Controlled TiO_2 nanotube arrays as an active material for high power energy storage device

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There has been extensive investigation for the electrode materials of electric double layer capacitors(EDLCs) such as activated carbons, carbon nanotubes, and other carbon based materials, which have high specific surface area. Of the materials being developed for EDLC, activated carbon remains the most promising because of its low cost and high specific capacitance(~200F/g). However, the widespread commercial use of activated carbon is impared by its low volumetric capacitance due to there low density. In this study, charge storage behavior of vertically grown TiO_2 nanotube arrays from electroc double layer was investigated for the first time. The specific capacitances of the TiO_2 nanotube arrays were greatly influenced not only by there crystalline structure but also the electrolyte composition. When the volumetric capacitance of the TiO_2 nanotube arrays were compared with that of activated carbon based EDLC, more than 50% higher capacitance than activated carbon were observed in water based electrolyte.