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Performance of Nickel Cobaltite - Anodised Titania Nanotubes Composite Electrochemical Capacitor Electrodes in Different Electrolytes

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Abstract. The effects of electrolyte on the electrochemical performance of nickel cobaltite – titania nanotubes composite electrochemical capacitors were evaluated. Four types of electrolyte were selected, namely aqueous electrolytes, 1.0 M KCl, 1.0 M HCl, 1.0 M KOH; and organic 0.27 M tetra-n-butylammonium tetrafluoroborate (TBATFB) in acetonitrile. Results have shown optimal performance in 1.0 M KOH, which endowed the composite with excellent rate capability up to 200 mV s⁻¹. Charge – discharge analyses has shown that the composite possessed specific areal capacitance of up to 214 $\mu\text{F cm}^{-2}$ when evaluated at a current density of 350 $\mu\text{A cm}^{-2}$. The composite retained up to 97.79 % of its capacitance when current density was increased to 400 $\mu\text{A cm}^{-2}$. The composite has demonstrated a promising application for electrochemical capacitors through its facile fabrication technique.

Keywords: Nickel cobaltite, titania nanotubes composite, wet impregnation, electrolytes, ionic liquid