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## Structural, Morphological and Confocal Raman Spectroscopy characterization of titanium dioxide nanotubes on functional substrates

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Titanium dioxide nanotubes (TNTs) arrays were grown on the titanium film layers sputter coated on a conductive glass substrate for the development of photoelectrodes for dye-sensitized solar cell application. Highly cohesive titanium films were deposited on functional substrates (FS) using RF sputtering technique at a sputtering power of 150W, operating pressure of 39 mbar and at a deposition temperature of 200°C for 4 hours to obtain a thickness of 10  $\mu\text{m}$  under an inert argon atmosphere. Subsequently, the RF sputtered titanium films were anodized with ammonium fluoride/glycerol electrolyte solution at room temperature at 60 V for 72 hours. The resulting TNTs on functional substrates (TNTs-FS) were subjected to thermal treatment at 350°C, 450°C, 550°C and 650°C for 3 hours under a nitrogen atmosphere. The as prepared and thermally treated TNTs-FS were characterized by SEM, XRD, EDX and Confocal Raman Spectroscopy (CRS). CRS Large Area Scan (LAS) and Depth profiling (DP) were employed to study and evaluate the crystallinity phase distribution of TNTs-FS thermally treated at different temperatures. CRS LAS in the XY direction of TNTs-FS has revealed the presence of differently crystallized Anatase phases of  $\text{TiO}_2$  with Raman vibrational modes of 159.38  $\text{cm}^{-1}$  (Eg), 208.37  $\text{cm}^{-1}$  (Eg), 399.67  $\text{cm}^{-1}$  (B1g), 514.25  $\text{cm}^{-1}$  (A1g) and 641.58  $\text{cm}^{-1}$  (Eg) for the samples annealed at 350°C. The effect of annealing temperature on  $\text{TiO}_2$  phase evolution was meticulously evaluated using CRS for TNTs-FS for the samples annealed at 450°C, 550°C, and 650°C and will be presented in the final paper.

**Apply to be considered for a student &nbsp; award (Yes / No)?**

Yes

**Level for award&nbsp;(Hons, MSc, &nbsp; PhD, N/A)?**

MSc

**Main supervisor (name and email)&nbsp;and his / her institution**

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**Would you like to &nbsp; submit a short paper &nbsp; for the Conference &nbsp; Proceedings (Yes / No)?**

No

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