

ZnO-B₂O₃-SiO₂ 유리가 첨가된 ZnAl₂O₄의 저온 소결 및 마이크로파 유전 특성

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Low-temperature sintering and microwave dielectric properties of ZnAl₂O₄ with ZnO-B₂O₃-SiO₂ glass

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Abstract : In the present work, we have studied low temperature sintering and microwave dielectric properties of ZnAl₂O₄-zinc borosilicate (ZBS, 65ZnO-25B₂O₃-10SiO₂) glass composites. The focus of this paper was on the improvement of sinterability, low dielectric constant, and on the theoretical proof regarding of microwave dielectric properties in ZnAl₂O₄-ZBS glass composites, respectively. The ZnAl₂O₄ with 60 vol% ZBS glass ensured successful sintering below 900°C. It is considered that the non-reactive liquid phase sintering (NPLS) occurred. In addition, ZnAl₂O₄ was observed in the ZnAl₂O₄-(x)ZBS composites, indicating that there were no reactions between ZnAl₂O₄ and ZBS glass. ZnB₂O₄ and Zn₂SiO₄ with the willemite structure as the secondary phase was observed in the all ZnAl₂O₄-(x)ZBS composites. In terms of dielectric properties, the application of the ZnAl₂O₄-(x)ZBS composites sintered at 900°C to LTCC substrate were shown to be appropriate; ZnAl₂O₄-60ZBS ($\epsilon_r = 6.7$, $Q \times f$ value = 13,000 GHz, $\tau_f = -30$ ppm/°C). Also, in this work was possible theoretical proof regarding of microwave dielectric properties in ZnAl₂O₄-(x)ZBS composites

Key Words : ZnAl₂O₄, Zinc borosilicate, Glass-ceramic, Dielectric property