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[WO200656248](#)

Titanium aluminide based alloy
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GEESTKH





[CA2645843](#)

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GEESTKHAKHT HELMHOLTZ ZENTRUM GEESTHACHT

[US20140010701](#)

Titanium aluminide alloys
GKSS FORSCHUNGSZENTRUM HELMHOLTZ ZENTRUM GEESTHACHT

Titanium aluminide based alloy WO200656248

<ul style="list-style-type: none"> • Patent Assignee CAR GAME FOLDER SHUN SS GUSS ZENTRUM DOVE GAME STORE GKSS FORSCHUNGSZENTRUM GKSS FORSHUNGSTSENTRUM GEESTKH • Inventor OEHRING MICHAEL PAUL JONATHAN LORENZ UWE APPEL FRITZ • International Patent Classification C22C-001/04 C22C-014/00 C22C-021/00 C22C-030/00 C22F- 001/00 C22F-001/18 F01D-005/28 F01D-025/00 F02C-007/00 • US Patent Classification PCLO=420580000 • CPC Code B22D-021/00/5 C22C-014/00; 	<ul style="list-style-type: none"> • Publication Information WO2006056248 A1 2006-06-01 [WO200656248]     • Priority Details 2004DE-10056582 2004-11-23 2005WO-EP09402 2005-09-01
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- **Abstract:**

(EP1819838)

The invention concerns alloys made through the use of melting and powdered metallurgical techniques on the basis of titanium aluminides with an alloy composition of Ti-z Al-y Nb where 44.5 Atom %<=z<=47 Atom %, 44.5 Atom %<=z<=45.5 Atom %, and 5 Atom %<=y<=10 Atom % with possibly the addition of B and/or C at a content between 0.05 Atom % and 0.8 Atom %. Said alloy is characterized in that it contains a molybdenum (Mo) content ranging between 0.1 Atom % to 3.0 Atom %. (From US2010015005 A1)





Claims

(EP1819838)

1. A titanium aluminide based alloy, produced by using melt metallurgical and powder metallurgical techniques with an alloy composition of 44.5 atom % \leq Al \leq 47 atom %, 5 atom % \leq Nb \leq 10 atom %, molybdenum between 0.1 atom % to 3 atom %, optionally B and/or C with contents \geq 0.05 atom % and \leq 0.8 atom %, and the remainder being titanium and conventional impurities, wherein the gamma -titanium aluminide alloy is formed with a fine dispersion of the beta phase and the beta phase is present up to a temperature of less than 1320 deg.C.
2. An alloy as claimed in claim 1, characterised in that the proportion of aluminium in the alloy composition is between 44.5 atom % to 45.5 atom %.
3. A component produced from an alloy as claimed in claim 1 or 2.

Titanium aluminide alloys

CA2645843

<ul style="list-style-type: none"> • Patent Assignee GKSS FORCHUNGSZENTRUM GEESTHACHT GKSS FORSCHUNGSZENTRUM GKSS FORSHUNGSTSENTRUM GEESTKHAKHT HELMHOLTZ ZENTRUM GEESTHACHT • Inventor APPEL FRITZ PAUL JONATHAN OEHRING MICHAEL • International Patent Classification A61K B22F-001/00 C22C-001/02 C22C-001/04 C22C-014/00 C22C-021/00 C22C-030/00 C22C-032/00 C22F-001/00 C22F- 001/04 C22F-001/18 F01D-005/28 F01D-025/00 F02C-007/00 • US Patent Classification PCLO=148549000 PCLO=148538000 PCLX=075330000 PCLX=148437000 • CPC Code C22C-001/02; C22C-001/04/58; C22C-001/04/91; C22C- 001/04; C22C-014/00; C22C-030/00; C22F-001/18/3 	<ul style="list-style-type: none"> • Publication Information CA2645843 A1 2009-06-13 [CA2645843]     • Priority Details 2007DE-10060587 2007-12-13 2008EP-0020431 2008-11-25 2008US-12331909 2008-12-10 2009EP-0010152 2008-11-25 2009US-12512451 2009-07-30 																																																																																								
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<ul style="list-style-type: none"> • Abstract: (EP2423341) Alloy based on titanium aluminides has the composition: Ti - (38 -42 at.%) Al - (5-10 at.%) Nb. The composition has composite lamellae structures with B19-phase and beta -phase in each lamella. The ratio, especially the volume ratio, of the B19-phase and the beta -phase in each lamella is 0.05-20, especially 0.1-10. Independent claims are also included for the following: (1) Method for the production of the alloy; and (2) Component made from the alloy. 																																																																																									

Claims

(EP2423341)

