

ABSTRACT:

Impedance analyses was performed on undoped and Nb-doped $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ ($\text{CaCu}_3\text{Ti}_{4-x}\text{Nb}_x\text{O}_{12+x/2}$; $x = 0, 0.01, 0.03, 0.05, 0.1$) to investigate their electrical properties. The pellet samples were prepared using the solid state reaction method. Silver electrode was deposited on both pellets' surfaces for electrical measurement. The thermally etched samples showed tiny bumped domains within the grains. The existence of both domain and grain boundaries are believed to strongly influence the dielectric constant of $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ (CCTO). Undoped CCTO showed two arcs of impedance complex plane while Nb-doped samples have three arcs. Each arc represents the constituent elements of the CCTO. The highest frequency arc is evidence that CCTO consists of conductive domains which measure about 10^3 nm and are insulated by two types of barriers, i.e. domain boundary and grain boundary.