Contribution ID: **14** Type: **Poster Presentations**

X-Ray Diffraction Use fo PZN-PT Single Crystal's Synthesis and Microscopic Thermal Dilatation Coefficient Determination

Tuesday, 17 November 2015 18:06 (2 minutes)

The performance of transducers can be significantly increased by the use of active materials with large piezoelectric coefficients (dij) and large coupling factors (kij) [1]. Recently, high levels of piezoelectricity have been published in Pb(Mg_{1/3}Nb_{2/3})O₃-PbTiO₃ (PMN-PT) and Pb(Zn_{1/3}Nb_{2/3})O₃-PbTiO₃ (PZN-PT) single crystals: d33 > 2500 pC/N, d31> -1500pC/N, k33> 90%, k31> 80% and kt> 60% [1-5].
X-Ray Diffraction is an excellent technique to follow and analyze structures and crystallographic phases of solid materials.
In this paper we use the X-Ray powder Diffraction technique to control the different steps for the synthesis of precursors (PbTiO₃ and ZnNb₂O₆) and single crystals such as PZN-PT and PMN-PT.
X-Ray powder Diffraction was performed on ground single crystals with the help of a Philips X'pert Pro diffractometer using a monochromatic selecting CuKα radiation (λ = 1.5418 Å). Measurements for XRD characterization were realized by using a HTK16 high temperature chamber. The DRX diffraction patterns confirm a pure perovskite phase for the two crystals, within the X-ray powder diffraction's sensitivity. It means that Pb(Zn_{1/3}Nb_{2/3}))O₃ and PbTiO₃ have formed a perfect perovskite structure solid solution. Generally, XRD diagrams are carried out over narrow angular regions centered about the six pseudo-cubic reflections (100), (110), (111), (200), (220) and (222), from which it is possible to determine unambiguously the crystal's symmetry [6]. In the rhombohedral symmetry, the (h00) pics are all singulets while the (hhh) pics become doubled. In our case, from the peak profiles of the pseudo-cubic (200) and (222) reflections, the symmetry is clearly seen to be rhombohedral. The lattice parameters were determined in ambient and non-ambient conditions for the rhombohedral and cubic structure respectively. The plot of the lattice parameter and the lattice volume versus temperature in the cubic phase was performed to determine the dilatation coefficients a and v by calculating the slope as indicating in the following equations:

Primary author: Dr KOBOR, Diouma (University Assane Seck of Ziguinchor)

Co-authors: Prof. GUYOMAR, Daniel (LGEF); Prof. LEBRUN, Laurent (LGEF)

Presenter: Dr KOBOR, Diouma (University Assane Seck of Ziguinchor)

Session Classification: Poster Session

Track Classification: Main