

## Electronic properties of TiO<sub>2</sub> films grown by atomic layer deposition

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We have studied the electronic properties of TiO<sub>2</sub> thin films grown by atomic layer deposition (ALD) by means of synchrotron radiation photoemission spectroscopy (SR-PES). The use of ALD for growing thin oxide films assures the homogeneity and complete coverage even of the first monolayer [1]. Samples, grown in-situ on Si substrates, had thickness ranging between 1 monolayer and 8nm, depending on the ALD parameters, i.e. number of cycles and oxygen precursors used. Thanks to the homogeneity of the samples we could investigate the electronic properties depending on film thickness and morphology. In particular we observed the evolution of the valence band and in-gap states with film thickness, by making use of resonant photoemission (resPES) at both the Ti2p and O1s edges. By means of X-ray absorption spectroscopy (XAS) we observed the intensity evolution of the main peaks at both the Ti2p and O1s edges, also related to the film thickness and homogeneity. The changes, previously observed for nanoparticles [2] and sputtered films [3], were alternatively addressed to quantum confinement [2] and to structural relaxations [3]. Based on both resPES and XAS results, we discuss the two hypotheses. We finally discuss the occurrence of linear dichroism at both Ti2p and O1s edges, depending on the film thickness and ALD preparation.

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