

Training Examples

Project TE109, existing example No. A14

Level / Category (ies)

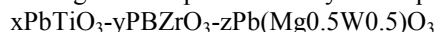
CL 2a, 2a1, 2b1, 3c
AL 2a, 2a1, 2b1, 3c

Documents (Classification is based on GB 1 251 933)

GB 1 251 933 A
FR 2 055 350 A
DE 1 938 318 A

Short Version of the Disclosure

The document discloses a piezoelectric body made of a ferroelectric ceramic material with a perovskite structure, the components of which belong to the triple element system represented by:



with $x = 0.41 - 0.49$
 $y = 0.37 - 0.49$
 $z = 0.05 - 0.18.$

The material further contains 1% by weight of MnO_2 and about 0.15 % of Al_2O_3 (see p.2, lines 3 - 19).

Representative Prior Art

Piezoelectric bodies made of ferroelectric ceramic materials with a perovskite structure and which components belong to triple element systems are known. The fundamental triple element system for these materials is $\text{PbTiO}_3\text{-PbZrO}_3\text{-Pb(A.B)O}_3$, with A being, inter alia, Mn or Mg and B being, inter alia, Sb, Nb, Ta, S or W, e.g. $\text{PbTiO}_3\text{-PbZrO}_3\text{-Pb(Mg0.5W0.5)O}_3$.

When 0.2 to 3% by weight of MnO_2 is added the electro-mechanical characteristics are improved (see p. 1, line 17 - 69).

Invention Information

I1. The present invention relates to a further improvement of the electro-mechanical characteristics of piezoelectric ceramic materials based on the known $\text{PbTiO}_3\text{-PbZrO}_3\text{-Pb(Mg0.5W0.5)O}_3$ system, by further incorporating about 0,15 % of Al_2O_3 , next to the known addition of MnO_2 (see p.2, lines 2 -19 or claim 1).

I2. As no indication is found that the ceramic product mentioned in I1 as such is known in the prior art, the ceramic composition as such is to be considered as representing invention information as well.

Additional Information

none

Identification of Potential Subclasses

From a term search in the IPC, particularly by the use of the IPC Catchword index, the potentially appropriate IPC places for Invention Information are identified.

Subject Matter	Tool	Query	IPC Places
I1	Catchword index	PIEZO-ELECRICITY elements in general	H01L41/00
I2	Catchword index	materials for/compositions of CERAMICS	C04B33/00,C04B35/00

Analysis and Selection of Classification Symbols

Core Level

I1. In main group H01L41/00, the “common rule” for group selection applies. The most detailed classification place provided for the technical subject of I1 is H01L41/18, which group relates to the selection of materials for piezo-electric elements.

I2. In subclass C04B, main group C04B35/00 relates to ceramics other than those of the clay-ware type, thus excluding main group C04B33/00. In C04B35/00, classification is made according to note (1) following the title of this group, i.e. *“in this group, in the absence of an indication to the contrary, compositions are classified according to the constituent present in the highest proportion by weight”*. In this particular case, there is an indication to the contrary, i.e. the limiting reference in the group for titanates C04B35/46, stipulating that ceramic compositions based on titanates which also contain zirconates are not classified in this group, but in group C04B35/49. Therefore classification is only made in this group, and no further classification is made in group C04B35/46, notwithstanding the higher values of x in the formula above.

According to par. 156 of the guide to the IPC, the classification symbol which most adequately represents the invention should be listed first. For the present example, this is H01L41/18, as this classification symbol relates to both the material and its application, while C04B35/49 only relates to ceramic materials as such.

Advanced Level

I1. In main group H01L41/00, the “common rule” for group selection applies. The most detailed classification place provided for the technical subject of I1 is the specific subgroup for ceramic compositions of group H01L41/16, which group relates to the selection of materials for piezo-electric elements. I.e. classification is made in H01L41/187.

I2. In subclass C04B, main group C04B35/00 relates to ceramics other than those of the clay-ware type, thus excluding main group C04B33/00. In C04B35/00, classification is made according to note (1) following the title of this group, i.e. *“in this group, in the absence of an indication to the contrary, compositions are classified according to the constituent present in the highest proportion by weight”*. In this particular case, there is an indication to the contrary, i.e. the limiting reference in group C04B35/46, stipulating that ceramic compositions based on titanates which also contain zirconates are not classified in this group, but in group C04B35/49. As all the compositions covered by the formula of claim 1 contain lead zirconates, lead titanates, as well as an other lead compound, classification is made in C04B35/493. Because of the limiting reference, further classification for the higher values of x is not made in the titanates group.

According to par. 156 of the guide to the IPC, the classification symbol which most adequately represents the invention should be listed first. For the present example, this is H01L41/187, as this classification symbol relates to both the material and its application, while C04B35/493 only relates to ceramic materials as such.

Subject Matter	Analysis of Subclass Selection	Subclass	Analysis of Group Selection	IPC CL IPC(2006)	IPC AL
I1	Subclass title covers subject matter	H01L	Common rule	H01L41/18	H01L41/187
I2	Subclass title covers subject matter	C04B	Note(1) after 35/00 and reference in 35/46	C04B35/49	C04B35/493

Complete Classification

The complete core and advanced level classification for this document based on the above analysis is as follows:

Core level

Int. Cl. (2006)
H01L 41/18
C04B 35/49

Advanced level

H01L 41/187 (2006.01)
C04B 35/493 (2006.01)