

열처리 산소 분압에 따른 $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ 박막의 전기적 특성 변화

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Electrical Properties of $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ Thin Films dependant on Oxygen Partial Pressure during Annealing

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Abstract : $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ (BiT) thin films were well developed on the Pt/Ti/SiO₂/Si substrate by a metal organic decomposition (MOD) method. Oxygen was effective on the crystallization of the BiT thin films during a rapid thermal annealing process. The electrical properties of the BiT films dependant on the oxygen partial pressure were investigated. No crystalline phase was observed for the BiT film annealed at 700°C under oxygen free atmosphere. However, its crystallinity was significantly evolutionned with increasing oxygen partial pressure. In addition, its dielectric and piezoelectric properties were enhanced with increasing oxygen partial pressure to 10 torr. Especially, the BiT film, annealed at 700°C and 10 torr oxygen pressure, showed good dielectric properties: dielectric constant of 51 and dielectric loss of 0.2 % at 100 kHz. Its leakage current and piezoelectric constant (d_{33}) was also considerably improved, being as 0.62 nA/cm² at 1 V and approximately 51 pm/V, respectively.

Key Words : $\text{Bi}_4\text{Ti}_3\text{O}_{12}$, Thin film, Oxygen, Annealing, Electrical properties