The supporting information For

Bioresource Derived Porous Carbon from Cottonseed Hull for Removal of Triclosan and Electrochemical Application

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Abstract: Biomass-derived porous carbon materials have drawn considerable attention due to their natural abundance and low cost. In this work, nitrogen enriched porous carbons (NRPCs) with large surface areas were designed and prepared from cottonseed hull via simultaneous carbonization and activation with a facile one-pot approach. The NRPCs were tunable in terms of pore structure, nitrogen content and morphology by adjusting the ratio of the carbon precursor (cottonseed hull), nitrogen source (urea), and activation agent (KOH). The as-synthesized NRPCs exhibited three-dimensional oriented and interlinked porous structure, high specific surface area (1160-2573 m^2 g^{-1}) and high level of nitrogen-doping (6.02-10.7%). In a three electrode system, NRPCs prepared at 800 °C with the ratio (cottonseed hull : KOH: urea) of 1:1:2 (NRPC-112) showed high specific capacitance of 340 F g^{-1} at current density of 0.5 A g^{-1} and good rate capability (~80% retention at current density of 10 A g^{-1}) with 6 M KOH as electrolyte. In two electrode cell, NRPC-112 demonstrated high specific capacitance of 304 F g^{-1} at 0.5 A g^{-1} and excellent rate capacity (~71% retention at current density of 10 A g^{-1}) as well as excellent cycling stability (~91% retention at 5 A g^{-1}) after 5000 cycles. Furthermore, the NRPCs exhibited an extraordinary adsorption capacity up to 205 mg g^{-1} for emerging pollutant Tricloson (TCS). The work provided a sustainable approach to prepare functional carbon materials from biomass based resource for environment remediation and electrochemical applications.

Keywords: nitrogen-enriched porous carbons, bioresource, supercapacitors, Tricloson adsorption

The electrochemical properties of NRPC-112 were evaluated both in a three-electrode system using 1 M H_2SO_4 solution as electrolyte. Fig. S1a showed the CV curve of NRPC-112 at various scan rates. Fig. S1b was the GCD curves at current density range from 0.5 A g^{-1} to 10 A g^{-1}. It was found that the curves were near isosceles triangle shape. The Nyquist plot of NRPC-112 based symmetric supercapacitor was shown in Fig. S1c. It was found that the equivalent series resistance of NRPC-112 based symmetric supercapacitor was about 0.7 Ω. Fig. 9d showed the specific capacitance at various current densities. It showed that the specific capacitance of NRPC-112 was 336, 313, 190, 269, 242 F g^{-1} at the current density of 0.5, 1, 2, 5, 10 A g^{-1}, respectively, implying the rate capability of ~72% retention.

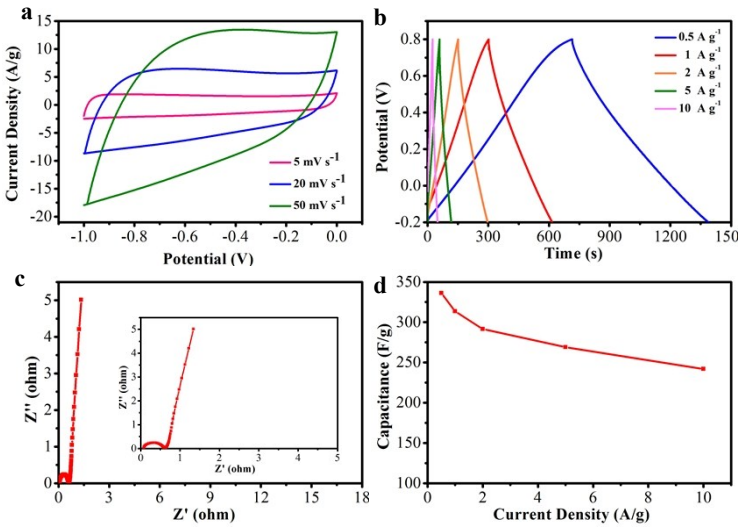

Fig. S1 Electrochemical performance of the NRPC-112 in 1 M H_2SO_4 (a) CV curves at different scan rates (b) GCD profiles tested at 0.5-10 A g^{-1} (c) Nyquist plots. (d) Specific capacitance at different current densities.