Number of documents: 11

JP06088151	Manufacturing method of the TiAl fund intergeneric chemical compound due to spread synthesis method NATL RES INST FOR METALS
JP07242967	Tial base alloy having high strength performance at high temperature NATL RES INST FOR METALS NIMS - NATIONAL INSTITUTE FOR MATERIALS SCIENCE
JP07011369	Polycrystalline substances of high ductile TiAl fund intergeneric chemical compound NATL RES INST FOR METALS
JP02228435	Melting casting method of Mn addition TiA1 intermetallic NATL RES INST FOR METALS
JP61223172	Manufacture of intermetallic compound tial base alloy NATL RES INST FOR METALS
JP61213361	Forming method for intermetallic compound tial-base alloy NATL RES INST FOR METALS
JP61041740	Heat-resistant alloy based on intermetallic compound TiAl NATL RES INST FOR METALS NIMS - NATIONAL INSTITUTE FOR MATERIALS SCIENCE
JP58123847	Heat resistant alloy basing on intermetallic tial compound incorporated with silver NATL RES INST FOR METALS
JP07188816	TiAl basic alloy NIMS - NATIONAL INSTITUTE FOR MATERIALS SCIENCE
JP06146031	Method for suppressing high-temperature oxidation of tial-base intermetallic compound and its product NIMS - NATIONAL INSTITUTE FOR MATERIALS SCIENCE
JP11061298	Titanium-aluminum intermetallic compound-base alloy and its production NIMS - NATIONAL INSTITUTE FOR MATERIALS SCIENCE

Manufacturing method of the TiAl fund intergeneric chemical compound due to spread synthesis method

JP06088151

- **Patent Assignee**
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- **Inventor**
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- **International Patent Classification**
  C22C-001/00

- **Publication Information**
  JPH0688151 **A 1994-03-29 [JP06088151]**
- **Priority Details**
  1991JP-0356627 1991-12-25
  1992JP-0073168 1992-02-25

- **Fampat family**

JPH0688151	A	1994-03-29	[JP06088151]
JP2636114	B2	1997-07-30	[JP2636114]

- **Abstract:**

(JP06088151)
PURPOSE:To produce the poreless TiAl-base intermetallic compd. at a low cost by subjecting a powder mixture or laminate composed of Ti and Al to plastic working and heating diffusion at a combustion synthesis reaction temp., then heating the powder mixture or laminate to a high temp., thereby homogeniz ing the powder mixture or laminate. CONSTITUTION:The structure mixture composed of the Ti and A1 powders or the laminate of Ti and A1 sheets is plastically worked at the compustion synthesis reaction temp. or below and is thereby molded. The molding is diffused by heating itself for several hours at 400 to 560 deg.C combustion synthesis reaction temp. under 30 to 200MPa inert gaseous pressure. The molding is further heated at 1050 to 1450 deg.C under 30 to 200MPa inert gaseous pressure, by which the molding is homogenized. The compsn. of the molding consists preferably of 30 to 37wt.% Al and the balance substantially Ti at this time. As a result, the TiAl-base intermetallic compd. which obviates the generation of the pores, is light weight, is resistant to heat and has high specific rigidity while the ease of shape imparatation is effectively utilized is obtd.

Claims

(JP06088151)

Claims machine translated from Japanese
1. Mixed group of titanium and aluminum powder
Layered product of weaving or titanium and aluminum sheet burning
-burning synthesize reaction temperature or less with plasticity process to depend form grant do, next
To be and with heating below combustion synthetic reaction temperature and spread, that
Rear hot heating processing, the spread combination which features that it converts homogeneously
Manufacturing method of the TiAl fund intergeneric chemical compound due to forming method.
2. Al30-37 weight %, the remainder substantial
Production of claim 1 of the TiAl fund intergeneric chemical compound which consists of Ti
Law.
3. Plastic work timber 30MPa-200MPa
Under inactive gas pressure under, burning under 400.deg.C-560.deg.C
-burning synthesize reaction temperature or less with several time heat do spread do,
Furthermore inactive gas pressure under 30MPa-200MPa
-under with 1050.deg.C-1450.deg.C under temperature to put heat do
Manufacturing method of the claim 1 which does [te] homogeneity spread.

