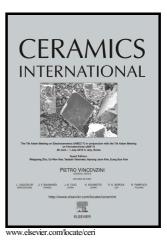
### Author's Accepted Manuscript

Correlations between the Structural Characteristics and Enhanced Microwave Dielectric Properties of V–Modified Li<sub>3</sub>Mg<sub>2</sub>NbO<sub>6</sub> Ceramics

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# PII: S0272-8842(18)31886-8 DOI: https://doi.org/10.1016/j.ceramint.2018.07.156 Reference: CERI18878

To appear in: Ceramics International

Received date:6 June 2018Revised date:13 July 2018Accepted date:17 July 2018

Cite this article as: Gang Wang, Huaiwu Zhang, Xin Huang, Fang Xu, Gongwen Gan, Yan Yang, Dandan Wen, Jie Li, Cheng Liu and Lichuan Jin, Correlations between the Structural Characteristics and Enhanced Microwave Dielectric Properties of V–Modified Li<sub>3</sub>Mg<sub>2</sub>NbO<sub>6</sub> Ceramics, *Ceramics International*, https://doi.org/10.1016/j.ceramint.2018.07.156

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#### **Correlations between the Structural Characteristics and**

#### **Enhanced Microwave Dielectric Properties of V-Modified**

Li<sub>3</sub>Mg<sub>2</sub>NbO<sub>6</sub> Ceramics

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#### Abstract

Novel low-temperature fired  $Li_3Mg_2Nb_{1-x}V_xO_6$  (x=0.02-0.08) microwave dielectric ceramics were synthetized by the partial substitution of V<sup>5+</sup> ions on the Nb<sup>5+</sup> sites. The effects of V<sup>5+</sup> substitution on structure and microwave dielectric properties were investigated in detail. XRD patterns and Rietveld refinement demonstrated that all of the samples exhibited a single orthorhombic structure. The structural characteristics such as the polarizability, packing fraction and NbO<sub>6</sub> octahedron distortion were determined to establish the correlations between the structure and the microwave dielectric characteristics. The  $\varepsilon_r$  values presented a tendency similar to that of the polarizability. The high  $Q \times f$  values were mainly attributed to the effects of the grain sizes and density rather than the packing fraction. The variation in the  $\tau_{t}$  values was attributed to NbO<sub>6</sub> octahedron distortion. Notably, the  $Li_3Mg_2Nb_{1-x}V_xO_6$  (x=0.02) ceramics sintered at 900 °C had outstanding microwave dielectric properties:  $\varepsilon_r=16$ ,  $Q \times f=131,000$  GHz (9.63 GHz), and  $\tau_f=-26$  ppm/°C, making these ceramics promising ultralow loss candidates for low temperature co-fired ceramics (LTCC) applications. **Keywords:** Li<sub>3</sub>Mg<sub>2</sub>Nb<sub>1-x</sub>V<sub>x</sub>O<sub>6</sub> ceramics, structural characteristics, correlations

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