

## Effect of sintering on the dielectric constant of $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$

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### Abstract

Recently the insulating cubic compound  $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$  (CCTO) has attracted much interest because of the unusually high value of its dielectric constant  $\epsilon \approx 10^4$  at low frequency which is only weakly varying over wide temperature range 100–600 K. Such properties lead these materials to be very attractive for capacitor applications and microelectronics devices (cell mobile phones for example). Powders have been prepared by using an organic gel (assisted citrate process) and studied by electron paramagnetic resonance (EPR). The EPR response of copper in X band gives a narrow symmetric signal. No fine structure is observed which is surprising since the polyhedron of the 12 first-neighbour oxygens is highly distorted. Sintering of powders was optimised. Scanning electron micrographs (SEM) show that the best sintering is obtained by using polyvinyl alcohol as a binder and when the gel is calcined at 500°C for 20h. Impedance spectroscopy data in terms of the PVA composition will be presented. Using the most sintered ceramic as a target, thin films were grown by pulsed laser deposition on  $\text{LaAlO}_3$  substrates. They are [001] oriented, and their microstructure depends highly on the deposition conditions, as shown by AFM measurements. Capacitive measurements of tri-layers stacks, with CCTO grown onto a conductive oxide, will be presented.