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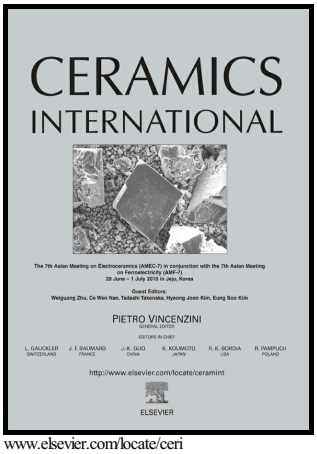

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Effect of MgO addition on the microstructure and dielectric properties of $BaTiO_3$ ceramics

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Abstract

MgO-doped $BaTiO_3$ ($BaTiO_3$/MgO) ceramics were prepared by a solid-state sintering method. The effects of MgO doping on the dielectric properties of $BaTiO_3$/MgO were investigated in terms of its microstructural development. The $BaTiO_3$/MgO was characterized by scanning electron microscopy, transmission electron microscopy, Raman spectroscopy, and x-ray powder diffraction. Results show that grain growth of the $BaTiO_3$/MgO during sintering was inhibited by adding MgO at least 0.5 mole%. It resulted in a high resistance of the $BaTiO_3$/MgO sintered at high temperature. The $BaTiO_3$/MgO possessed a broad temperature stability and met Electronic Industries Association (EIA) X7R specification. The improved dielectric properties of the $BaTiO_3$/MgO are attributed to the decreased tetragonality of $BaTiO_3$ lattice due to Mg^{2+} substitute for Ti^{4+}.

Keyword: Sintering; Dielectric properties; $BaTiO_3$ and titanates; Microstructure-final; Capacitors