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Nowadays, piezoelectric ceramics are integrated in a wide range of devices, in particular in ultrasonic applications (underwater sonar systems, medical imaging, non-destructive testing…). Most of them use $Pb(Zr,Ti)O_3$ (PZT). However, due to health care and environmental problems, lead content must be reduced in such applications [1]. Recent reviews demonstrated that few lead-free materials families can be considered: the alkaline-niobates ($K_{0.5}Na_{0.5}NbO_3$), the alkaline-bismuth-titanates ($Na_{0.5}Bi_{0.5}TiO_3$) and barium titanate based materials ($BaTiO_3$) [2, 3]. One of the limitations of ceramic materials is their isotropic nature. This is the reason why texturation process has been developed in order to improve their properties in particular electromechanical parameters. The aim of the present study is thus to obtain textured $BaTiO_3$ based materials by using the templated grain growth process (TGG) and to measure their piezoelectric properties.

Nanosized $BaTiO_3$ powders were prepared by classical solid state route at relatively low temperature. $BaTiO_3$ templates of different morphologies were elaborated by a molten salts process. Dispersing agent, binder and plasticizer, the mixture of the templates and matrix particles was then dispersed in the appropriated solvent using non-aqueous formulation. The slurry was then tape-casted on plastic film. After drying, the green sheet was cut, stacked, thermo compressed and then sintered at the appropriated temperature. This process allowed obtaining highly-oriented materials with a texturation degree around 95% (fig. 1), presenting K_t values around 35-40%, higher than for non-textured $BaTiO_3$ ceramics.

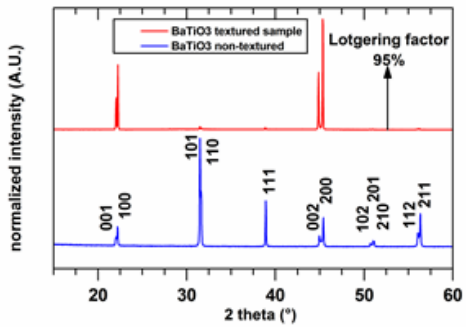

Fig. 1: X-ray diffraction diagram of (tetragonal) textured sample $BaTiO_3$ and (tetragonal) non-textured $BaTiO_3$ ceramic as reference.

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