COLOQUIO DE ΦÍSICA
UNIVERSIDAD DEL VALLE
Departamento de Física &
Posgrado en Ciencias-Física

Universidad del Valle

65 años 1945 - 2010

Serie de Coloquios Semestre II-2012

FERROELECTRIC DOMAIN STRUCTURE OF Ba1-xSrxTiO3 CERAMICS OBTAINED BY A RESONANCE TRACKING PFM METHOD

Dr. Francisco Javier Espinoza Beltrán

CINVESTAV Unidad Querétaro, Mexico.

Resumen:
Ferroelectric ceramics are widely used as sensors and actuators because of their electromechanical properties and in electronic applications for their dielectric properties. Ba1-xSrxTiO3 (BST) ceramics have been extensively studied because of their potential applications for various microelectronic devices. BST possess a wide range of relative dielectric permittivity varying from a few hundred to thousands depending on Ba/Sr ratio, grain size, and temperature. BST ceramics with sub-micrometric crystals were produced by a solid-state reaction route based on high energy ball milling and subsequent sintering for synthesis and densification. The Curie temperature for the tetragonal to cubic phase transition of these ceramics decreases from about 400 K to values lower than room temperature with the increase of Sr contents. Thus, for x > 0.3, BST ceramics are not ferroelectric at room temperature. In this work, the ferroelectric domains of BST ceramics were studied by a new resonance tracking piezoresponse force microscopy (RT-PFM) method using a fast frequency sweeping excitation. This method allows quantitative imaging of ferroelectric domains with nanoscale resolution at high data acquisition rates. The RT-PFM system consists of a commercial AFM system combined with a high frequency lock-in amplifier, a function generator and a data acquisition card. This imaging system forms a useful arrangement able to map ferroelectric domains of materials. In this work we present a description of the RT-PFM technique and its ability to simultaneouslyobtain high resolution images of topography, resonance frequency of the tip-sample contact, Q-

value, PFM amplitude and PFM phase. Additionaly, the contact stiffness mapsof the tip-sample contact were obtained from the resonance frequency images.

Septiembre 25 de 2012 | 11:00 am | Sala de Conferencias de Física
Edificio de Ciencias Naturales y Exactas | Espacio 320-2182