Relaxor Ferroelectric Behaviour of $Ba_{1-x}A_x(Ti_{0.7}Zr_{0.3})O_3$ Compositions (A=Ca,Sr)

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The relaxor ferroelectric materials exhibit a large range of interesting properties related to their complex order/disorder nanostructures. The relaxor behaviour is well known in lead based compositions. Nevertheless, the latter present a disadvantage due to the toxicity of polluting substances. The actual evolution of research is directed to replace the lead by lead-free compositions [1, 2]. The aim of the present work was to prepare and to characterize some ceramics derived from $BaTiO_3$ by cationic substitution in the 12-C.N crystallographic site.

The various compositions were obtained by solid state synthesis. Room temperature X-ray diffraction analysis allowed us to determine the limits of solid solution. Dielectric measurements exhibit a relaxor behaviour in the range $0<x<0.20$. Whatever A, Tm decreases as x increases. However, the decrease was comparatively lower in the case of the calcium substitution. This result is related to the size of each cation. For the Ba-Sr substitution the decrease of Tm results from reduction of the c/a ratio. On the contrary, for the Ba-Ca substitution, Ca^{2+} induces a local polar moment leading to a small decrease of Tm. Concerning the strontium substitution, one of the noteworthy characteristic is the very high value in the maximum of ε'r.

[1] Ravez J., Simon A.*, J. Korean Phys. Soc*., 1998, **32**, 955. [2] Nagata H., Takeneda T., *Spn. S. Appl. Phys.,* 1998, **37**, 5311

Keywords: ferroelectric relaxor, lead-free, disordered materials