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# Synthesis and study of piezoelectric materials in α-quartz family

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Piezoelectric materials which can be used at very high temperature without degradation are sought for the control system in severe environmental conditions. However, the use of a piezoelectric material at elevated temperature presents many challenges such as possible phase transition, chemical degradation or structural defect propagation which can cancel or drastically decrease the piezoelectric properties. α-quartz, which is quite common piezoelectric material, cannot be used at temperatures higher than 573℃ because of phase transition alfa−>beta-quartz occurs. Among the piezoelectric materials, there are potentially powerful piezoelectric materials with α-quartz structure such as: 1) α-GeO2, which has a very wide range of operating temperature (until 1115℃) because its strong structural distortion prevents the transition to beta-quartz-type phase. 2) BaZnO2 –some theoretical calculations showed that such a crystal with α-quartz structure possesses outstanding piezoelectric properties.
So, the main objectives of the work are: development of the experimental conditions to control the seeded crystal growth of α-GeO2 with high crystalline quality by the high temperature flux method; study of the thermal, piezoelectric and dielectric properties of the crystals at different temperatures (up to 700℃); synthesis of pure powder of complex oxide BaZnO2 and following crystal growth by flux-growth method.

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