1. An alloy based on titanium aluminides, particularly made with the use of fusion or powder metallurgical processes, preferably on the basis of gamma (TiAl), wherein TiAl alloys with further additives contain volumetric fractions of the beta phase, characterised in that the composition includes composite lamellar structures with B19 phase and beta phase in each lamella, wherein the ratio, particularly the volumetric ratio, of the B19 phase and the beta phase in each lamella is between 0.05 and 20, particularly between 0.1 and 10, wherein the alloy has the following composition: Ti - (41 to 44.5 at %) Al - (5 to 10 at %) Nb - (0.5 to 5 at %) Fe.
2. An alloy as claimed in claim 1, characterised in that the ratio, particularly the volumetric ratio, of the B19 phase and the beta phase in each lamella is between 0.2 and 5, particularly between 0.25 and 4.
3. An alloy as claimed in claim 1 or 2, characterised in that the ratio, particularly the volumetric ratio, of the B19 phase and beta phase in each lamella is between (1/3) and 3, particularly between 0.5 and 2.
4. An alloy as claimed in one of claims 1 to 3, characterised in that the ratio, particularly the volumetric ratio, of the B19 phase and beta phase in each lamella is between 0.75 and 1.25, particularly between 0.8 and 1.2, preferably between 0.9 and 1.1.
5. An alloy as claimed in one of claims 1 to 4, characterised in that the composition selectively includes (0.1 to 1 to 1 at %) B (boron) and/or (0.1 to 1 at %) C (carbon).
6. An alloy as claimed in one of claims 1 to 5, characterised in that lamellas of the composite lamellar structures are surrounded by lamellas of the gamma (TiAl) type, preferably on both sides of the lamella.
7. An alloy as claimed in one of claims 1 to 6, characterised in that the lamellas of the composite lamellar structures have a volumetric proportion of more than 10%, preferably more than 20%, of the alloy.
8. An alloy as claimed in one of claims 1 to 7, characterised in that the lamellas of the composite lamellar structures include the phase alpha 2-Ti 3Al in a proportion of up to 20%.
9. A method of making an alloy as claimed in one claims 1 to 8 using fusion or powder metallurgical techniques, wherein after making the alloy into an intermediate product a further heat treatment of the intermediate product is performed at temperatures above 900 deg.c, preferably above 1000 deg.c, particularly at temperatures between 1000 deg.c and 1200 deg.c for a predetermined period of time of more than 60 minutes, preferably more than 90 minutes and subsequently the heat-treated alloy is cooled at a predetermined cooling rate of more than 0.5 deg.C per minute.
10. A method as claimed in claim 9, characterised in that heat-treated alloy is cooled at a predetermined cooling rate of between 1 deg.c per minute to 20 deg.c per minute, preferably to 10 deg.c per minute.
11. A component which is made of an alloy as claimed in one of claims 1 to 8, wherein, in particular, the alloy is made by fusion or powder metallurgical methods or techniques.
12. Use of an alloy as claimed in one of claims 1 to 8 for making a component.

Claims

(US20140010701)

What is claimed is:

1.

An alloy comprising titanium, 38 to 46 at % aluminum, and 5 to 10 at % niobium, and comprising composite lamella that contain a B19 phase and a beta phase in a volume ratio of B19:13 of 0.05:1 to 20:1.

2. The alloy of claim 1, comprising/containing 38 to 42 at % aluminum.

3. The alloy of claim 1, comprising 38.5 to 42.5 at % aluminum, and 0.5 to 5 at % chromium.

4. The alloy of claim 1, comprising 39 to 43 at % aluminum, and 0.5 to 5 at % zirconium.

5. The alloy of claim 1, comprising 41 to 45 at % aluminum, and 0.5 to 5 at % tantalum.

6. The alloy of claim 1, comprising 41 to 45 at % aluminum, and 0.1 to 1 at % lanthanum, scandium or yttrium.

7. The alloy of claim 1, comprising 41 to 45 at % aluminum, and 0.5 to 5 at % vanadium.

8. The alloy of claim 1, comprising 41 to 44.5 at % aluminum, and 0.5 to 5 at % iron or molybdenum.

9. The alloy of claim 1, comprising 41 to 46 at % aluminum, and 0.5 to 5 at % tungsten.

10. The alloy of claim 1, comprising 41 to 46 at % aluminum, and 0.5 to 5 at % manganese.

11. The alloy of claim 1, comprising 0.1 to 1 at % boron, or 0.1 to 1 at % carbon, or both 0.1 to 1 at % boron and 0.1 to 1 at % carbon.

12. The alloy of claim 1, the alloy containing composite lamella structures that include B19 phase and beta phase in a volume ratio between 0.2:1 and 5:1.

13. The alloy of claim 1, the alloy containing composite lamella structures that include B19 phase and beta phase in a volume ratio between 1:3 and 3:1.

14. The alloy of claim 1, the alloy containing composite lamella structures that include B19 phase and beta phase in a volume ratio between 0.75:1 and 1.25:1.

15. The alloy of claim 1, the alloy containing composite lamella structures and type gamma TiAl lamella structures.

16. The alloy of claim 15, comprising composite lamella structures surrounded by type gamma TiAl lamella structures.

17. The alloy of claim 1, the alloy containing more than 10 volume percent composite lamella structures, based on the volume of the alloy.

18. The alloy of claim 1, wherein the composite lamella structures include a alpha 2-Ti3Al phase.

19. The alloy of claim 18, wherein the alloy contains 20 volume percent alpha 2-Ti3Al phase or less, by volume of the alloy.

20. A method for the production of an alloy, comprising: providing a composition that comprises titanium, 38 to 46 at % aluminum, and 5 to 10 at % niobium;

subjecting the composition to a casting or powder metallurgical technique to produce an intermediate product; and

subjecting the intermediate product to a heat treatment, the heat treatment comprising heating the intermediate product at a temperature above 900 deg. C. for more than sixty minutes, and cooling the intermediate product at a rate of more than 0.5 deg. C. per minute.

21. The method of claim 20 wherein the heat treatment comprises heating the intermediate product at a temperature above 1000 deg. C.

22. The method of claim 20 wherein the heat treatment comprises heating the intermediate product at a temperature between 1000 deg. C. and 1200 deg. C.

23. The method of claim 20 wherein the heat treatment comprises heating the intermediate product at said temperature above 900 deg. C. for more than 90 minutes.

24. The method of claim 20 wherein the heat treatment comprises heating the intermediate product at a temperature above 1000 deg. C. for more than 90 minutes.

25. The method of claim 20, comprising cooling the intermediate product at a rate of 1 deg. C. per minute to 20 deg. C. per minute.

26. The method of claim 20, comprising cooling the intermediate product at a rate of 1 deg. C. per minute to 10 deg. C. per minute.

27. An alloy made by the method of claim 20.

28. A component comprising the alloy of claim 1.