

Microwave Dielectric Properties of Low-Temperature Sintered $\text{Li}_3\text{AlB}_2\text{O}_6$ Ceramic

Makoto Ohashi, Hirotaka Ogawa, Akinori Kan and Eri Tanaka

Faculty of Science and Technology, Meijo University, 1-501 Shiogamaguchi, Tempaku-ku Nagoya 468-8502, Japan

Recently, much attention has been paid for the synthesis of low temperature sintered microwave dielectric ceramics for the application to the multilayer microwave devices as a low temperature co-fired ceramics (LTCC); in this case, the sintering temperature of the dielectric ceramics should be lower than the melting point of silver. Thus, this paper focused on the development of new LTCC material, the microwave dielectric property, the crystal structure and the microstructure of $\text{Li}_3\text{AlB}_2\text{O}_6$ ceramic were investigated in this study.

The $\text{Li}_3\text{AlB}_2\text{O}_6$ ceramic was prepared by using the conventional solid-state reaction method; these pellets were sintered in the temperature range of 625-700°C for 2h in air. The X-ray powder diffraction (XRPD) pattern of $\text{Li}_3\text{AlB}_2\text{O}_6$ ceramic sintered at 625°C showed the single phase which corresponded to the triclinic phase with space group of *P***Erreur!**. With increasing the sintering temperatures from 625°C to 700°C, the dielectric constants of the $\text{Li}_3\text{AlB}_2\text{O}_6$ ceramic varied from 4.5 to 7.5, whereas the $Q \times f$ value of the ceramic ranged from 10000 to 6000 GHz. The decrease in the $Q \times f$ value is attributed to the decomposition of $\text{Li}_3\text{AlB}_2\text{O}_6$ ceramic. Moreover, the chemical compatibility of the ceramic with silver was investigated from the XRPD pattern of the mixtures of the $\text{Li}_3\text{AlB}_2\text{O}_6$ ceramic and silver heat-treated at 625°C; the interface reaction between the $\text{Li}_3\text{AlB}_2\text{O}_6$ ceramic and silver was not observed in the XRPD pattern.