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14. ABSTRACT

Ordered carbon nanotube (CNT) arrays with pore diameter 24.4 ± 4.6 nm formed within anodized aluminum oxide (AAO) bonded to Si were used as electrodes for supercapacitors with neat EMIM-BF4 ionic liquid as the electrolyte. A series of devices with increasing AAO thickness (equal to CNT length) were tested using electrochemical impedance spectroscopy (EIS). Data were fit using the de Levie model of porous electrodes to determine the electrochemically active surface area and the in-pore electrolyte resistivity. The results indicate that uncatalyzed chemical vapor deposition (CVD) of CNTs in AAO can lead to blocked CNTs and reduced active area. The average resistivity of the electrolyte within the pores across the four devices tested was determined to be approximately 383 Ω cm, more than five times higher than the reported bulk resistivity of 70.9 Ω cm. It is possible that the enhanced resistivity is due to hydrophilic surface functionalities on the surface of the CNTs.

15. SUBJECT TERMS
CNTs(carbon nanotubes), supercapacitor, ionic liquid, AAO(anodized aluminum oxide), EDLC(electrochemical double layer capacitor)

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