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# Electrical properties of La- and Mn- Doped Barium Titanate

**M.M. Vijatović Petrović[1], J.D. Bobić[1], J. Banys[2], B.D. Stojanović[1]**

*[1]Institute for Multidisciplinary Research, Belgrade University, Kneza Višeslava 1, Belgrade, Serbia*
*[2]Faculty of Physics, Vilnius University, Sauletekio al. 9, Vilnius, Lithuania*
*Corresponding author: miravijat@yahoo.com*

Substitution of the barium or titanium ion with small concentrations of ions with a similar radius could lead to structure and microstructure changes and furthermore modification of dielectric and ferroelectric properties. The possibility of easy substitution is enabled due to the capability of the perovskite structure to host different sized ions in the BT lattice. Doping of $BaTiO_3$ (BT) ceramics is very important due to possibility to obtain different materials with required electrical characteristics [1].

Lanthanum was used as a donor dopant and it commonly substitutes Ba in the lattice of barium titanate. Since La has different valence than Ba this change produces a charge imbalance. Therefore, the charge compensation requires the production of the electron, electron holes or vacancies in the material influencing the electrical properties [1]. On the other hand, manganese was believed to substitute Ti and acts as an acceptor with unstable valence, from $Mn^{2+}$, $Mn^{3+}$ to $Mn^{4+}$. Simultaneous substitution of lanthanum and manganese is expected to maintain charge neutrality without requiring creation of defects if all the Mn ions exist in the trivalent state [2, 3].

In this work, barium titanate doped with 0.3 mol% lanthanum (BTL) and simultaneously doped with 0.3 mol% lanthanum and 0.1 mol % manganese (BTLM) ceramics was investigated. The influence of dopants on structure change, grain size reduction and microstructure development was analyzed. The effect of dopants on dielectric properties and resistivity was studied.

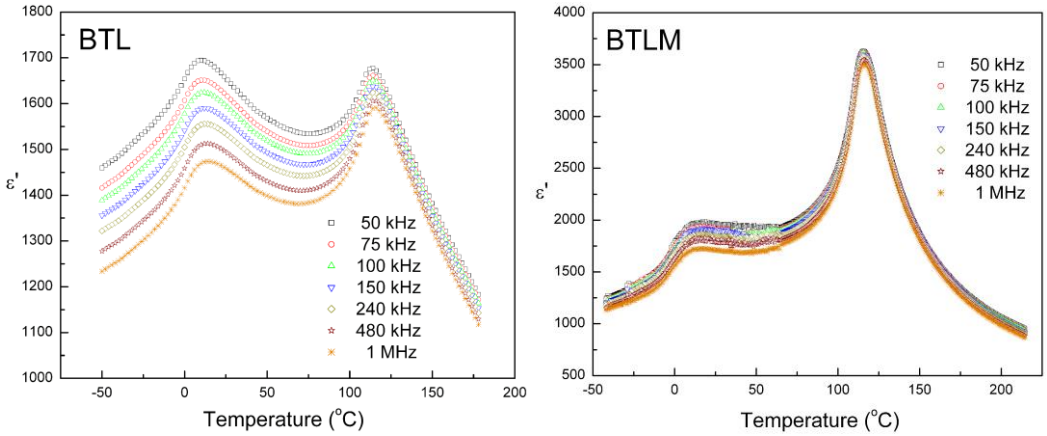


Figure 1. Temperature dependence of dielectric permittivity of BTL and BTLM ceramics

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