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Pseudo-capacitance of silver oxide thin film electrodes in ionic liquid for electrochemical energy applications(Article)(Открытый доступ)

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The energy storage potential of silver oxide (Ag_2O) thin film electrodes, deposited via radio frequency reactive magnetron sputtering, was investigated in an ionic electrolyte (1-Ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide) for supercapacitor applications. X-ray diffraction (XRD), Raman spectroscopy, X-ray photoelectron spectroscopy (XPS) and Fourier Transform infrared spectroscopy (FTIR) tools were used to evaluate the structural and oxide phases present in the sputtered silver oxide thin film electrodes. The growth mode, morphology, surface area, wettability and surface energy of the deposited nano-structure silver oxide thin films were confirmed by scanning electron microscope (SEM) data, the Brunauer-Emmett-Teller (BET) analysis and by goniometer and tensiometer studies. Furthermore, the ion diffusion, the Faradaic redox reactions and the capacitance of the sputtered thin films exposed to 1-Ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide ionic electrolyte, were monitored with electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV). The SEM micrographs depict that silver oxide thin films exhibit a columnar growth mode. The wettability analysis reveals that Ag_2O thin films are hydrophilic, an indication for excellent electrochemical behaviour. Cyclic voltammetry measurements show that Ag_2O thin films exhibit a specific capacitance of 650 F/g at higher sputtering power, demonstrating its promising potential as an active electrode for supercapacitor applications. © 2019 The Authors