

## Ultra-Low Loss Dielectric Properties of $(\text{Mg}_{1-x}\text{Ni}_x)_2(\text{Ti}_{0.95}\text{Sn}_{0.05})\text{O}_4$ Microwave Ceramics

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**Abstract :** Microwave dielectric ceramic materials of  $(\text{Mg}_{1-x}\text{Ni}_x)_2(\text{Ti}_{0.95}\text{Sn}_{0.05})\text{O}_4$  for  $x = 0.01, 0.03, 0.05, 0.07$  and  $0.09$  were prepared and sintered at  $1250\text{-}1400^\circ\text{C}$ . The microstructure and microwave dielectric properties of the ceramic materials were examined and measured. The observations shows that the content of  $\text{Ni}^{2+}$  ions has little effect on the crystal structure, dielectric constant, temperature coefficient of resonant frequency ( $\tau_f$ ) and sintering temperatures of the ceramics. However, the quality values ( $Q \times f$ ) are greatly improved due to the addition of  $\text{Ni}^{2+}$  ions. The present study showed that the ceramic material prepared for  $x = 0.05$  and sintered at  $1325^\circ\text{C}$  had the best  $Q \times f$  value of  $392,000 \text{ GHz}$ , about 23% improvement compared with that of  $\text{Mg}_2(\text{Ti}_{0.95}\text{Sn}_{0.05})\text{O}_4$ .

**Keywords :**  $(\text{Mg}_{1-x}\text{Ni}_x)_2(\text{Ti}_{0.95}\text{Sn}_{0.05})\text{O}_4$ , microwave dielectric ceramics, high quality factor, high frequency wireless communication

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