

Supporting information

1. Fabrication of the TiO₂ nanotubes

The titanium foil(99.99 %, supplied by sigma- aldrich) is anodized in an electrolyte containing 0.5 wt % ammonium fluoride and 2 vol % de-ionized water in ethylene glycol The anodization has been carried out at 50V for one hour room temperature (25°C), in a two electrode system with mirror polished titanium foil as working electrode and counter electrode. The distance between the working electrode and counter electrode .is maintained at 3 cm. Ultrasonic cleaning in deionised water has been done to remove surface deposited nanograss after the anodization.

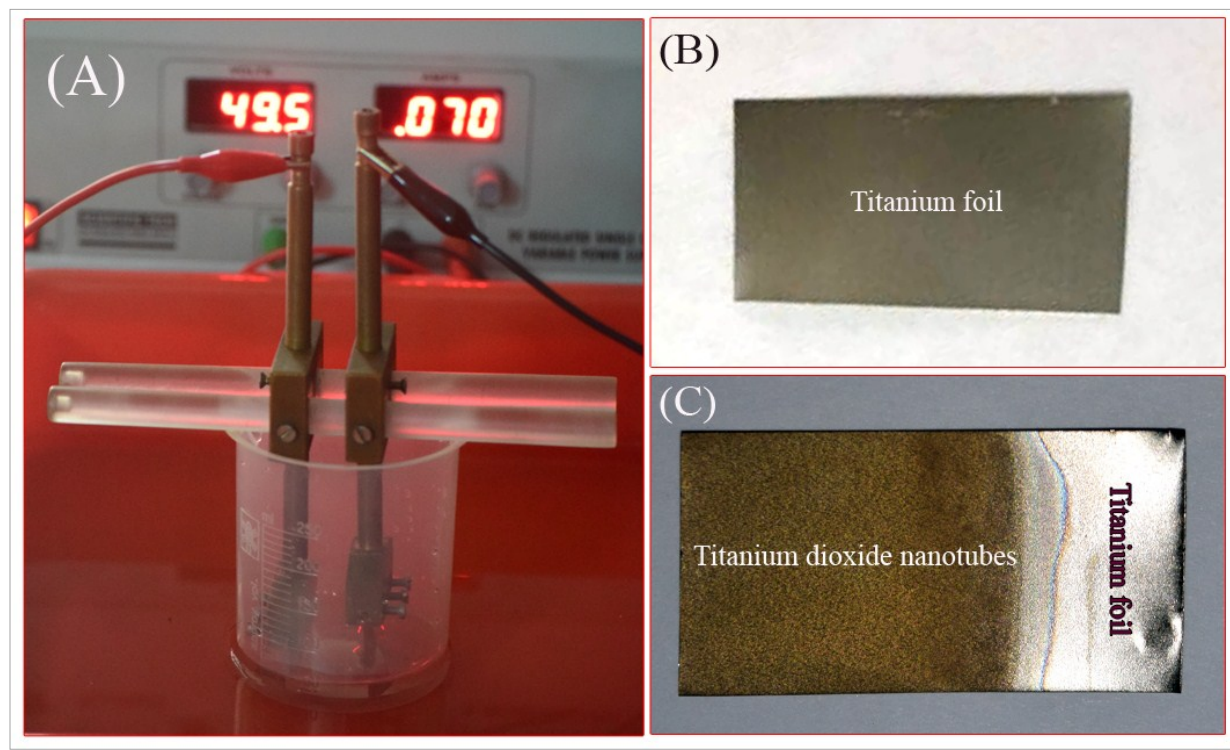


Figure. 1 (A) Experimental set up used for the fabrication of the TiO₂ Nanotubes. (B) Titanium foil before electrochemical anodization (C) formation of TiO₂ Nanotubes on the titanium foil after electrochemical anodization.

2. Method of pulsed crystallization

The pulsed crystallization is done by applying an alternating voltage square pulses of the pulse width 100 ms for a duration of 5 to 15 minutes. The working electrode for the process is the as fabricated titanium dioxide nanotubes and the platinum foil is used as the counter electrode. The electrolyte used for the reaction is 1 M KCL in distilled water. The KCL is added to water to improve the conductivity of the water which does not participate in the reactions taking place at the anode and cathode.

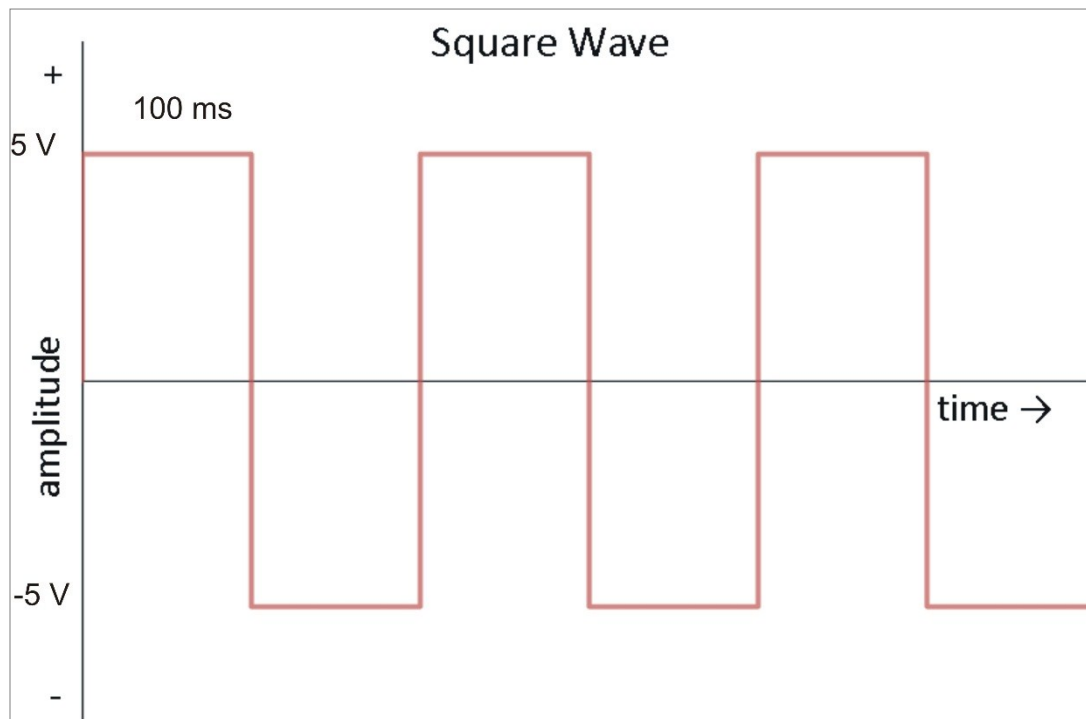


Fig.2 alternating square pulses applied for the pulsed crystallization

3. Fabrication of Dye Sensitized Solar Cell

The dye sensitized solar cell is fabricated using the N 719 dye (from *dye sol*). Platinum coated FTO is used as the counter electrode and electrolyte used is electrolyte EL-HSE

(from *dye sol*). The J – V characteristics are measured with the aid of solar simulator (AM 1.5, 100 mW/cm²) and Keithley source measure unit.