

ABSTRACT

A piezoelectric element having a piezoelectric body and an electrode in contact with the piezoelectric body: the piezoelectric body being formed of a lead-free piezoelectric ceramic composition which includes a primary phase formed of an alkali niobate-based perovskite oxide represented by a compositional formula $(A1_aM1_b)_c(Nb_{d1}Mn_{d2}Ti_{d3}Zr_{d4}Hf_{d5})O_{3+e}$ (wherein element A1 represents at least one species among the alkali metals; element M1 represents at least one species among Ba, Ca, and Sr; the following conditions: $0 < a < 1$, $0 < b < 1$, $a + b = 1$, $0.80 < c < 1.10$, $0 < d1 < 1$, $0 < d2 < 1$, $0 < d3 < 1$, $0 \leq d4 < 1$, $0 \leq d5 < 1$, and $d1 + d2 + d3 + d4 + d5 = 1$, are satisfied; and e represents a value showing the degree of deficiency or excess of oxygen) and which satisfies the condition: $b/(d3 + d4 + d5) \leq 1$, and the electrode containing a base metal as a main component.

Figure 1