Tial base alloy having high strength performance at high temperature

JP07242967

- **Patent Assignee**
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- **Inventor**
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  NOBUKI MINORU
  NAKAMURA MORIHIKO
  DOI HARUO
- **International Patent Classification**
  C22C-014/00
- **US Patent Classification**
  PCLO=148421000 PCLX=420418000 PCLX=420419000
- **CPC Code**
  C22C-014/00

- **Publication Information**
  JPH07242967 A 1995-09-19 [JP07242967]
- **Priority Details**
  1994JP-0054807 1994-03-02

- **Fampat family**

JPH07242967	A	1995-09-19	[JP07242967]
US5542992	A	1996-08-06	[US5542992]
JP2903102	B2	1999-06-07	[JP2903102]

- **Abstract:**
  (US5542992)
  A TiAl base alloy containing 46 to 54 mol % of Ti and 46 to 52 mol % of Al in which Sb is added within a range of 0.1 to 1 mol %, at least one element of Hf and/or Zr is further added within a range of 0 to 3 mol %, and three phases of a gamma phase, an alpha 2 phase and Sb-rich phase coexist.

Claims

(US5542992)

What is claimed is:

1.

A TiAl base alloy consisting essentially of 46 to 54 mol % Ti, 46 to 52 mol % Al, 0.1 to 1 mol % Sb, and 0 to 3 mol % of at least one element selected from the group consisting of Hf and Zr as an additive, said alloy having a three-phase microstructure where a GAMMA phase, an ALPHA 2 phase and an Sb-rich phase coexist.

2. A TiAl base alloy as claimed in claim 1, wherein both said ALPHA 2 and Sb-rich phases have shapes in fine particle size, each of which is contained in said alloy within a range of 2 to 10 vol. %.

3. A TiAl base alloy as claimed in claim 1, wherein at least one element selected from the group consisting of Sn, Mn and Si is further added as an additive within a range of 0 to 3 mol %.

Polycrystalline substances of high ductile TiAl fund intergeneric chemical compound

JP07011369

- **Patent Assignee**
  NATL RES INST FOR METALS
- **Inventor**
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  HIRANO TOSHUKI
- **International Patent Classification**
  C22C-001/00 C22C-001/02 C22C-014/00 C22C-021/00

- **Publication Information**
  JPH0711369 A 1995-01-13 [JP07011369]
- **Priority Details**
  1991JP-0242306 1991-08-29

- **Fampat family**

JPH0711369	A	1995-01-13	[JP07011369]
JP2829372	B2	1998-11-25	[JP2829372]

- **Abstract:**

(JP07011369)
PURPOSE:To improve ductility as well as strength in a polycrystal body and to facilitate its production by specifying the content of Ti, forming its structure into a two phase lamellar structure or a single phase structure and moreover forming a columnar crystal structure. CONSTITUTION:The polycrystal body has a two phase lamellar structure of TiAl-gamma and Al-alpha<2> or a single phase structure of TiAl-gamma. Its compsn. is constituted of, by atom, 45 to 54% Ti, and, if desired, <=3% of one or more kinds among Mn, Cr, V and Nb are added. As for the shape of the crystal grains, a columnar crystal structure longly extended along the crystal growing direction is formed. The ratio (aspect ratio) of the length in the longitudinal direction to the width of the crystal grains in the columnar crystal structure is preferably regulated to about >=10. Furthermore, its cold ductility is preferably regulated to about >=4%. This polycrystal body is produced by unidirectional solidification.

Claims

(JP07011369)

1. TiAl-.gamma. and Ti [3] Al-.alpha. [2]
2 phase stratified organization, or the single-phase organization of TiAl-.gamma. possession
To do, Ti-45-54 atmoic % to consist of the constitution of Al, crystal
Grain form the prismatic crystal organization which extends long according to grain growth direction
Forming, high ductile TiAl fund intergeneric it features that it becomes
Polycrystalline substances of chemical compound.
2. 3 atmoic % to Mn and Cr, V and N
Adding 1 kinds or more of b, the polycrystalline substances of the claim 1 which becomes.
3. Longitudinal direction and width of crystal grain of prismatic crystal organization
Ratio of length (aspect ratio) the claim 1 which is approximately 10 or more
Or polycrystalline substances of 2.
4. The claim 1,2 where normal temperature ductility is 4% or more
Or polycrystalline substances of 3.
5. On the one hand producing with tropistic solidification, the claim which becomes
Polycrystalline substances of 1,2,3 or 4.

