

졸-겔법으로 증착된 $(\text{Bi,Nd})_4\text{Ti}_3\text{O}_{12}$ 박막의 미세구조와 강유전성에 대한 연구

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Microstructure and Ferroelectric Properties of Randomly Oriented Polycrystalline $(\text{Bi,Nd})_4\text{Ti}_3\text{O}_{12}$ Thin Films Prepared by Sol-Gel Method

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Abstract : Ferroelectric neodymium-substituted $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ (BTO) thin films have been successfully deposited on Pt/Ti/SiO₂/Si substrate by a sol-gel spin-coating process and the effect of crystallization temperature on their microstructure and ferroelectric properties were studied systematically. $\text{Bi}(\text{TMHD})_3$, $\text{Nd}(\text{TMHD})_3$, $\text{Ti}(\text{O}^i\text{Pr})_4$ were used as the precursors, which were dissolved in 2-methoxyethanol. The thin films were annealed at various temperatures from 600 to 720 °C in oxygen ambient for 1 hr, which was followed by post-annealed for 1 hr after depositing a Pt electrode to enhance the electrical properties. X-ray diffraction (XRD) and scanning electron microscopy (SEM) were used to analyze the crystallinity and surface morphology of layered perovskite phase, respectively. The crystallinity of the BNT 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 polarization values of the films were a monotonous function of the crystallization temperature. The remanent polarization value of the BNT thin films annealed at 720 °C was 24.82 $\mu\text{C}/\text{cm}^2$ at an applied voltage of 5 V.

Key Words : Nd-substituted, Sol-Gel, Spin-coating, Microstructure, Ferroelectric