Electronic Supplementary Material (ESI) for Energy & Environmental Science


# Carbon Coated Textiles for Flexible Energy Storage in Smart Garments

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## Supplemental Information:

### A. Pore Size Distribution for YP17, CXV and Carbon Onions (1800°C)

The pore size distribution (PSD, **Figure SI. 1** ) was determined through nitrogen gas sorption as described in section 2.11 for YP17 activated carbon, CXV activated carbon and carbon onions annealed at 1800°C (Section 2.1). YP17 shows the most narrow PSD and, on average, the smallest mean pore size, followed by CXV and carbon onions. The pores in carbon onion electrodes can be understood as the pore volume comprised between single onions / clusters of carbon onions (this includes pores which are larger than the average diameter of the onions) and slitpores on the surface of the carbon onion nanoparticles.

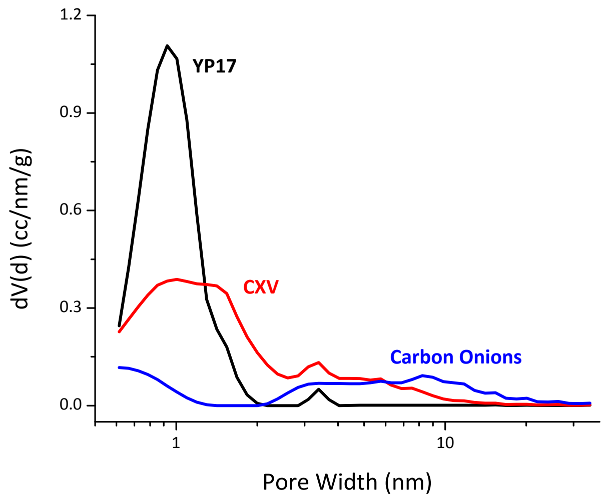


**Figure SI. 1.** Pore size distribution of carbon materials (Section 2.1)

**B. Galvanostatic Cycling and Electrochemical Impedance Spectroscopy of Cotton Lawn YP17 tested in 1M $Na_2SO_4$**

The electrodes were cycled galvanostatically at 2.5 mA·cm$^{-2}$ and 5 mA·cm$^{-2}$ corresponding to ~0.25 A·g$^{-1}$ and 0.5 A·g$^{-1}$ respectively. The plots show no electrochemical bumps, and the charge and discharge curves are linear and symmetrical (**Fig. SI. 2**). Electrochemical Impedance Spectroscopy (EIS) was conducted with an amplitude of 10 mV with a frequency range from 10 mHz to 200 kHz (**Figure SI. 3**). A full description of the electrochemical testing resutls can be found in Section 4.2.

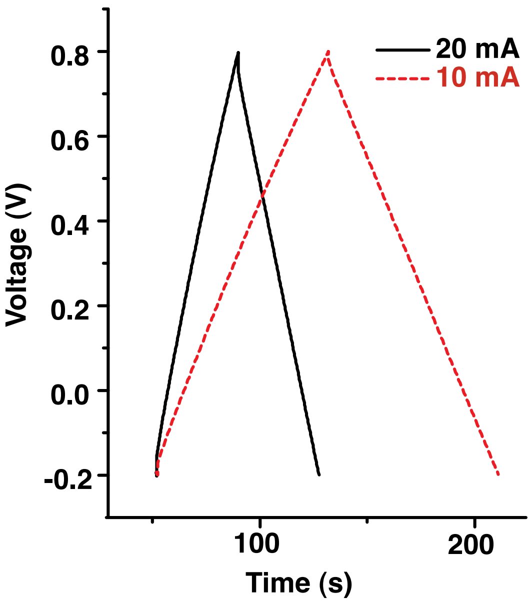


**Figure SI. 2**. Galvanostatic plots for cotton lawn YP17 devices tested in sodium sulfate.

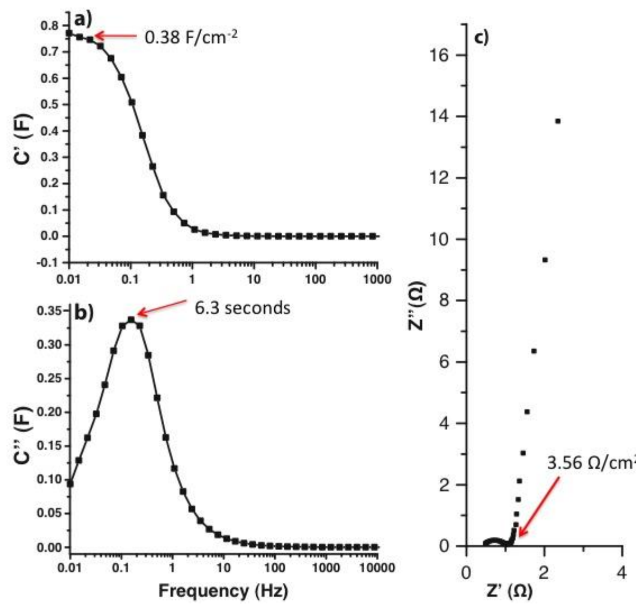


**Figure SI. 3**. EIS plots for cotton lawn coated with YP17 and tested in 1M sodium sulfate. a) capacitance derived from the imaginary part of the impedance shows cotton lawn YP17 having a device capacitance of 0.76 F. b) the time constant is derived from the real part of the impedance with a peak of 6.3 seconds. c) the nyquist plot of the real and imaginary impedance for the cotton lawn device having a device resistance of 0.89 Ω at 1 kHz.