



Layered sodium titanate nanostructures as a new electrode for high energy density supercapacitors



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ABSTRACT

A flower-shaped hydrated layered sodium titanate material, $\text{Na}_2\text{Ti}_2\text{O}_4(\text{OH})_2$, have been synthesized through a facile hydrothermal method and subsequently converted into sodium free titania (anatase). Potential application of the $\text{Na}_2\text{Ti}_2\text{O}_4(\text{OH})_2$ as an electrode for supercapacitors under pseudo-capacitance storage mode is evaluated. The $\text{Na}_2\text{Ti}_2\text{O}_4(\text{OH})_2$ showed sixfold higher specific capacitance ($C_s \sim 300 \text{ F g}^{-1}$) in an aqueous electrolyte than the anatase and demonstrated stable electrochemical cycling. This high C_s is originated from a combination of electrochemical double layer and pseudo-capacitance storage mechanisms. The presence of hydrated layered within some loose interlayer plays an important role in assisting the diffusion process of ions as confirmed in electrical impedance spectroscopy analysis.

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