

LEAD-FREE PIEZOELECTRIC CERAMIC COMPOSITION, PIEZOELECTRIC
ELEMENT COMPRISING SAME, KNOCK SENSOR, AND PROCESS FOR
PRODUCTION OF LEAD-FREE PIEZOELECTRIC CERAMIC COMPOSITION

ABSTRACT

[Object] To provide a lead-free piezoelectric ceramic composition having good piezoelectric properties without abrupt properties changes between -50°C and $+150^{\circ}\text{C}$.

[Solution] A lead-free piezoelectric ceramic composition includes a first crystal phase of alkali niobate/tantalate type perovskite oxide having piezoelectric properties and a second crystal phase of A-Ti-B-O composite oxide (where the element A is an alkali metal; the element B is at least one of Nb and Ta; and the contents of the element A, the element B and Ti are not zero). Examples of the second crystal phase are those represented by $\text{A}_{1-x}\text{Ti}_{1-x}\text{B}_{1+x}\text{O}_5$. It is preferable that x satisfies $0 \leq x \leq 0.15$.

[Drawing] FIG. 4