Melting casting method of Mn addition TiA1 intermetallic

JP02228435

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  NATL RES INST FOR METALS
- **Inventor**
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- **International Patent Classification**
  C22C-001/02 C22C-014/00

- **Publication Information**
  JPH02228435 A 1990-09-11 [JP02228435]
- **Priority Details**
  1989JP-0046469 1989-03-01

- **Fampat family**

JPH02228435	A	1990-09-11	[JP02228435]
JPH066762	B2	1994-01-26	[JP94006762]
JP1917846	C	1995-04-07	[JP1917846]

- **Abstract:**
  (JP94006762)
  PURPOSE: To produce an Mn-containing TiAl intermetallic compound improved in Mn yield and free from pinholes by melting a briquette consisting of Mn and coarse-grained Ti and Al, reversing the resulting ingot, and then melting and degassing a surface layer. CONSTITUTION: A briquette 1 consisting of Mn and coarse-grained Ti and Al is put into a water-cooled copper mold 2 and irradiated with electron beam 3 to undergo primary melting, which is formed into a bar-shaped ingot 4. Subsequently, this bar-shaped ingot 4 is reversed to allow the bottom part A to face upward, and the resulting surface part A alone is melted at low temp. for a short time by means of the electron beam 3 to undergo degassing, and then, the bar-shaped ingot 4 is supported by means of a supporting member 5. While being moved, the above bar-shaped ingot 4 is melted by means of the electron beam 3, and then, an ingot 7 is cast, while being pulled down in the direction of an arrow, in a water-cooled copper mold 6. By this method, the yield of Mn in the Mn-containing TiAl intermetallic compound can be improved, and the sound ingot free from pinholes can be obtained. COPYRIGHT: (C)1990,JPO&Japio

Claims

(JP94006762)

Claims machine translated from Japanese
1. The TiAl intermetallic which adds Mn pu
-razuma electronic beam furnace with melt cast do to encounter, plasma electric
Below 750A to do child beam melting low with electric flowing down, at the same time,
Primary melting the briquette from Mn and Ti and Al grain
After doing, the ingot to reverse, melting the surface layer of the ingot, the degassing
Doing, coming after and the ingot which is obtained, melting it lowers and casts
Mn in the plasma electron beam furnace which features ru thing
Melting casting method of addition TiAl intermetallic.

Manufacture of intermetallic compound tial base alloy

JP61223172

- **Patent Assignee**
  NATL RES INST FOR METALS
- **Inventor**
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  PPONMA KAZUHIRO
  OOGOSHI TSUNEO
  NAKANO OSAMU
  TSUJIMOTO TOKUZO
- **International Patent Classification**
  C22C-001/02 C22C-014/00 C22F-001/00 C22F-001/02 C22F-001/04 C22F-001/18

- **Publication Information**
  JPS61223172 A 1986-10-03 [JP61223172]
- **Priority Details**
  1985JP-0063342 1985-03-29

- **Fampat family**

JPS61223172	A	1986-10-03	[JP61223172]
JPH0116289	B2	1989-03-23	[JP89016289]
JP1525421	C	1989-10-30	[JP1525421]

- **Abstract:**
  (JP1525421)
  PURPOSE: To obtain easily the titled alloy having low hardness, superior ductility, workability and uniform compsn., by simple operation, by heating, degassing treating a crucible using calcia in vacuum, then feeding raw material composed of specified quantities of Ti, Al into the crucible to melt it by vacuum induction melting method. CONSTITUTION: In manufacturing the titled alloy by using raw material composed of, by weight, 74-56% Ti, 26-44% Al, crucible made of calcia, or that lined with calcia is used after heating and degassing treating it in vacuum before use. If the raw material is melted in such crucible by vacuum induction melting, reaction with component material of crucible is avoided, and uniforming of compsn. and degassing effect due to induction stirring are added, and the alloy free from contamination, and having uniform compsn., low hardness, superior ductility, workability is obtd. COPYRIGHT: (C)1986,JPO&Japio

Claims

(JP1525421)
JP6334285 1985-03-29 [1985JP-0063342]

Forming method for intermetallic compound tial-base alloy
JP61213361

- **Patent Assignee**
  NATL RES INST FOR METALS
- **Inventor**
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  TSUJIMOTO TOKUZO

- **International Patent Classification**
  C22F-001/00 C22F-001/18

- **Publication Information**
  JPS61213361 A 1986-09-22 [JP61213361]
- **Priority Details**
  1985JP-0053439 1985-03-19

- **Fampat family**

JPS61213361	A	1986-09-22	[JP61213361]
JPS636625	B2	1988-02-10	[JP88006625]
JP1458304	C	1988-09-28	[JP1458304]

