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Process for producing a composite material consisting of gamma titanium aluminide as matrix with titanium diboride as perserdoid therein

EP-577116

	Patent Assignee TOYOTA MOTOR	•	Publication Information EP0577116 A1 1994-01-05 [EP-577116]	a	
	Inventor MORIKAWA TAKASHI SHAMOTO HIROYUKI SUGANUMA TETSUYA	•	<u>Priority Details</u> 1992JP-0200334 1992-07-03		
	International Patent Classification C22C-001/00 C22C-001/05 C22C-001/10 C22C-014/00 C22C- 029/14 C22C-032/00				
•	US Patent Classification PCLO=420418000 PCLX=148421000 PCLX=420590000				
	CPC Code C22C-001/10/36; C22C-032/00/73; C22C-2001/1047				
	Fampat family EP0577116 A1 1994-01-05 JPH0625774 A 1994-02-01 US5397533 A 1995-03-14 EP0577116 B1 1998-01-14 DE69316273 D1 1998-02-19 JP2743720 B2 1998-04-22 DE69316273 T2 1998-09-17		[EP-577116] [JP06025774] [US5397533] [EP-577116] [DE69316273] [JP2743720] [DE69316273]		

Abstract:

(EP-577116)

A TiAP intermetallic compound source and a boride which is less stable than TiB2 are mixed and melted, followed by solidification to form a TiB2 -dispersed TiAP-based composite material in which the TiB2 is contained in an amount of 0.3 to 10% by volume. In this process, the dispersed TiB2 particles become very fine, so that the hardness as well as the elongation and bending strength of the TiAP material are improved by the finely dispersed TiB2 particles. Claims

(EP-577116)

 A process for producing a TiB2 -dispersed TiAL-based composite material, comprising the steps of: forming a molten mixture of a TiAL intermetallic compound source and a boride which is less stable than TiB2, and cooling and solidifying said molten mixture to form a TiAL-based composite material in which TiB2 is dispersed in an amount of 0.3 to 10% by volume of the composite material.

2. A process according to claim 1, wherein said boride is at least one selected from the group consisting of ZrB2, NbB2, TaB2, MoB2, CrB, WB, VB and HfB.

3. A process according to claim 2, wherein said boride has an average particle size of 100 to 0.1 m.

4. A process according to claim 1, wherein said TiAL intermetallic compound source is a mixture of Ti and AL metal particles, the AL metal particles being in an amount of 31 to 37% by weight of the total of the Ti and AL metal particles.

5. A process according to claim 1, wherein said TiAL intermetallic compound source includes a TiAL intermetallic compound.

6. A process according to claim 1, wherein said boride is added in such an amount that the obtained TiAL-based composite material contains 1 to 5% by volume of the dispersed TiB2.

7. A process according to claim 1, wherein said mixture is heated up to a temperature of 1550 DEG.C to 1750 DEG.C.

8. A process according to claim 1, wherein said TiB2 dispersed in said TiAL-based composite material has a particle size of less than 10 m.

Oxidation method of the TiAl intermetallic for the slide member which is superior in resistance abrasiveness

JP07180025

Patent Assignee TOYOTA MOTOR			•	Publication Information JPH07180025 A 1995-07-18 [JP07180025]	R 1	 5	
Inventor							
SHAMOTO HIROYUKI							
MORIKAWA TAKASHI			•	Priority Details			
				1993JP-0328716 1993-12-24			
 International Patent Classification 							
C22C-014/00 C23C-008/12							
			<u> </u>			 	 -
Fampat family JPH07180025 JP3077867	A B2	1995-07-18 2000-08-21		[JP07180025] [JP3077867]			

Abstract:

(JP07180025)

PURPOSE:To provide a method for oxidizing a Ti Al intermetallic compound excellent in wear resistance. CONSTITUTION:A Ti-Al intermetallic compound is subjected to oxidizing treatment under heating under the conditions of T+50logH>=750... inequality (a) and 500+25XAl>=T... inequality (b) [where T: treating temp. (deg.C), H: treating time (h) and Al: the content of Al (wt.%) in the material to be treated] in an atmosphere contg. at least oxygen. In the oxidizing treatment, it is subjected to oxidizing treatment under heating under conditions of 25logH+T+ 0.4<1150... inequality (c) [where P: pressure (Torr)]. Thus, an oxidized film excellent in wear resistance can be obtd. on the surface of the Ti-Al intermetallic compound.

