Synthesis and Characterization of TiO_2 Nanotube Arrays

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TiO_2 is a versatile material that has found applications in a diverse range of devices and applications such as solar cells, photocatalysts, gas sensors, photovoltaics, hydrogen storage, Li-ion batteries etc. In recent years, highly-ordered one-dimensional TiO_2 nanotubes have attracted much attention due to their distinctive properties in these advanced functional devices. In this study, vertically aligned TiO_2 nanotubes were synthesized by anodizing a Ti foil in a non-aqueous electrolyte containing ethylene glycol (97.5 wt.%), NH_4F (2 wt.%) and deionized (DI) water (0.5 wt.%). Scanning electron microscopy (SEM) was used to characterize the morphology of prepared nanotubes. Preliminary results showed the formation of tubular structures with a diameter of 1.315 μm and the wall thickness of 209.1 nm. The results indicate that the morphology of the nanotubes depends on the anodization voltage, anodization time and electrolyte composition. In this study, it is expected to establish a relationship between the nanotube morphology with anodization time, anodization voltage and electrolyte composition. The outcome of this study will enable the synthesis of TiO_2 nanotube structures with tailored morphologies, for possible applications in a wide range of advanced functional devices.

Keywords: *TiO_2, Nanotube Morphology, SEM*