Supporting information

Nanosized silver phosphate based asymmetric and symmetric electrochemical capacitors for first and second-order low-pass filter application

Material Characterization: X-ray diffraction (XRD) study was performed using a PANalytical X'pert diffractometer to determine the crystal structure. Surface features were examined using a JEOL JSM-7001F scanning electron microscope (SEM) operating at 15 kV. Transmission electron microscopy (TEM) thechique (JEOL JEM-ARM200F) provided detailed morphological insights. Surface chemistry was analyzed through X-ray photoelectron spectroscopy (XPS) using a Thermo Scientific MultiLab 2000. Raman spectroscopy, conducted with a Jobin-Yvon T64000 spectrometer, offered information on molecular vibrations. Fourier transform infrared spectroscopy (FTIR) measurements were performed with a Shimadzu IRSpirit-X to identify functional groups.

Figure: S1

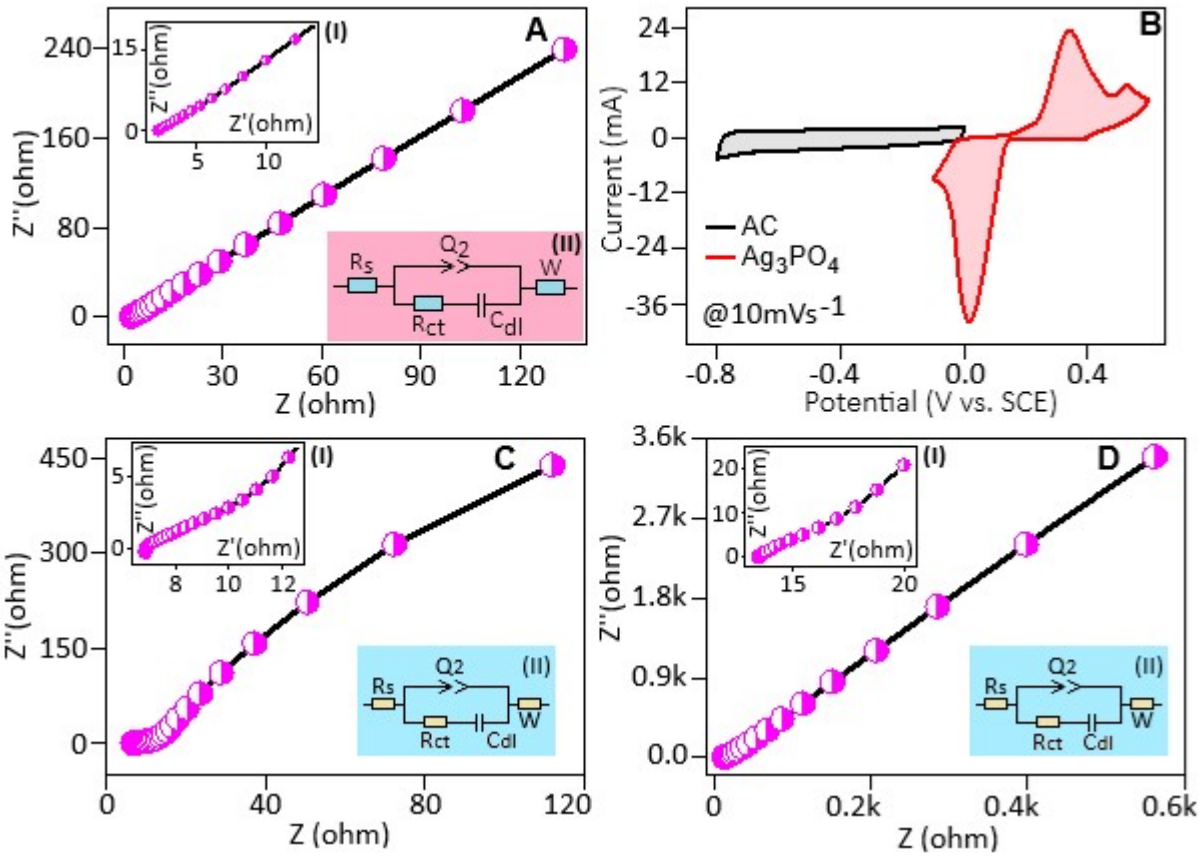

Figure S1: (A) Nyquist plot within the frequency ranges from 100 mHz to 200kHz for three electrode system. Inset figures: (I) magnified image of the plot for the high-frequency region and (II) equivalent circuit model. (B) Comparative voltammograms of the activated carbon and SPO modified electrodes at 10 $mV.s^{-1}$. (C) Nyquist plot for the asymmetric device within the frequency ranges from 100mHz to 200kHz. Inset figures: (I) magnified image of the plot for the high-frequency region and (II) equivalent circuit model. (D) Nyquist plot of the symmetric device within the frequency ranges from 100mHz to 200kHz. Inset figures: (I) magnified image of the plot for the high-frequency region and (II) equivalent circuit model.

Table S1: Electrochemical performance parameters for various silver-based electrode materials used in electrochemical capacitor applications.

Table: S1

Electrode material	Electrolyte	Specific capacitance /capacity (Device)	Energy density (Wh/kg)	Power density (kW/kg)	Stability @ cycles	Ref.
Ag-CuO	KOH (6M)	134.98 F/g @1.5A/g	40.02	1.0	96.7% @5000	[1]
Ag-PASA	KOH (1M)	55 C/g @ 5 mV/s	15.1	0.3	85% @10000	[2]
Ag_2S /graphene	KOH (6M)	20 F/g @1 A/g	15	1.8	80% @7500	[3]
Ag-CoS	KOH (1M)	97 C/g @1 A/g	22.3	0.8	82 % @1000	[4]
$Ag_2Co_3(PO_6)_2$	KOH (1M)	178.59 C/g @ 1 A/g	40.92	4.1 @ 5 A/g	89.21 @3000	[5]
β-Ag_2MoO_4	KOH (2M)	392 C/g @ 2 A/g	54	7.5	79.7 @5000	[6]
Ag_2CrO_4	KOH (1M)	36 C/g @ 0.4 A/g	13.0	0.3	85 % @5000	[7]
Ag_3PO_4	KOH (2M)	99 C/g @ 0.5A/g	41	0.86	86% @5000	This work

* Ag-CuO: silver copper oxide; Ag-PASA: silver-poly (aminosalicylic acid); Ag CoS : silver cobalt-sulfide; Ag_2S: silver sulfide; $Ag_2Co_3(PO_6)_2$: silver cobalt phosphate; β-Ag_2MoO_4: silver molybdate; Ag_2CrO_4: silver chromate.

References:

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