Electronic Supplementary Material (ESI) for RSC Advances.

Boosting the supercapacitive properties of polypyrrole with chitosan and hybrid silver nanoparticle/nanocluster

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Calculation

Three-electrode configuration

The specific capacitance was calculated from the galvanostatic charge/discharge (GCD) curves using equation (1).

$$C_m = I\Delta t/m\Delta V \qquad (1)$$

where C_m is the specific capacitance in farads per gram, I is the discharge current, Δt is the discharge time, m is the mass of the active materials in the electrode and ΔV is the potential window.

Two-electrode configuration

A symmetric supercapacitor cell was assembled using a Teflon Swagelok® construction with two equal Ag@PPy/CS electrodes. The separator is a piece of filter paper soaked with 1.0 M H_2SO_4 electrolyte. The specific capacitance was calculated according to equation (2)

$$C_m = 4C/m \quad (2)$$

where C is the experimental measured capacitance of the supercapacitor device, and m is total mass of the active materials in both electrodes. Electrochemical impedance spectroscopy (EIS) was carried out with a perturbation amplitude of 5 mV versus the open-circuit potential within a frequency range of 100 kHz to 0.1 Hz. The energy and power density of the symmetric supercapacitor were calculated from the GCD measurements by employing equations (3) and (4), respectively.

$$E_{cell} = C_{cell}V^2/2 \quad (3)$$

$$P_{cell} = E_{cell}/\Delta t \quad (4)$$

where E_{cell} is the energy density (W h kg^{-1}), C_{cell} is the specific capacitance of the cell, V is the working potential window, P_{cell} is the power density (W kg^{-1}), and Δt is the discharge time.

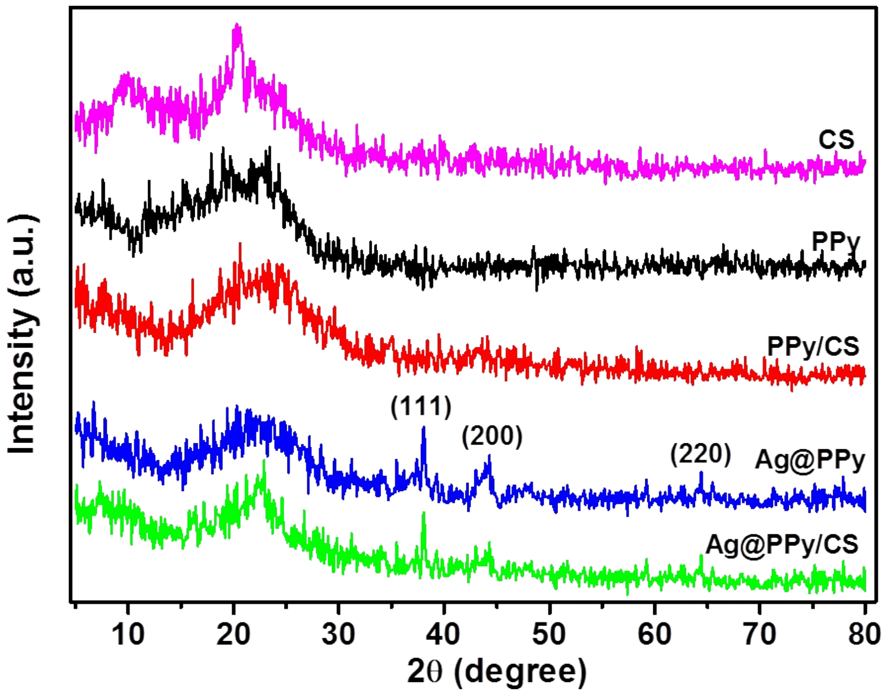

Figure S1: X-ray diffraction patterns of CS, PPy, PPy/CS, Ag@PPy and Ag@PPy/CS nanocomposites.