

# Synthesis of highly ordered Titanium dioxide nanotubes: Impact of process parameters

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Highly ordered arrays of Titanium dioxide nanotubes were synthesized from Titanium foil using the electrochemical anodization process in an etching solution consisting of Ammonium Fluoride ( $\text{NH}_4\text{F}$ ) and Ethylene Glycol.  $\text{TiO}_2$  nanotubes have shown great potential in applications such as the new generation solar cells called the Dye Sensitized Solar Cells (DSSC). We examined the possibility of fabricating nanotubes of different lengths by varying the anodization parameters. The lengths and diameters of the synthesized  $\text{TiO}_2$  were found to be governed by two main process parameters, current density and etching solution composition. The etching process was carried out in two different configurations. First, 55volts DC was used to drive the etching process. The anodic current in this case was found to be between 0.07 to 0.01 amperes. Secondly, 55 volts DC with 5 volts AC was employed to carry out the etching process. The average anodic current was found to be higher in the second case. The recorded anodic current was between 0.1 to 0.01 amperes. The characterization of the synthesized  $\text{TiO}_2$  was carried out using the Atomic Force Microscope (AFM).