



POLITECNICO DI TORINO  
Repository ISTITUZIONALE

Tuning of physical-chemical properties of TiO<sub>2</sub> nanotubes for multifunctional applications

*Original*

Tuning of physical-chemical properties of TiO<sub>2</sub> nanotubes for multifunctional applications / Baudino, Luisa; Serrapede, Mara; Pedico, Alessandro; Lamberti, Andrea; Pirri, Candido. - ELETTRONICO. - (2019), pp. 173-173. ((Intervento presentato al convegno Merck Young Chemists' Symposium 2019 tenutosi a Rimini (IT) nel November 25th-27th, 2019.

*Availability:*

This version is available at: 11583/2770481 since: 2019-11-28T17:04:13Z

*Publisher:*

Società Chimica Italiana

*Published*

DOI:

*Terms of use:*

openAccess

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

*Publisher copyright*

(Article begins on next page)



## Tuning of physical-chemical properties of TiO<sub>2</sub> nanotubes for multifunctional applications

Luisa Baudino,<sup>a</sup> Mara Serrapede,<sup>b</sup> Alessandro Pedico,<sup>a</sup> Andrea Lamberti,<sup>a,b</sup> and C. Fabrizio Pirri<sup>a,b</sup>

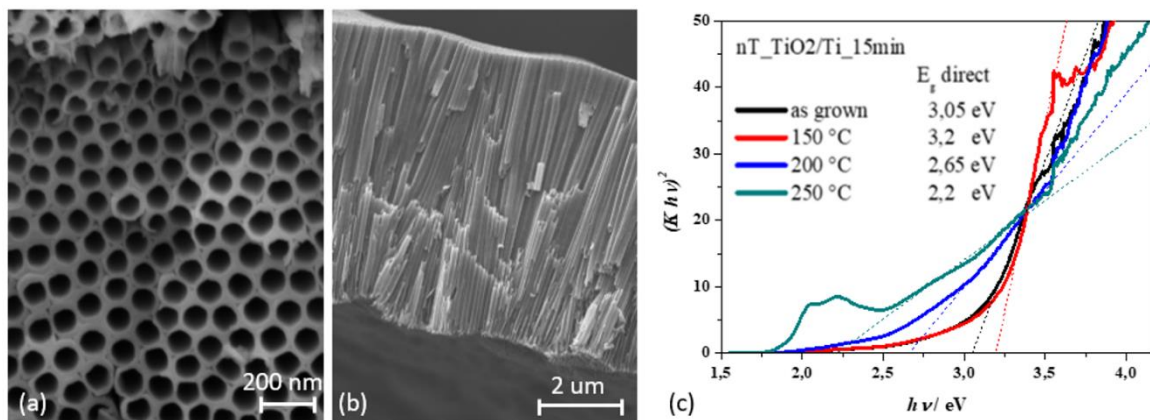
<sup>a</sup> DISAT Dipartimento di Scienza Applicata e Tecnologia, Politecnico di Torino, corso Duca degli Abruzzi 24, 10129-Torino, Italy

<sup>b</sup> Istituto Italiano di Tecnologia, Center for Sustainable Future Technologies, Via Livorno 60, 10144-Torino, Italy

E-mail: [luisa.baudino@polito.it](mailto:luisa.baudino@polito.it)

Titanium dioxide nanotubes (TiO<sub>2</sub> NTs) have been widely investigated in the past twenty years due to the variety of possible applications of this material. Important characteristics of TiO<sub>2</sub> NTs are their high surface area and tuneable morphology. These can be combined with key features of TiO<sub>2</sub>, such as biocompatibility and photo and electrocatalytic properties. This combination makes TiO<sub>2</sub> NTs perfect candidates for multifunctional applications ranging from biomedical application to sensing and energy devices [1].

Herein, we present TiO<sub>2</sub> NTs grown by anodic oxidation on top of a titanium foil in an EG-based electrolyte with NH<sub>4</sub>F [2]. The as-grown amorphous nanotubes were morphologically characterized, as shown in Figure 1a-b. Additionally, the tuneable electronic properties (such as the band gap, Figure 1c) were investigated varying the post-processing temperatures, while maintaining their amorphous nature.



**Figure 3:** FESEM (a) top view and (b) cross view, (c) UV-VIS curves of the amorphous TiO<sub>2</sub> NTs.

[1] P. Roy, S. Berger, and P. Schmuki, *Angew. Chem. Int. Ed.* **50** (2011) 2904-2939.

[2] A. Lamberti, N. Garino, A. Sacco, S. Bianco, A. Chiodoni, and C. Gerbaldi, *Electrochim. Acta* **151** (2015) 222-229.