

One-dimensional TiO₂ by electrochemical anodization of DC sputtered Ti films

P. Vengatesh^a, C. Karthik Kumar^a and T. S. Shyju^{a,b,c*}

^aCentre of Excellence for Energy Research, ^bCentre for Nanoscience and Nanotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119, India

E-mail: shyjuantony1983@gmail.com

^cDepartment of Physics, Faculty of Physical and Mathematical Sciences, Post Box 160-C, University of Concepcion, Concepcion, Chile

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In the present work, we have deposited titanium (Ti) thin films on FTO substrates by DC magnetron sputtering and subsequently formed nanoporous titanium dioxide (TiO₂) via electrochemical anodization of Ti films. The anodization was performed at different voltages ranging from 10 to 40 V in the electrolyte (NH₄F/H₂O/ethylene glycol). The nanopores with pore diameter of around 40–60 nm was achieved which is deduced from the SEM analysis. The investigated optoelectronic properties indicated the high mobility with reasonable carrier concentration, decreased resistivity and increased transmittance for nanoporous TiO₂. This paves the way for the fabrication of solid state heterojunction solar cells using nanoporous TiO₂ as efficient electron transporting layer.

Keywords: DC sputtering, anodization, nanoporous TiO₂, optoelectronics.