

# Lanthanum titanate ceramics : electrical characterizations in large temperature and frequency ranges

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## Abstract

ABO<sub>3</sub> ceramics have been studied for many years. More recently, thin films deposition has allowed to make electronic devices like ferroelectric grid FET, tunable filters or antennas. Using RF-magnetron sputtering, we have deposited LaTiO<sub>x</sub>Ny oxynitride thin films on (001) strontium titanate and glass substrates, starting from a homemade oxide target [1]. In this paper, the microwave dielectric properties of La<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> ceramic have been investigated in order to have a reference for further studies. These results are presented, to our knowledge, for the first time. The behaviour of this ceramic is also presented in a large temperature range. In fact, high temperature applications are also possible because La<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> has a very high Curie temperature: T<sub>c</sub>=1500C [2].

Microwave dielectric measurements. Small dense oxide pellets ( = 3 mm) were prepared by pressure-less sintering at 1400C for 3 hours under air. Gold-palladium electrodes were sputtered on either side of the sintered pellets. The following apparatus have been used : an HP4284A LCR bridge from 20Hz to 1MHz, an HP4291A LCR bridge from 1MHz to 1.8GHz and an ANRITSU 37369A vectorial network analyzer from 40MHz to 10GHz. We have made a specific support for the pellets which can be used with all our measurement systems. The evolution of  $\epsilon'$  and  $\epsilon''$  shows a dielectric relaxation with a critical frequency F<sub>c</sub> = 1GHz.

Dielectric measurements in the [293K-1150K] range

The evolution of the dielectric constant  $\epsilon'$  is presented. Its value is quite constant up to 550K at different frequencies. Above this temperature,  $\epsilon'$  roughly depends on the frequency : at a given temperature,  $\epsilon'$  increases with the frequency.