© QUESTEL

Claims

(JP07180025)

Claims machine translated from Japanese

1. With oxidation method of TiAl intermetallic [a]

The [tsu] te, under the atmosphere which at least includes oxygen,

T+50logH>=750... (a)

500. +25xAl>=T..... (b)

(Here, T: Processing temperature (.deg.C), H: Processing time (h),

Al: Al of suffering processing material (weight %))It heats under the condition for becoming

Conversion between the TiAl metal which feature that it does, oxidation

Oxidation method of combination ones.

2. Oxidation of TiAl intermetallic of claim 1

In processing method,

25. LogH+T+0.4P<1150... (c)

26. (Here, T: Processing temperature (.deg.C), H: Processing time (h),

P: Pressure (Torr))To heat under the condition for becoming, oxidation The oxidation place of the TiAl intermetallic which features that it does Reason method.

Production method of TiAl based intermetallic layer JP04021756

<u>Patent Assignee</u> TOYOTA MOTOR	•	• [Publication Information JPH0421756 A 1992-01-24 [JP04021756]	f .a	2	
 Inventor MORIKAWA TAKASHI SHAMOTO HIROYUKI TSUNEKAWA YOSHIKI International Patent Classification C22C-001/02 C22C-014/00 C22C-021/00 C23C 004/08 C23C-004/12 C23C-016/50 	-004/06 C23C-	• [Priority Details 1990JP-0123307 1990-05-14			
• Fampat family JPH0421756 A JP2767972 B2	1992-01-24 1998-06-25		[JP04021756] [JP2767972]			

Abstract:

(JP2767972)

PURPOSE: To easily form a coating layer excellent in wear resistance and oxidation resistance by carrying out reactive lowpressure plasma spraying by using a Ti powder containing specific percentages of Al powder as a thermal spraying material and also using a nitrogen gas as a plasma gas. CONSTITUTION: This process is characterized by reactive lowpressure plasma spraying by the use of a Ti powder containing 20-63%, by weight ratio, of AI powder as a thermal spraying material and also a nitrogen gas as a plasma gas. A TiAl intermetallic compound layer can be produced by supplying the Ti powder with which the Al powder is mixed into a plasma column and melting this powder, and further, the compositional range of the TiAl intermetallic compound layer melted and deposited onto the surface of a base material can freely be regulated according to the amount of the Al powder mixed into the Ti powder as thermal spraying material. Moreover, since an N2 gas plasma can be formed, a hard Ti-Al-N nitride can be formed in a sprayed deposit and the wear resistance and oxidation resistance of the TiAl intermetallic compound layer can remarkably be improved.

© QUESTEL Claims

airris

(JP2767972)

Claims machine translated from Japanese

1. The Ti powder which contains the AI powder of the 20-63% at weight ratio

It designates end as the thermal spray material, it reacts the nitrogen gas as a plasma gas The characteristic decompression plasma between the TiAl metal which feature that it sprays Production method of chemical compound layer.

Production method of TiAl intermetallic sinterring component JP02228403

Patent Assignee TOYOTA MOTOR		Publication Information JPH02228403 A 1990-09-11 [JP02228403]
 Inventor NATSUME TOSHIO International Patent Classification B22F-003/10 C22C-001/04 		 Priority Details 1989JP-0050685 1989-03-02
• Fampat family JPH02228403 JP2762520	A 1990-09-11 B2 1998-06-04	[JP02228403] [JP2762520]

Abstract:

(JP2762520)

PURPOSE: To manufacture a TiAl intermetallic compound sintered member having excellent high temp. oxidizing resistance by sintering under non-oxidizing atmosphere after forming AI super fine powder layer packing voids on surface of a green compact of TiAl intermetallic compound. CONSTITUTION: The powder of TiAl intermetallic compound is compacted. On the surface of this green compact, the layer composed of the AI super fine powder having <+0.1.mu.m average particle diameter, is formed. Then, the above Al super fine powder particles are packed into the voids near the surface of the green compact. After that, this green compact is sintered under non-oxidizing atmosphere at about 1,000-1,400 deg.C. By this sintering, the Al super fine powder is melted and bitten into the surface of sintered body through the voids to form mixed layer composed of TiAl(sub 3) and Al closely combined. This mixed layer is gradually oxidized at the time of using to form the close Al(sub 2)O(sub 3) protecting layer. By this method, the TiAl intermetallic compound sintered body having excellent oxidizing resistance even at high temp. of >= about 800 deg.C, is obtd. COPYRIGHT: (C)1990, JPO& Japio

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© QUESTEL

Claims

(JP2762520)

Claims machine translated from Japanese

1. The powder of the TiAl intermetallic the dust it formed

After, on surface of that dust compact AI below mean diameter 0.1 millimicron

Consists of super fines end the layer which, that Al super fines end particle dust formation

In order to fill up to the hole near the body surface, to form, after that fault

Between the TiAl metal which feature that you sinter in oxidation characteristic atmosphere Production method of chemical compound sinterring component.

