Workshop of the COST MP0904 Action, 24-26 September, 2012, Iasi, Romania, Programme and book of abstracts, p57

Influence of dopants on barium bismuth titanate electrical properties

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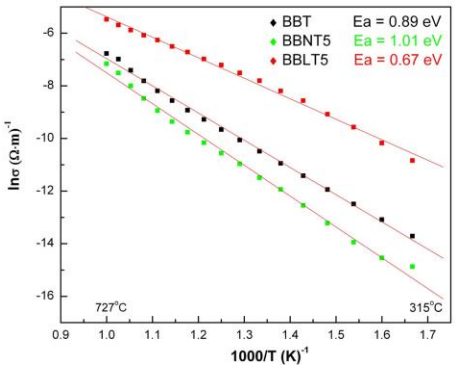
The Aurivillius structure has capability to host ions of different size, so a large number of different dopants can be accommodated in the $BaBi_4Ti_4O_{15}$ (BBT) lattice. It was detected that various substitutions of Bi^{3+} and Ti^{4+} ions can affect the change of microstructure and electrical properties of barium bismuth titanate ceramics. Doping of BBT ceramics is very important due to possibility to obtain materials with required characteristics [1].

In this work, pure and niobium and lanthanum doped barium bismuth titanate powders were prepared by conventional solid state method, according to formulas $BaBi_{4-x}La_xTi_4O_{15}$ and $BaBi_4Ti_{4-5/4x}Nb_xO_{15}$ (x=0.05). Obtained powders were uniaxially pressed and sintered at different temperature depending on the composition.

The influence of dopant type on structure change, grain size reduction and microstructure development was analyzed. XRD measurements showed formation of orthorhombic BBT crystal structure without presence of secondary phase in doped samples. Dopants had influence on shifting of temperature phase transition peaks to the lower temperatures, broadening of ε - T curves and increasing relaxor behavior of phase transition (Table). Temperature dependence of the electrical conductivity shown at Fig. pointed out that niobium as a donor dopant decrease conductivity [2] and lanthanum as a isovalent dopant increase conductivity of BBT ceramics. Obtained results were analyzed in the frame of the influence of the grain and grain boundaries contribution to the dielectric behavior through impedance spectroscopy.

	ε_{RT}	ε_m	T_m (°C)	ΔT_{relax}
BBT	204	2429	415	16
BBLT5	273	2540	369	20
BBNT5	292	2424	378	23



Acknowledgements

The authors gratefully acknowledge to the financial support of the Ministry of Education and Science (III 45021) and COST MP 0904.

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