CLAIMS

1. A ceramic comprising a solid solution of formula:

$$x(Bi_aK_{1-a})TiO_3 - yBiFeO_3 - zPbTiO_3$$

wherein $0.4 \leq a \leq 0.6$;

$0 < x < 1$;

$0 < y < 1$;

~~$0 \leq z \leq 0.5$~~$0 < z \leq 0.5$; and

$x + y + z = 1$,

wherein the ceramic is substantially free of non-perovskite phases.

2. A ceramic as claimed in claim 1 wherein ~~$0 \leq z \leq 0.3$~~$0 < z \leq 0.3$.

~~3. A ceramic as claimed in claim 1 or 2 comprising a solid solution of formula:~~

~~$$x(Bi_aK_{1-a})TiO_3 - (1-x)BiFeO_3$$~~

~~wherein a is in the range 0.4 to 0.6 and x is in the range 0.01 to 0.99, wherein the ceramic is substantially free of non-perovskite phases.~~

43. A ceramic as claimed in any preceding claim further comprising one or more perovskite phases selected from the group consisting of $(Bi_aK_{1-a})TiO_3$, $BiTiO_3$, $KTiO_3$, $BiFeO_3$ and $PbTiO_3$.

54. A ceramic as claimed in any preceding claim wherein the solid solution has two of the group consisting of a rhombohedral phase, a monoclinic phase, an orthorhombic phase and a tetragonal phase.

65. A ceramic as claimed in any preceding claim wherein x is in the range 0.7 to 0.9.

~~7~~6. A ceramic as claimed in any of claims 1 to ~~5~~ 4 wherein x is in the range 0.1 to 0.4.

~~8~~7. A ceramic as claimed in any of claims 1 to ~~5~~ 4 wherein x is in the range 0.5 to 0.6.

~~9~~8. A ceramic as claimed in any preceding claim wherein a is 0.50.

~~10~~9. A ceramic as claimed in any preceding claim wherein in the solid solution, Bi and/or K are substituted by an A-site metal dopant selected from the group consisting of Li, Na, Ca, Sr, Ba and a rare earth metal.

~~11~~10. A ceramic as claimed in any preceding claim wherein in the solid solution, Fe and/or Ti are substituted by a B-site metal dopant which has a higher valency than the valency of the metal which it substitutes or has a mixed valency.

~~12~~11. A ceramic as claimed in any preceding claim wherein in the solid solution, Fe and/or Ti are substituted by a B-site metal dopant selected from the group consisting of Ti, Zr, W, Nb, V, Ta, Mo and Mn.

~~13~~12. A ceramic as claimed in any preceding claim wherein in the solid solution, Fe and/or Ti are substituted by a B-site metal dopant selected from the group consisting of Ti, Fe, Co and Ni.

~~14~~13. A ceramic as claimed in any preceding claim obtainable by a process comprising:

(A) preparing an intimate mixture of a substantially stoichiometric amount of a compound of each of Bi, K, Ti ~~and~~, Fe (and ~~optionally~~ Pb);

(B) converting the intimate mixture into an intimate powder;

(C) inducing a reaction in the intimate powder to produce a mixed metal oxide;

(D) manipulating the mixed metal oxide into a sinterable form; and

(E) sintering the sinterable form of the mixed metal oxide to produce the ceramic.

~~15~~14. A process for preparing a ceramic as defined in any preceding claim comprising:

(A) preparing an intimate mixture of a substantially stoichiometric amount of a compound of each of Bi, K, Ti ~~and~~, Fe ~~(and optionally Pb)~~;

(B) converting the intimate mixture into an intimate powder;

(C) inducing a reaction in the intimate powder to produce a mixed metal oxide;

(D) manipulating the mixed metal oxide into a sinterable form; and

(E) sintering the sinterable form of the mixed metal oxide to produce the ceramic.

~~16~~15. A process as claimed in claim ~~15~~14 wherein in step (A) the substantially stoichiometric amount of the compound of each of Bi, K, Ti ~~and~~, Fe ~~(and optionally Pb)~~ is expressed by the compositional formula:

$$x(Bi_bK_c)TiO_3 - y(BiFe_{1-d}B_dO_3) - zPbTiO_3$$

wherein:

B is a B-site metal dopant;

b is in the range 0.4 to 0.6;

c is in the range 0.4 to 0.6;

d is in the range 0 to 0.5; and

x, *y* and *z* are as defined in any preceding claim.