O20: Titanium dioxide nanotube array thin films for photovoltaic application

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A new solar cell type based on organic-inorganic lead halide perovskites attracted attention as this material is a promising candidate to satisfy the need for high efficiencies and low production costs. The so far most efficient perovskite solar cells (PSC) consist of a perovskite absorber layer contacted by an organic hole transport layer (spiro-OMeTAD) and an electron transport layer, which is a mesoporous TiO2 film in which the perovskite is partly infiltrated.

A method to further improve the electron extraction from the perovskite film is to change the mesoporous TiO_2 structure to a more ordered one, e.g. to nanorod or nanotube arrays. 1D nanostructures on transparent conductive oxide (TCO) substrates can provide a direct pathway for electron transport and also offer open channels for filling with light absorbers and HTMs for solar cells. In this work, we will present results of preparation of highly ordered TiO_2 nanotube thin films for application in PSC by electrochemical anodization of Ti thin films deposited by magnetron sputtering on the FTO-coated glass substrate.

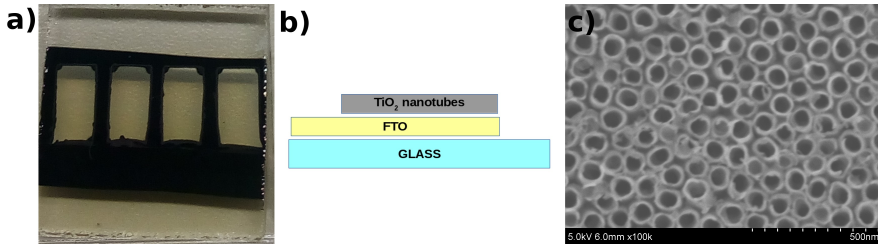

Figure 1 a) TiO_2 nanotube array thin film sample ready for perovskite layer deposition; b) multilayer structure of TiO_2 samples; c) SEM image of TiO_2 nanotube array thin film.

[1] V. Mandić, M. Plodinec, I. Kereković, K. Juraić, V. Janicki, D. Gracin, A. Gajović, A. Moguš-Milanković, M.G. Willinger, *Solar Energy Materials and Solar Cells* **168** (2017) 136.