- **Abstract:**
  (JP1458304)
  PURPOSE: To enable forming working with ease by covering with a specific sheathing material an alloy with an intermetallic compound TiAl base which is a material difficult to work and then by carrying out hot working. CONSTITUTION: The TiAl-base alloy prepared by adding, to a TiAl intermetallic compound consisting of 74-56wt% Ti and 26-44wt% Al, the third and the fourth elements has excellent characteristics such as light weight, resistance to oxidation, specific strength at high temp., and high-temp. creep strength, but, on the other hand, it is a material difficult to work because of its lack of cold ductility and inferiority in high-temp. deformability. In subjecting this material to forming working, the TiAl-base alloy material is covered with the sheathing material which causes no chemical reaction with TiAl-base alloys of Ni type, Co type, Fe-Ni type, etc., having high-temp. deformation resistance close to the high-temp. deformation resistance of this TiAl-base alloy at 1,000 deg.C and has a capacity to undergo plastic working, cutting work, and welding, which is subjected to hot working. In this way, the forming working into required shape is facilitated. COPYRIGHT: (C)1986,JPO&Japio

Claims

(JP1458304)
JP5343985 1985-03-19 [1985JP-0053439]

Heat-resistant alloy based on intermetallic compound TiAl
JP61041740

- **Patent Assignee**
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  OSAMU NAKANO
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- **International Patent Classification**
  C22C-014/00
- **US Patent Classification**
  PCLO=420418000 PCLX=420420000
- **CPC Code**
  C22C-014/00

- **Publication Information**
  JPS6141740 A 1986-02-28 [JP61041740]
- **Priority Details**
  1984JP-0161601 1984-08-02

- **Fampat family**

JPS6141740	A	1986-02-28	[JP61041740]
JPS62215	B2	1987-01-06	[JP87000215]
US4661316	A	1987-04-28	[US4661316]
JP1395560	C	1987-08-24	[JP1395560]

- **Abstract:**
  (US4661316)
  A heat-resistant alloy comprising an alloy based on an intermetallic compound TiAl composed of 60 to 70% by weight of titanium and 30 to 36% by weight of aluminum, and 0.1 to 5.0% by weight of manganese.

Claims

(US4661316)

What is claimed is:

1.

A heat-resistant alloy consisting essentially of (1) an alloy based on an intermetallic compound TiAl composed of 60 to 70% by weight of titanium and 30 to 36% by weight of aluminum and (2) 0.1 to 5.0% by weight of manganese.

2. The alloy of claim 1 wherein the content of aluminum is 31 to 35% by weight.

3. The alloy of claim 1 wherein the amount of manganese is 0.5 to 3.0% by weight.

4. The alloy of claim 1 which further contains at least one element selected from the group consisting of

(a) zirconium in an amount of 0.6 to 2.8% by weight;

(b) niobium in an amount of 10.6 to 4.0% by weight;

(c) vanadium in an amount of 01.6 to 1.9% by weight;

(d) tungsten in an amount of 0.5 to 1.2% by weight;

(e) molybdenum in an amount of 0.5 to 1.2% by weight;

and

(f) carbon in an amount of 0.02 to 0.12% by weight.

Heat resistant alloy basing on intermetallic tial compound incorporated with silver

JP58123847

- **Patent Assignee**
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  SUGA HIROO
- **International Patent Classification**
  C22C-005/06 C22C-014/00 C22C-021/00

- **Publication Information**
  JPS58123847 A 1983-07-23 [JP58123847]
- **Priority Details**
  1982JP-0006137 1982-01-20

- **Fampat family**

JPS58123847	A	1983-07-23	[JP58123847]
JPS59581	B2	1984-01-07	[JP84000581]
JP1226807	C	1984-08-31	[JP1226807]

- **Abstract:**
  (JP1226807)
  PURPOSE: To remarkably enhance the ductility of a TiAl alloy contg. an intermetallic TiAl compound phase having L1O crystal form as the base by adding Ag to the alloy. CONSTITUTION: Ag or an Ag compound is added to an alloy contg. an intermetallc TiAl compound phase (expressed as a TiAl phase hereunder) as the base so that 0.5-50wt% Ag is contained. The TiAl phase consisting essentially of Ti and Al and has L1O crystal form. By adding Ag, a structure in which each of grains having the TiAl phase has been covered with a primary solid soln. of Ag is formed, and the boundaries of the grains having the TiAl phase disappear. Accordingly, it is considered that the ductility of the TiAl alloy incorporated with Ag can be enhanced. The TiAl alloy with improved ductility shows characteristics peculiar to the TiAl phase. COPYRIGHT: (C)1983,JPO&Japio

