

BaTiO₃-Nb₂O₅-Ni₂O₃三元系统的介电性能研究

王升, 张树人, 周晓华, 李波, 陈祝

电子科技大学微电子与固体电子学院, 成都 610054

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摘要 对三元系统BaTiO₃-Nb₂O₅-Ni₂O₃的微结构和介电性能进行了研究. XRD分析表明Nb₂O₅/Ni₂O₃协同掺杂的BaTiO₃陶瓷为赝立方相结构; 在掺杂1.0 mol% Ni的BaTiO₃中, Nb的固溶度<4.0mol%.

SEM观察表明, 随Nb掺杂量的增加, BaTiO₃陶瓷的晶粒尺寸先增大后减小. BaTiO₃陶瓷的室温介电常数、介质损耗, 以及在低温端和高温端的电容变化率都随Nb含量的增加而先增大后减小. DSC测量表明, Nb掺杂使BaTiO₃陶瓷的居里温度向高温方向移动.

该系统瓷料介电性质的变化与材料的晶粒尺寸以及掺杂剂导致的相变温度的移动密切相关. 本实验在BaTiO₃-Nb₂O₅-Ni₂O₃系统中开发出了新型的X8R材料, 这种材料很有希望用于制备大容量X8R多层陶瓷电容器.

关键词 [BaTiO3](#) [X8R](#) [介电性能](#) [居里温度](#)

分类号 [TM534](#)

Dielectric Properties of BaTiO₃-Nb₂O₅-Ni₂O₃ Ternary System

WANG Sheng, ZHANG Shu-Ren, ZHOU Xiao-Hua, LI Bo, CHEN Zhu

School of Microelectronics and Solid-State Electronics, University of Electronic Science and Technology of China, Chengdu 610054, China

Abstract The microstructure and dielectric properties of ternary system BaTiO₃-Nb₂O₅-Ni₂O₃ were investigated. XRD analyses indicate that Nb₂O₅/Ni₂O₃ co-doped BaTiO₃ ceramics have pseudo-cubic structures. The solubility of Nb in BaTiO₃ with 1.0 mol% Ni is <4.0mol%. SEM results show that the grain size of BaTiO₃ ceramics initially increases and then decreases with the increase of Nb amount. Also the room-temperature dielectric constant and loss, as well as the capacitance variation values at low and high temperature range initially increase and then decrease with the increase of Nb amount. DSC results show that the Curie temperature of the BaTiO₃ ceramics is shifted to higher temperatures by Nb addition. The modification of the dielectric properties of the ceramic system is considered to be correlated with the grain size and the shift of phase transition temperature by the additives. The novel X8R material developed in the BaTiO₃-Nb₂O₅-Ni₂O₃ system in the present work is very promising for preparation of X8R MLCCs with large capacitance.

Key words [BaTiO3](#) [X8R](#) [dielectric properties](#) [Curie temperature](#)

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通讯作者 王升 wangsheng1975@tom.com

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