Manufacture of parts for automotive engine made of tial alloy JP06002095

•	Patent Assignee AISAN INDUSTRY NKK - NIPPON KOKAN TOYOTA MOTOR Inventor TAKAGI SHINICHI OUCHI CHIAKI HOSHIDA TATSUO MORIKAWA TAKASHI SHAMOTO HIROYUKI	•	Publication Information JPH062095 A 1994-01-11 [JP06002095] Priority Details 1992JP-0187511 1992-06-22	a 3	2	
•	SUGANUMA TETSUYA SAKURAI KOJI International Patent Classification B22D-021/00 B22D-029/00 C22C-014/00 C22F-001/00 C22F- 001/18 F01D-005/28 F01D-025/24 F01L-003/02					
•	Fampat family JPH062095 A 1994-01-11		[JP06002095]			

Abstract:

(JP06002095)

PURPOSE: To manufacture the objective lightweight parts for an automotive engine excellent in cold strength by casting a TiAl alloy having a specified compsn. into automotive parts by a precision casting method and thereafter executing hot hydrostatic pressing treatment. CONSTITUTION: The molten metal of a TiAl alloy having a compsn. constituted of, by weight, 32 to 36% Al and 0.01 to 0.1% N, and the balance Ti is used as a raw material and is cast into parts for an automotive engine by a precision casting method. This cast is subjected to hot hydrostatic pressing treatment at 1000 to 1200 deg.C under 1000 to 3000 atmospheric pressure, by which the objective lightweight parts for an automotive engine in which casting defects caused by shrinkage are not present at the inside and excellent in cold strength can be manufactured at high product yield. COPYRIGHT: (C)1994,JPO&Japio

© QUESTEL Claims

(JP06002095)

1. Al: 32-36wt.% and N: 0.01-0.1wt.%, and

remainder: The TiAl basic alloy which

consists of Ti and the inevitable impurity, with precise casting process automobile [en]

It cast in the part for the gin, it cast next, in this way

It features that HIP processing is administered to the aforementioned part, the TiAl basis go

Production method of part for gold made automobile engine.

2. As for the aforementioned HIP processing condition,

temperature: 1000-1200.deg.C, and

pressure: It features

that it is 1000-3000 atmospheric pressure, the TiAl basic alloy of claim 1 statement

Make production method of part for automobile engine.

Tial-base alloy with high ductility JP05230570

Patent Assignee TOYOTA MOTOR	•	Publication Information JPH05230570 A 1993-09-07 [JP05230570]	T .a	5		
Inventor MORIKAWA TAKASHI SUGANUMA TETSUYA SHAMOTO HIROYUKI	•	Priority Details 1992JP-0072353 1992-02-21			<u> Yro</u>	
International Patent Classification C22C-014/00 C22C-021/00						
• Fampat family JPH05230570 A 1993-09-07		[JP05230570]				

Abstract:

(JP05230570)

PURPOSE: To obtain a Till-base alloy excellent in strength at ordinary temp. as well as in ductility at ordinary temp. CONSTITUTION: This alloy has a composition consisting of, by atom, 45-50% AI, 0.3-4.0% Cu, and the balance Ti with inevitable impurities. By the incorporation of Cu the precipitation of .gamma.-phases moves onto the low-Al side, and, although the structure is inherently formed into a so-called lamellar structure where .alpha.(sub 2) phases (Ti(sub 3)Al) and .gamma.-phases (TiAI) are alternately laminated into layer state, the .gamma.-phases are dispersed into network state and mixed into the lamellar structure and a so-called dual phase structure of the lamellar structure and the .gamma.-phases is formed, and further, Cu has a function of preferentially entering into solid solution in the .gamma.-phases and strengthening the .gamma.-phase itself. Thus, superior ductility at ordinary temp. and strength at ordinary temp. can be obtained. COPYRIGHT: (C)1993,JPO&Japio

© QUESTEL

Claims

(JP05230570)

1. Atmoic % With AI of 45-50% and, 0.3

To contain Cu of the -4.0%, the remainder Ti and inevitability non-

Pure ones and normal temperature ductility and the normal temperature which feature that it consists of it is strong The TiAl basic alloy which is superior in degree.