

Elaboration and Optimisation of Oriented Ferroelectric PLZT Thin Films

Gérald Leclerc, Gilles Poullain, Rachid Bouregba

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Abstract

This work deals with the elaboration of ferroelectric thin films of (Pb,La) (Zr,Ti) O₃ (PLZT) by RF multitarget sputtering on Pt(111)/TiO₂/SiO₂/Si(111) substrate. The purpose is to grow textured thin films in situ in order to improve the ferroelectric and/or dielectric properties. The effect of (111) or (100) orientation in tetragonal structure on the electric properties is studied.

In this presentation, we focus our attention on the composition (Pb_{0.85}La_{0.10})(Zr_{0.40}Ti_{0.60})O₃ (usually noted as 10/40/60). The effects of some growth conditions on the crystallisation and electric properties are investigated.

The main parameters studied are : - The temperature deposition - The presence/nature of a buffer layer (TiO_x) - The thickness of the buffer layer - The thickness of the film - The nature of the substrate (Pt/Si, Pt/MgO) - The variations around the (10/40/60) composition while keeping the tetragonal structure

It is found that the presence of a thin buffer layer of TiO_x on Si/Pt substrate improves the (111) orientation when x is near 2 whereas (100) orientation is promoted for small values of x. Moreover, this buffer layer presents an optimal thickness about 3 nm. The study of the temperature deposition (with TiO₂ buffer layer) shows a competition between (111)/(110) orientations in the 450/550°C temperature range and (111)/(100) competition for the 570/600°C range. The dependence of the ferroelectric/dielectric properties on the thickness of the films will be discussed.