Improved Dielectric Properties of CaCu₃Ti₄O₁₂ by Calcination at Different Temperatures

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Abstract : Calcium copper titanate (CCTO) was synthesized via the sol-gel auto-combustion method. The precursor was calcined at 800°C and 1000°C for 6 hours providing brown-coloured powders, which were pelletized and sintered at 1000°C for 12 hrs to determine their dielectric behaviour in the frequency range (100Hz-10MHz) at room temperature. The dielectric constant(ϵ r) and loss tangent (tan δ) has been found to be ~ 6153 and 0.5 for 800°C and ~ 5504 and 0.2 for 1000°C respectively, at frequency 1kHz. Microstructure study revealed maximum grain growth occurs in sample calcined at 800°C, responsible for its high dielectric constant. Phase identification of CaCu₃Ti₄O₁₂ has been carried out through X-ray diffraction. It can be used in various electronic applications as it shows large ϵ r and low tan δ values over a wide frequency spectrum, including energy storage devices, microwave shielding, and sensors.

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Keywords : calcium copper titanate, dielectric behaviour, microstructure, X-ray diffraction

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