

Dielectric properties of $\text{La}_{0.67}\text{Sr}_{0.33}\text{Mn}_{1-x}\text{Ti}_x\text{O}_3$ with $x = 0.4$ and 0.6 .

Abstract

The dielectric properties of Ti-substituted $\text{La}_{0.67}\text{Sr}_{0.33}\text{Mn}_{1-x}\text{Ti}_x\text{O}_3$ with $x = 0.4$ and 0.6 as a function of frequency and temperature have been investigated. The samples have been prepared using the conventional solid state reaction method at 1300°C . Both samples showed rhombohedral structure with R3C space group. The grain size of $x = 0.4$ and 0.6 are ~ 2.5 to $3.3 \mu\text{m}$ and ~ 0.4 to $0.9 \mu\text{m}$ respectively. The dielectric constant, ϵ' of the samples decreases with frequency but increases with temperature. We have successfully obtained very high dielectric constant material. The highest ϵ' value for LSMT with $x = 0.4$ and 0.6 are at frequency of 10 Hz and temperature 300 K , which are $\sim 5.7 \times 10^6$ and $\sim 2.4 \times 10^6$. The $\tan \delta$ increases with temperature for $x = 0.6$ but shows a peak at a certain temperature for $x = 0.4$. Sample with $x = 0.4$ has better dielectric properties compared to $x = 0.6$ sample because it has higher ϵ' and lower $\tan \delta$ value. At 175 K and 1 kHz sample with $x = 0.4$ shows the best dielectric properties with a high ϵ' value and low $\tan \delta$ which are 1.1×10^5 and 0.8 respectively.

Keyword: LSMO; Dielectric properties.