**Reactive RF magnetron sputtering fabrication of TiO2 thin films for tunable rutile to anatase ratios**

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**Abstract**

Transition metal oxides play a key and growing role in industry. These materials are currently being intensively studied due to their applications in energy conversion and storage technology, sensor manufacturing, computer memory and photocatalysis [1]. The reason for this diversity is the possibility to manipulate their electrical, magnetic, optical and catalytic properties by controlling the degree of stoichiometry through reduction-oxidation reactions. In particular, thin films made of these materials are of great importance in development and production of certain classes of devices.

In this presentation we will characterize the morphological and structural properties of TiO2 thin films fabricated by reactive RF magnetron sputtering. They were deposited at different substrate temperatures, ranging from RT to 600 oC. Some of them were then annealed to higher temperatures - up to 750 oC. Films’ morphology was then characterized ex-situ by Scanning Electron Microscopy, Atomic Force Microscopy and X-Ray Diffraction. It has been shown that both TiO2 grain size and rutile to anatase content ratio grow with temperature. This makes them tunable characteristics, the latter being of particular interest. Additionally, the anatase-rutile phase transition of the film occurs with the post-deposition annealing at threshold temp. of 650 oC.

[1] F. Parrino and L. Palmisano, "Titanium Dioxide (Tio₂) and Its Applications", Elsevier, 2021