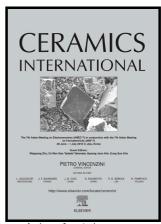
## Author's Accepted Manuscript

Temperature Stable and High-Q Microwave Dielectric Ceramics in the Li<sub>2</sub>Mg<sub>3-x</sub>Ca<sub>x</sub>TiO<sub>6</sub>system (x=0.00~0.18)

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www.elsevier.com/locate/ceri

PII: S0272-8842(16)31363-3

DOI: http://dx.doi.org/10.1016/j.ceramint.2016.08.055

Reference: CERI13507

To appear in: Ceramics International

Received date: 8 July 2016 Revised date: 6 August 2016 Accepted date: 8 August 2016

Cite this article as: Zixuan Fang, Bin Tang, Feng Si and Shuren Zhang Temperature Stable and High-Q Microwave Dielectric Ceramics in the Li<sub>2</sub>Mg<sub>3-x</sub>Ca<sub>x</sub>TiO<sub>6</sub>system (x=0.00~0.18), *Ceramics International* http://dx.doi.org/10.1016/j.ceramint.2016.08.055

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## **ACCEPTED MANUSCRIPT**

Temperature Stable and High-Q Microwave Dielectric Ceramics in the

 $\text{Li}_2\text{Mg}_{3-x}\text{Ca}_x\text{TiO}_6$  system (x=0.00~0.18)

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Abstract

Microwave dielectric properties of Li<sub>2</sub>Mg<sub>3-x</sub>Ca<sub>x</sub>TiO<sub>6</sub> (x=0~0.18) ceramics were studied using a

conventional solid-state route to find temperature stable and high Q microwave ceramics. As the

calcination temperature was 500 °C, the Li<sub>2</sub>TiO<sub>3</sub> phase with monoclinic rock salt structure in C2/

c space group started to form. When the samples were calcined from 600 °C to 900 °C, the XRD

patterns exhibited a remarkable chemical reaction between the MgO and Li<sub>2</sub>TiO<sub>3</sub> phases, which

eventually formed the  $\text{Li}_2\text{Mg}_3\text{TiO}_6$  phase. The results indicated the  $\text{Li}_2\text{Mg}_3\text{TiO}_6$  and  $\text{CaTiO}_3$  co-existed

with each other and formed a stable composite system when the calcium content was added. The SEM

photographs indicated that the pores caused by the Li evaporation could be effectively reduced due to

the appearance of CaTiO<sub>3</sub>. As x was increased from 0 to 0.18, the relative density was significantly

improved due to the elimination of pores. As the Ca content increased, the dielectric constant  $(\varepsilon_r)$ 

increased from 14.8 to 20.6; the quality factor (Q×f) decreased from 148,713 GHz to 79,845 GHz, and

the temperature coefficient of resonant frequency ( $\tau_f$ ) significantly increased from -42.4 to +10.8

ppm/°C due to the increased amount of CaTiO<sub>3</sub>. Therefore, at x=0.12, the LMCxT ceramics sintered at

1280 °C for 6 h displayed excellent comprehensive properties of  $\varepsilon_r$ = 17.8, Q×f= 102,246 GHz and  $\tau_f$ =

-0.7 ppm/°C.

Keywords: Microwave Ceramics; Dielectrics; Temperature Stable; High Q

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