

# **Local piezoelectric properties of oriented PZT based ferroelectric thin films**

*J. Ricote<sup>1</sup>, G. Leclerc<sup>2</sup>, D. Chateigner<sup>2</sup>, P. Ramos<sup>3</sup>, R. Bouregba<sup>2</sup> and G. Poullain<sup>2</sup>*

*<sup>1</sup>Instituto de Ciencia de Materiales de Madrid, CSIC, Cantoblanco, E-28049 Madrid, Spain*

*<sup>2</sup>Laboratoire de Cristallographie et Science de Matériaux-ENSICAEN, F-14050 Caen, France*

*<sup>3</sup>Escuela Politécnica Superior, Universidad Autónoma de Madrid, E-28049 Madrid, Spain*

The preparation of highly oriented ferroelectric thin films is the subject of intense work due to the large improvement of the properties that is achieved. However, the reduction of the device dimensions driven by the miniaturisation trends followed by the microelectronics industry has driven the attention to the study of the local properties of these films at the nanometer scale, more relevant for their potential application in the new nanodevices. Therefore, the study of the influence of the global texture on the local properties of these highly oriented films becomes an important issue that must be addressed.

In the present work, we study by piezoresponse force microscopy (PFM) a series of PZT based ferroelectric thin films obtained by multitarget sputtering with different preferential orientations. The modification of the substrate by the deposition of an extra TiO<sub>x</sub> layer, or the use of MgO based substrates instead of the usual Si based, produce changes in the main texture components of the film. The local distribution of the polar axis of these crystallites can be analysed through the phase and amplitude piezoresponse images obtained on the films. The results allow us to discuss the origin of some special features observed, like the appearance of protruding grains in films with specific orientations, and the homogeneity of the piezoelectric performance at the nanoscale.

Keywords: texture; piezoresponse SFM; thin films

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