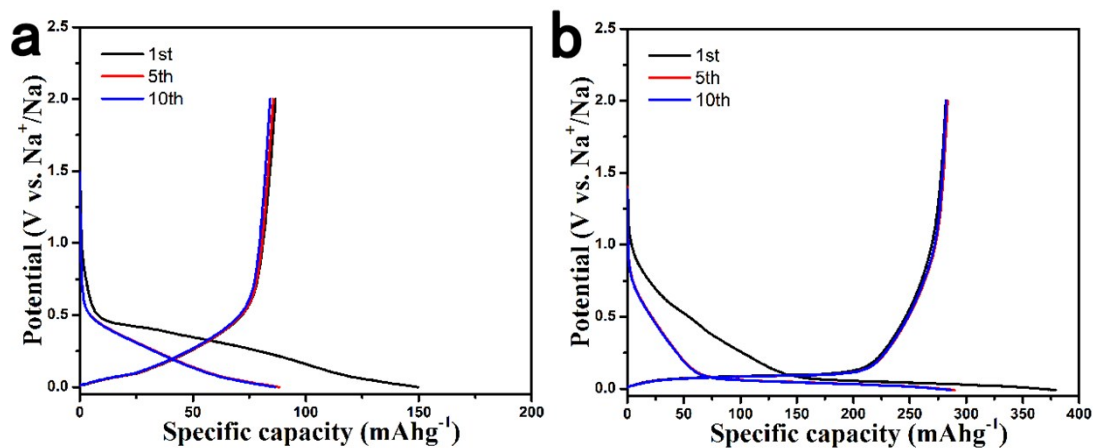


Fig. S2 The discharge and charge curves of the carbon electrode pyrolyzed from (a) pitch and (b) lignin at 1400 °C for the 1st, 5th and 10th cycles at a current density of 30 mA g⁻¹.

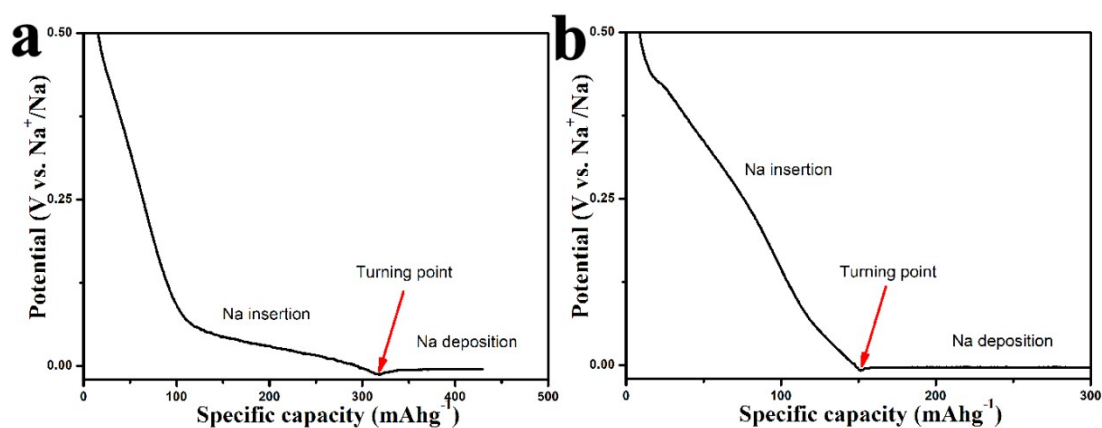


Fig. S3 The initial discharge curves of (a) AC111400 and (b) pitch with a cut-off voltage of -0.02 V. The voltage at the turning point is -0.015 V. One can see a long flat plateau which can be ascribed to the Na deposition on the surface of carbon. This is different from the Na insertion into hard carbon.

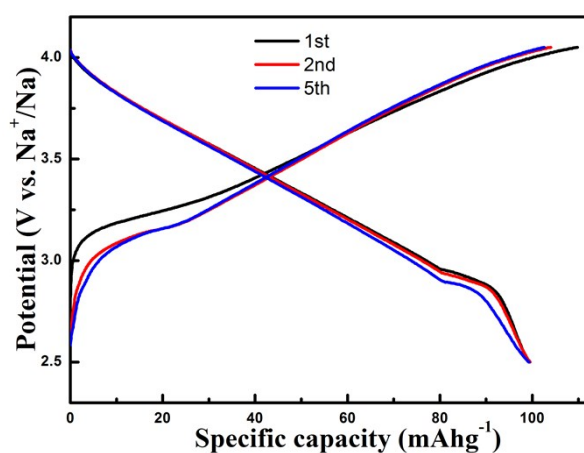


Fig. S4 The typical charge and discharge curves for 1st, 2nd and 5th cycles of the O3-Na_{0.9}[Cu_{0.22}Fe_{0.30}Mn_{0.48}]O₂ cathode at a current density of 10 mA g⁻¹.