

저온소결용 $\text{Bi}(\text{Nb}_{0.7}\text{Ta}_{0.3})\text{O}_4$ 세라믹스의 유전특성에 미치는 TiO_2 영향

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Influence of TiO_2 on the dielectric properties of $\text{Bi}(\text{Nb}_{0.7}\text{Ta}_{0.3})_4$ ceramics for low-firing

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Abstract

Influence of TiO_2 on the dielectric properties of the $\text{Bi}(\text{Nb}_{0.7}\text{Ta}_{0.3})\text{O}_4$ ceramic with 7 wt% zinc borosilicate(ZBS) glass was investigated as a function of the TiO_2 contents with a view to applying this system to LTCC technology. The $\text{Bi}(\text{Nb}_{0.7}\text{Ta}_{0.3})\text{O}_4$ ceramic addition of 7 wt% ZBS glass ensured successful sintering below 900 °C. But, TCF of $\text{Bi}(\text{Nb}_{0.7}\text{Ta}_{0.3})\text{O}_4$ ceramic is large negative values, respectively, it is necessary to adjust to zero TCF for practical applications. Therefore, the addition of materials having positive TCF, such as TiO_2 , might be an effective method for the improvement. In general, increasing addition of TiO_2 increased dielectric constant and TCF but it decreased the sinterability and $Q \times f$ value significantly due to the dielectric property and high sintering temperature of TiO_2 . $\text{Bi}(\text{Nb}_{0.7}\text{Ta}_{0.3})\text{O}_4$ ceramic with 7 wt% ZBS glass and then addition 0.5 wt% TiO_2 sintered at 900 °C demonstrated 42 in the dielectric constant(ϵ_r), 1,000 GHz in the $Q \times f$ value, and 10 ± 5 ppm/°C in the temperature coefficient of resonant frequency(τ_f).

Key Words : $\text{Bi}(\text{Nb}_{0.7}\text{Ta}_{0.3})\text{O}_4$, TiO_2 , Zinc borosilicate glass, TCF