中文摘要

本論文以反應燒結法製備(1-x)CaNb2O6-xTiO2(CNT)(x=0.1、0.3、0.5)與(Zn0.67Ni0.33)0.5Ti0.5NbO4(ZNTN)微波介電陶瓷。CaNb2O6(CN)陶瓷添加少量的TiO2 可以有效的降低 CN 陶瓷的燒結溫度，且可以使其更緻密。1270oC 燒結 6 小時之 CNT 在 x=0.1 可獲得微波介電特性： ε r=20.7、Q×f=42,900GHz(6.6GHz)。1270oC 燒結 6 小時之 CNT 在 x=0.3 可獲得微波介電特性： ε r=20.6、Q×f=32,900GHz(6.4GHz)。1250oC 燒結 4 小時之 CNT 在 x=0.5 可獲得微波介電特性： ε r=17.2、Q×f= 22,100GHz (6.9GHz)。ZNTN 陶瓷在 1250oC 以下燒結，其主要生成相爲 Zn0.5Ti0.5NbO4 相與二次相 NiNb2O6，並且有少量的 Ni0.5Ti0.5NbO4 相形成，當燒結溫度爲 1300oC 時其主要生成相轉變成 Ni0.5Ti0.5NbO4 爲主。從 SEM 中發現在 1300oC 時有晶粒異常成長的狀態。在 1150oC 燒結 2 小時可得較佳微波介電特性： ε r=43.1、Q×f=18,800GHz (6.2GHz)和 τ f =+12.72 ppm/oC。

英文摘要

Properties of (1-x)CaNb2O6-xTiO2 (CNT) (x=0.1, 0.3, and 0.5) and (Zn0.67Ni0.33)0.5Ti0.5NbO4 (ZNTN) microwave dielectric ceramics produced using a reaction-sintering process were investigated. With TiO2 addition, the sintering temperature could be effectively lowered and density increased in CNT ceramics. Microwave dielectric properties: εr=20.7, Q×f = 42,900GHz (6.6GHz) were obtained in CNT with x=0.1 after sintering at 1270oC for 6 h. εr=20.6, Q×f=32,900GHz (6.4GHz) were obtained in CNT with x=0.3 after sintering at 1270oC for 6 h. Microwave dielectric properties: εr=17.2, Q×f = 22,100GHz (6.9GHz) were obtained in CNT with x=0.5 after sintering 1250oC for 4 h. The main phase Zn0.5Ti0.5NbO4 and second phase NiNb2O6 accompanied with small amount of Ni0.5Ti0.5NbO4 phase were observed in ZNTN ceramics sintered below 1250oC. Ni0.5Ti0.5NbO4 became the main phase in ZNTN ceramics sintered above 1300oC. Microwave dielectric properties: εr=43.1, Q×f=18,800GHz (6.2GHz) and τf =+12.72 ppm/oC were obtained in ZNTN after sintering at 1150oC for 2 h.