Liquid Delivery MOCVD로 증착된 강유전체 BDT 박막의 피로 특성 향상

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Improvement of Fatigue Properties in Ferroelectric Dy-Doped Bismuth Titanate (BDT) Thin Films Deposited by Liquid Delivery MOCVD System

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Abstract : Dysprosium-doped bismuth titanate (BDT) thin films were successfully deposited on Pt(111)/Ti/SiO_2/Si(100) substrates by liquid delivery MOCVD process and their structural and ferroelectric properties were characterized. Fabricated BDT thin films were found to be random orientations, which were confirmed by X-ray diffraction experiment and scanning electron microscope analysis. The crystallinity of the BDT films was improved and the average grain size increased as the crystallization temperature increased from 600 to 720 °C at an interval of 40 °C. The BDT thin film annealed at 720 °C showed a large remanent polarization (2Pr) of 52.27 μC/cm^2 at an applied voltage of 5V. The BDT thin film exhibits a good fatigue resistance up to 1.0×10^{11} switching cycles at a frequency of 1 MHz with applied pulse of ±5 V. These results indicate that the randomly oriented BDT thin film is a promising candidate among ferroelectric materials useful in lead-free nonvolatile ferroelectric random access memory applications.

Key Words : Dysprosium-doped bismuth titanate, Liquid delivery MOCVD, Randomly-oriented, Fatigue-free