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Formation of a TiO(001) epitaxial thin film on TiO_2(110) induced by ion bombardment OSCAR RODRIGUEZ, BEATRIZ MARTINEZ, Universidad Complutense, Spain, IRENE PALACIO, Synchrotron Soleil, France, ARANTZAZU MASCARAQUE, JESUS LOPEZ, Universidad Complutense, Spain, GERMAN CASTRO, JUAN RUBIO, PILAR FERRER, Synchotron ESRF, France, MATTEO MONTI, JOSE MARCO, IFQ Rocasolano, CSIC, Spain, JUAN BELTRAN, CARMEN MUNOZ, ICMM CSIC, Spain — TiO_2 is one of the most studied oxides. This is mainly due to its outstanding photochemical properties. More recently, a growing interest in this oxide has arisen in relationship with resistive switching mechanisms and its possible use in memristors. For all applications low energy ion bombardment has been frequently used to modify or enhace its properties. In this work we show that high doses of ion bombardment tranforms the upper layers of TiO_2(110) into epitaxial TiO(001). Surface diffraction and chemical analysis shows the initial transformation of the surface into a disordered suboxide which gives rise to an ordered layer of the monoxide after long irradiation times. This is achieved thanks to the oxygen preferential sputtering, the good registry between the TiO_2(110) (rutile) and the TiO(001) (rocksalt) structures (as salso shown by DFT calculations) and the diffusion induced by ion bombardment. To the best of our knowledge, this is the first time that low energy ion bombardment is used to transform the surface of an oxide into another material with a different crystalline structure, while keeping the single crystalline character of the surface.

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