

Accepted Manuscript

Full Length Article

Depth elemental characterization of 1D self-aligned TiO₂ nanotubes using calibrated Radio Frequency Glow Discharge Optical Emission Spectroscopy (GDOES)

Shiva Mohajernia, Anca Mazare, Imgon Hwang, Sofia Gaiaschi, Patrick Chapon, Helga Hildebrand, Patrik Schmuki

PII: S0169-4332(18)30540-3
DOI: <https://doi.org/10.1016/j.apsusc.2018.02.185>
Reference: APSUSC 38643

To appear in: *Applied Surface Science*

Received Date: 8 January 2018
Revised Date: 13 February 2018
Accepted Date: 19 February 2018

Please cite this article as: S. Mohajernia, A. Mazare, I. Hwang, S. Gaiaschi, P. Chapon, H. Hildebrand, P. Schmuki, Depth elemental characterization of 1D self-aligned TiO₂ nanotubes using calibrated Radio Frequency Glow Discharge Optical Emission Spectroscopy (GDOES), *Applied Surface Science* (2018), doi: <https://doi.org/10.1016/j.apsusc.2018.02.185>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Depth elemental characterization of 1D self-aligned TiO₂ nanotubes using calibrated Radio Frequency Glow Discharge Optical Emission Spectroscopy (GDOES)

Shiva Mohajernia^a, Anca Mazare^a, Imgon Hwang^a, Sofia Gaiaschi^b, Patrick Chapon^b, Helga Hildebrand^a, Patrik Schmuki^{*a}

^aDepartment of Materials Science, WW4-LKO, University of Erlangen-Nuremberg,
Erlangen, Germany

^bHORIBA FRANCE SAS Avenue de la Vauve - Passage Jobin Yvon
Palaiseau, France

**Corresponding author email: schmuki@ww.uni-erlangen.de*

Abstract

In this work we study the depth composition of anodic TiO₂ nanotube layers. We use elemental depth profiling with Glow Discharge Optical Emission Spectroscopy and calibrate the results of this technique with X-ray photoelectron spectroscopy (XPS) and energy dispersive spectroscopy (EDS). We establish optimized sputtering conditions for nanotubular structures using the pulsed RF mode, which causes minimized structural damage during the depth profiling of the nanotubular structures. This allows to obtain calibrated sputter rates that account for the nanotubular “porous” morphology. Most importantly, sputter-artifact free compositional profiles of these high aspect ratio 3D structures are obtained, as well as, in combination with SEM, elegant depth sectional imaging.

Keywords: TiO₂ nanotube, anodization, depth profile, glow discharge optical emission spectroscopy

Download English Version:

<https://daneshyari.com/en/article/7834876>

Download Persian Version:

<https://daneshyari.com/article/7834876>

[Daneshyari.com](https://daneshyari.com)