SUPPLEMENTARY INFORMATION

Silica-templated ordered mesoporous carbon thin films as electrodes for micro-capacitors

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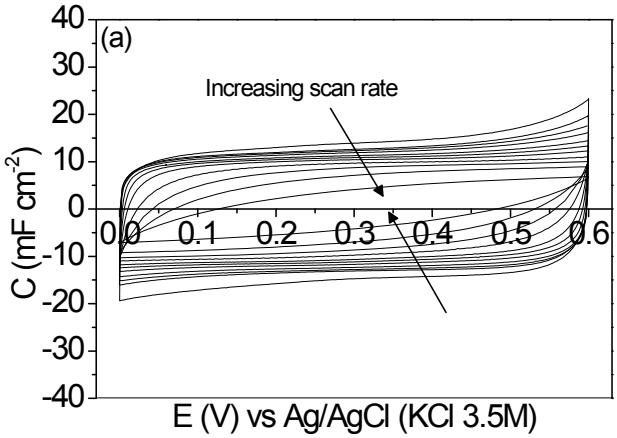
S1. Three-electrode electrochemical characterization results

Figure S1a shows the voltammograms done between 0.00 V and 0.60 V at different scan rates. The voltammograms show a quasi-rectangular shape even at high scan rate values. Figure S1b shows the voltammograms done at 5 mV s^{-1} under three subsequent potential windows: between -0.20 V and 0.80 V (dash line), between -0.40 V and 1.00 V (dot line) and between -0.60 V and 1.00 V (solid line). A similar behaviour to that observed for mesoporous carbon thin film is shown. Upon broadening the potential window several redox processes takes place. The oxidation of the carbon material from 0.60 V to more positive values and the corresponding cathodic peak at around 0.37 V are observed (see dot and solid lines). Furthermore, the electrochemical hydrogen evolution process (starting from -0.20 V to less positive potential values) and the oxidation of the adsorbed hydrogen in the subsequent positive sweep (at around 0.10

V), are also shown. Moreover, a well-defined oxidation peak at 0.72 V is observed during the positive sweep (see dot and solid lines). Since this peak does not appear in the mesoporous carbon thin film, it may be related to oxygen groups originated from remnant traces of the carbonized F127 surfactant used in the synthesis of the mesoporous silica thin film. It should be noted that this oxidation peak does not appear in the potential window between -0.20 V and 0.80 V, thus suggesting that the oxygen groups originated from these remnant traces of the carbonized F127 should be previously reduced (upon reaching more negative potential values) and then oxidized in the subsequent anodic sweep. Figure S1c, shows the voltammograms done between 0.00 V and 0.60 V at different scan rates after opening the potential window. Likewise for mesoporous carbon thin film, the capacitance values increase with respect to the recorded before broadening the potential window.



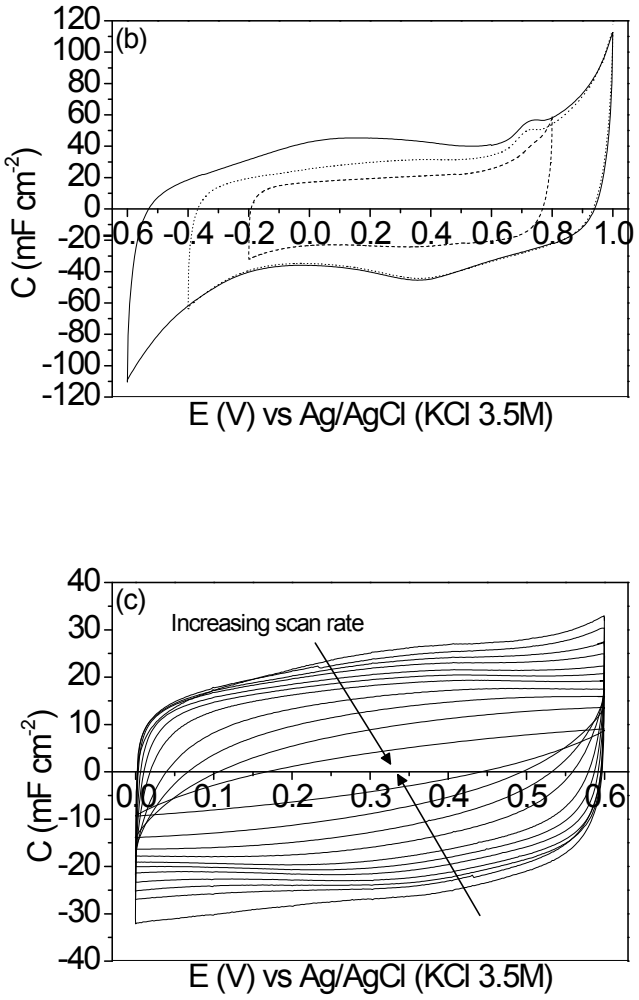


Figure S1. Cyclic voltammograms of the composite silica/carbon thin film in 1M H_2SO_4 solution: between 0.00 V and 0.60 V at 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000 mV s^{-1} (a); between -0.20 and 0.80 V (dash line), between -0.40 V and 1.00 V (dot line) and between -0.60 and 1.00 V (solid line) at 5 mV s^{-1} (b); between 0.00 V and 0.60 V at 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000 mV s^{-1} after opening the potential window (c).

From GCD characterization results it can be seen that the curves show a quasi-ideal triangular and symmetrical shape, and negligible ohmic drop, typical of a capacitive behaviour associated to the formation of the EDL.

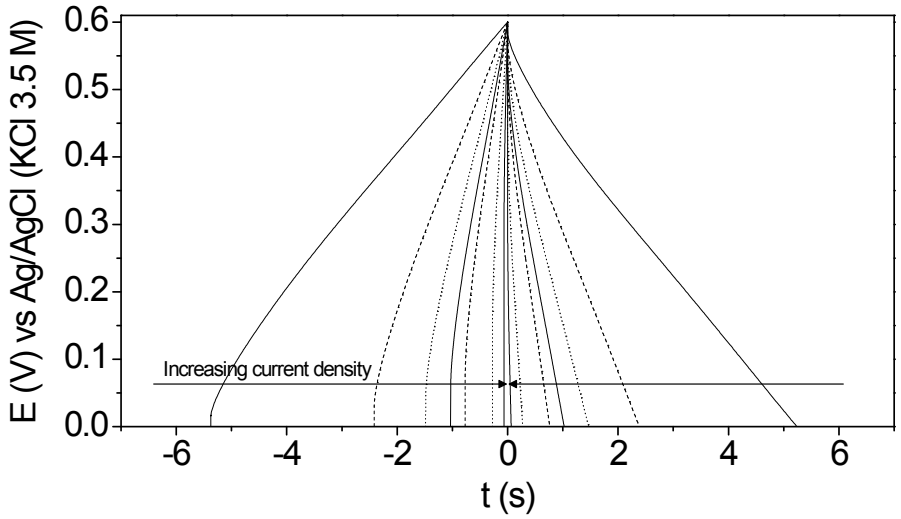


Figure S2. 4th chage-discharge cycle of the composite silica/carbon thin film in 1M H_2SO_4 solution at: 2 (solid line), 4 (dash line), 6 (dot line), 8 (solid line), 10 (dash line), 20 (dot line), 40 (solid line) mA cm^{-2}.