Claims

(JP1226807)
JP613782 1982-01-20 [1982JP-0006137]

TiAl basic alloy
JP07188816

- **Patent Assignee**
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  NAKAMURA MORIHIKO
- **International Patent Classification**
  C22C-014/00

- **Publication Information**
  JPH07188816 A 1995-07-25 [JP07188816]
- **Priority Details**
  1993JP-0346906 1993-12-27

- **Fampat family**

JPH07188816	A	1995-07-25	[JP07188816]
JP3194004	B2	2001-07-30	[JP3194004]

- **Abstract:**
  (JP07188816)
  PURPOSE:To obtain a high strength and high ductility TiAl alloy having high ductility at ordinary temp. and easy to form and work. CONSTITUTION:This high strength and high ductility TiAl -based alloy contains 33-59mol% Ti, 35-47mol% Al and 6-20mol% V, contains coexistent gamma-, alpha2-and beta-phases in a uniformly dispersed state and has isometric grains having <=10mum average grain diameter size.

Claims

(JP07188816)

Claims machine translated from Japanese
1. Ti33-59 mol %, Al35-47
The mol % and the V6-20 mol % to contain, I phase, I [2] phase
And high intensity 3 phases of I phase have coexisted & high ductile Ti where
Al basic alloy.
2. Axial grain of even crystal grain size 10 .micro.m or less and the like possession
Ti of the claim 1 where 3 phases which it does, coexist are uniformly dispersed
Al basic alloy.
3. Claim at the time of alloying 1 or 2, in V
Replacing, or with V Nb, Mo, Hf and M
The element of 1 kinds or more which are selected from n the 6-20 mol % content
The TiAl alloy which is done.

Method for suppressing high-temperature oxidation of tial-base intermetallic compound and its product

JP06146031

- **Patent Assignee**
  NIMS - NATIONAL INSTITUTE FOR MATERIALS SCIENCE
- **Inventor**
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  MIYAZAKI AKIMITSU
  NAKAZAWA SHIZUO

- **International Patent Classification**
  C22C-014/00 C22F-001/00 C22F-001/18 C23C-008/28 C23C-028/04 C23F-015/00
- **Publication Information**
  JPH06146031 A 1994-05-27 [JP06146031]
- **Priority Details**
  1992JP-0322329 1992-11-09

- **Fampat family**

JPH06146031	A	1994-05-27	[JP06146031]

- **Abstract:**
  (JP06146031)
  PURPOSE:To improve the high-temp. oxidation resistance of the TiAl-base intermetallic compd. by heating the TiAl-base intermetallic compd. consisting of a specific compsn. to a specific temp. in a gaseous nitrogen atmosphere contg. a slight amt. of oxygen. CONSTITUTION:This product consisting of the TiAl-base intermetallic compd. having the compsn. contg. >=32% and <36% Al, or further 4% Mn and the balance Ti is held at >=1000 deg.C and <1150 deg.C in the gaseous nitrogen atmosphere, contg. an oxidative gas releasing sufficient O2 for conversion of AlN to Al2O3 and <300ppm in volume or the O2 of the amt. corresponding thereto. The film of a two-phase sepn. structure consisting of a low-Ti-content Al2O3 layer and TiO2, TiN layers is formed on the surface of the product consisting of the TiAl-base intermetallic compd. The layer consisting of the low Al-content TiO2 and TiN and the Al rich layer are formed on the surface of the product of the Mn-contg. TiAl-base intermetallic compd. and these layers are oxidized to form the Al2O3 as the oxidation resistant film. The oxidation resistance which is the drawback of the TiAl-base intermetallic compd. is thus greatly improved.

Claims

(JP06146031)

