Contribution ID: **113** Type: **Poster Presentation**

The effect of annealing temperature on morphology and structural properties of TiO2 nanotubes membranes.

Tuesday, 4 July 2017 17:10 (1h 50m)

Abstract
In this work, we present a simple electrochemical approach to obtain large-area free-standing TiO2 nanotube (TNT) membranes, via anodic oxidation of pure Ti metal sheets. The highly ordered vertically oriented TNTs were characterized by SEM-EDS, XRD, CRM and AFM. SEM-EDS analysis confirms the presence of Ti and O-species in the as-prepared free-standing TNTs layer in significant amount. CRM has confirmed the presence of only Anatase phase TiO2 with Raman vibration modes at 144.37 cm-1, 199.04 cm-1, 399.67 cm-1, 516.16 cm-1 and 639.29 cm-1. The intensity of XRD peaks increases with the increase in heat treatment and better crystallinity occurs at higher temperatures. SEM and AFM analysis has revealed the presence of porous structure on the fabricated membranes. The study focused on the effect of annealing temperature on TNTs crystalline structure. Results showed that smooth surface and high aspect ratio TNTs were successfully fabricated.

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Session Classification: Poster Session 1

Track Classification: Track A - Division for Physics of Condensed Matter and Materials