SYNTHESIS OF TITANIA NANOTUBE ARRAYS FOR SUPERCAPACITOR APPLICATIONS

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This research aimed to increase the capacitance of Titania nanotubes (TNTs) through improved electrical conductivity. The synthesis of Titania nanotubes (TNTs) was carried out using an electrochemical anodization method. To further enhance their performance, the electrochemical reduction process was employed on TNTs to modify the TNTs, involving the variation of the applied voltage to optimize the conditions for this modification. Additionally, graphene oxide (GO) was electrodeposited onto the reduced TiO_2 nanotube arrays. The prepared samples were characterized using Scanning Electron Microscopy (SEM) and X-ray diffraction (XRD), and the electrochemical performance was evaluated using cyclic voltammetry (CV) and galvanostatic charge-discharge tests.

The research outcomes are significant for advancing energy storage techniques, particularly in supercapacitor applications. Increasing the capacitance of TNTAs through improved electrical conductivity enhances the potential for efficient and high-performance energy storage devices. On the other hand, Sri Lanka possesses substantial titanium resources, which are valuable and can be effectively utilized to produce Titania Nanotubes. Hence, this research gives valuable insights into developing efficient and sustainable energy storage solutions, facilitating progress toward a greener and more sustainable future.

Keywords: TiO_2 Nanotube Arrays, Supercapacitor Electrode, Electrochemical Reduction, GO Deposition, Enhancing Capacitance