NBT-BT THIN FILMS: STRUCTURAL AND DIELECTRIC PROPERTIES

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Ferroelectric thin films are used in sensors, actuators, and microelectromechanical systems because of their dielectric properties. The development of lead-free ferroelectric materials has gained increasing attention as an alternative to lead-based materials. However, achieving reproducible growth and consistent dielectric behavior in lead-free thin films remains challenging. In this work, the structural and dielectric properties of $Na_{0.5}Bi_{0.5}TiO_3$-$BaTiO_3$ (NBT-BT) thin films prepared by pulsed laser deposition are investigated.

Thin films of 0.8NBT-0.2BT were deposited on $Pt/LaNiO_3/SiO_2/Si$ substrates. A relationship between the number of laser pulses and film thickness was established, allowing improved control of the growth process. The influence of deposition parameters, including substrate temperature, oxygen pressure, and laser fluence, on film structure and morphology was investigated using scanning electron microscopy and X-ray diffraction. Dielectric properties were evaluated using an LCR meter.

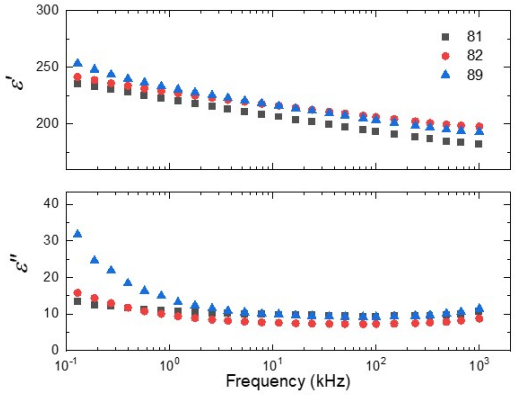

Fig. 1. Room-temperature dielectric behavior of films deposited under the same conditions.

The results show that films deposited under the same conditions have similar dielectric permittivity values, indicating reproducible dielectric response. The study highlights the importance of controlled deposition parameters for obtaining homogeneous NBT-BT thin films with reliable dielectric properties. These findings contribute to the understanding the influence of deposition parameters on thin films properties for future applications in electromechanical devices.