

QUANTITATIVE TEXTURE OF FERROELECTRIC MODIFIED LEAD TITANATE THIN FILMS

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The presence of any preferred crystallographic orientation in ferroelectric thin films is a determinant factor of their behaviour. For most applications a high degree of orientation of the crystals along the polar axis is advantageous. At present the mechanisms which leads to highly textured ferroelectric thin films are under discussion. Regardless of their interest, complete quantitative texture studies, measuring diffraction pole figures with a goniometer and calculating the orientation distribution functions, have not been carried out extensively on these materials. In this work we propose the analysis of modified lead titanate thin films, which crystallise in the tetragonal symmetry. These compositions are well-known for their pyroelectric and piezoelectric properties, which make them interesting for several applications, like Surface Acoustic Wave (SAW) devices and microactuators.

The experiments were performed on a Huber four-circle X-ray diffractometer at the Cu K α wavelength. We have used the INEL position sensitive detector to acquire all pole figures at the same scan. The integrated intensities were refined and corrected using the INEL packages. The quantitative texture analysis was carried out with the Beartex package.

The films have been produced varying the processing parameters and the nature of the substrates, in order to study the factors which lead to the appearance of textured structures. Results show that mainly fibre textures are developed, with fibre axes perpendicular to the film plane. The texture strength can be correlated to the preparation conditions and the physical properties of the films, like polarisation or coercive field. This information can be used to optimised the preparation methods of the films in order to obtain improved materials for specific applications.