Supplementary Information

UV-assisted Synthesis of Ag-poly-aminosalicylic acid Hybrid System for Asymmetric Supercapacitor and its Application as Low Pass Filter

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1. Electrode preparation and electrochemical parameter evaluation:

In this work, Ni-foam (active area: 1×1 cm^2) was applied as the working electrode and was modified with a slurry (1.2 mg cm^{-2}) composed of Ag-PASA (active material), PVDF, carbon black, in the ratio of 85:10:5 (wt%), in presence of NMP as a solvent and dried at 80 °C under vacuum. The electrochemical properties of the working electrode were evaluated at room temperature using a three-electrode setup with a platinum wire as counter electrode and saturated calomel electrode (SCE) as reference electrode in presence of KOH (1.0 mol dm^{-3}) as an electrolyte. The electrochemical characterization was performed using a Bio-Logic SP-300 system.

The specific capacity of the active material (Ag-PASA) was calculated using the following equations (1) and (2), derived from the cyclic voltammetry and galvanostatic charge-discharge experiments, respectively.

$$S_{CP} = \int IdV/2m_e v \ldots \quad (1)$$

$$S_{CP} = I\int Vdt/m_e V \ldots \quad (2)$$

where, S_{CP}, $\int IdV$, m_e, v, I, $\int Vdt$ and V represent specific capacity, area under cyclic voltammetry curve, mass of the electroactive material, scan rate, specific current, area under the discharge curve and potential window, respectively.

2. Design of asymmetric supercapacitor device:

An asymmetric supercapacitor was fabricated in a coin cell configuration using activated carbon as the anode electrode and Ag-PASA as the cathode electrode. The cathode electrode material for the device was prepared as described above, section 1. The anode electrode was prepared by mixing activated carbon and PVDF (95:5 wt %) in NMP. To attain a superior electrochemical performance, mass balance of both the electrodes was done using the equation (3),

$$m_+/m_- = S_{CP-} \times \Delta V_-/S_{CP+} \times \Delta V_+ \ldots(3)$$

Where, S_{CP+}, m_+, ΔV_+ and S_{CP-}, m_-, ΔV_- are the specific capacity, mass and potential window of the cathode and anode electrodes, respectively. The specific energy and specific power were calculated using the following equations.

$$S_E = I\int Vdt/m_e 3.6 \ldots \quad (4)$$

$$S_P = S_E \times 3600/t \ldots \quad (5)$$

where, S_E, S_P and t represent specific energy, specific power and discharge time.