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Silver thin film electrodes for supercapacitor application(Article)

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The potential of a radio frequency (RF) magnetron sputtered silver (Ag) thin film electrodes, for electrochemical energy storage application is presented in this paper. Scanning electron microscope (SEM) was used to reveal the information on the morphology and growth mode of the deposited silver thin film samples. The stoichiometry of the RF sputtered silver thin films was evaluated using X-ray diffraction (XRD), while the elemental constituents of the deposited thin films were confirmed using energy dispersive X-ray spectroscopy (EDX). The surface area, wettability and surface energy of silver thin film electrodes were determined, using Brunauer-Emmett-Teller (BET) and contact angle measurements. Furthermore, the ion diffusion, Faradaic redox reactions and the specific capacitance of the produced Ag thin film electrodes in ionic liquid (1-Ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide) were probed using electrochemical impedance spectroscopy (EIS), charge-discharge and cyclic voltammetry (CV). XRD result reveals that the sputtered silver thin films are crystalline, with metallic silver been the predominant element found on the EDX spectra. The specific capacitance of 431 F/g at 2 mV/s scan rate was achieved for Ag thin film electrode produced at 350 W forward power, demonstrating its promising potential as an active electrode for supercapacitor application. 