1. Aluminum content at weight 32% or more
TiAl fund intergeneric chemical compound under 36%, aluminum nitride
Although changes to alumina, being sufficient, at the same time with cubic measure 3
The oxygen under 00ppm or the oxygen of the quantity which is suitable to this
In the nitrogen gas atmosphere which includes the oxidation characteristic gas which it discharges, the 1000.deg.C from here
The TiAl basis which features that you keep at temperature under the upper 1150.deg.C
Control method of high-temperature oxidation the intermetallic.
2. Content of the aluminum 32% from here at weight
The TiAl fund intergeneric chemical compound which is under upper 36%, aluminum nitride
Although [niumu] changes to alumina, being sufficient, at the same time the body
With the product the oxygen under 300ppm or the quantity which is suitable to this
In the nitrogen gas atmosphere which includes the oxidation characteristic gas which discharges oxygen, 10
Keeping at temperature under the 1150.deg.C above the 00.deg.C, it can, the alloy chart
Surface layer layer of the oxide and the nitride of Ti is low the acid of Al of titanium content
Being formed from 2 layer isolation structure layer of layer of the chemical material
The hot oxidation resistance TiAl fund intergeneric chemical compound product which is made feature.
3. Aluminum content at weight 32% or more
Under 36%, at the same time manganese at weight maximum of 4% TiAl which is included
Fund intergeneric chemical compound, aluminum nitride oxidation [aruminiu]
Although it changes to [mu], being sufficient, at the same time with cubic measure the acid under 300ppm
The oxidation characteristic moth which discharges the element or the oxygen of the quantity which is suitable to this
In the nitrogen gas atmosphere which includes [su], under the 1150.deg.C above the 1000.deg.C warm
The manganese content TiAl fund being attached which features that you keep at degree
Control method of high-temperature oxidation the between chemical compound.
4. Content of the aluminum 32% from here at weight
Under upper 36%, at the same time manganese at weight maximum of 4% Ti which is included
Al fund intergeneric chemical compound, aluminum nitride oxidation Al mini-
Although it changes to [umu], being sufficient, at the same time with cubic measure under 300ppm
The nitrogen gas which includes oxygen or the oxygen of the quantity which is suitable to this
In the surrounding air, keeping under the 1150.deg.C above the 1000.deg.C, it can, combination
Gold surface layer is low the oxide and the nitride of Ti of aluminum content
From layer and aluminum concentrated layer being formed special
The hot oxidation resistance manganese content TiAl fund intergeneric chemical combination which is made collection/symbol
Thing product.

Titanium-aluminum intermetallic compound-base alloy and its production
JP11061298

- **Patent Assignee**
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  NIINOBE KOUICHI
  AKUTSU AKIHIDE

- **International Patent Classification**
  C22C-014/00 C22F-001/00 C22F-001/18
- **Publication Information**
  JPH1161298 A 1999-03-05 [JP11061298]
- **Priority Details**
  1997JP-0221657 1997-08-18

- **Fampat family**

JPH1161298	A	1999-03-05	[JP11061298]

- **Abstract:**
  (JP11061298)
  PROBLEM TO BE SOLVED: To obtain a TiAl intermetallic compd.-base alloy controlled to a fine uniform microstructure only by heat treatment by forming a uniform fine isometric grain structure having a structure form with a β-phase filmily deposited on γ-grain boundaries. SOLUTION: Since a TiAl intermetallic compd.-base alloy is treated by air cooling from a high temp. α-single phase region so as to form a feathery γ-structure, a special cooling equipment for iced water cooling, etc., used for forming a massive γ-structure is not necessary. The feathery γ-structure can be formed by controlling the cooling rate of the TiAl alloy. In a more practical manner, the structure is easily formed by adding a 3rd element other than Ti and Al. One or more among Cr, V, Nb, Mo and W may be used as the 3rd element and the element is preferably added by 0.1-10 at.%. The alloy with the formed feathery γ-structure is tempered and aged in an α+γ or β+γ two-phase region or an α+β+γ three-phase region to form a uniform fine microstructure.

Claims

(JP11061298)

Claims machine translated from Japanese
1. Being the TiAl intermetallic basic alloy,
It possesses the organizational form which to the I grain boundary I phase precipitated to film condition
TiAl which features that it consists of uniform minute and the like axial grain organization
Intermetallic basic alloy.
2. Crystal grain size uniformity of abbreviation 30 .micro.m or less minuteness and the like
The alloy of the claim 1 which consists of axial grain organization.
3. As for TiAl intermetallic basic alloy, the group
Forming,
Ti-Al-X
(X, Cr, V, 1 kinds inside Nb, Mo and W from here
The element above is shown, it is the atmoic %, 0.1-10)
So the claim the alloy of 1 which is displayed or 2.
4. Claim no TiAl of 1 or 3
Being manufacturing method of the intermetallic basic alloy, hot I single-phase territory
Directly by cooling from the limits, [huezari] I organization raw
Forming, next 2 phases or .alpha.+ of .alpha.+.gamma. or .beta.+.gamma.
It tempers in 3 phase territory of .beta.+.gamma. and it features that aging it does
Production method of TiAl intermetallic basic alloy.
5. Cooling rate as an abbreviation 10-40K/s cold
The claim 4 which makes [huezari] I phase form by ***
Production method.