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

### EP-577116

<ul style="list-style-type: none"> <li>• <b>Patent Assignee</b> TOYOTA MOTOR</li> <li>• <b>Inventor</b> MORIKAWA TAKASHI SHAMOTO HIROYUKI SUGANUMA TETSUYA</li> <li>• <b>International Patent Classification</b> C22C-001/00 C22C-001/05 C22C-001/10 C22C-014/00 C22C-029/14 C22C-032/00</li> <li>• <b>US Patent Classification</b> PCLO=420418000 PCLX=148421000 PCLX=420590000</li> <li>• <b>CPC Code</b> C22C-001/10/36; C22C-032/00/73; C22C-2001/1047</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Publication Information</b> <a href="#">EP0577116</a> A1 1994-01-05 [EP-577116]</li> </ul> <div style="text-align: right;">  </div> <ul style="list-style-type: none"> <li>• <b>Priority Details</b> 1992JP-0200334 1992-07-03</li> </ul>																												
<ul style="list-style-type: none"> <li>• <b>Fampat family</b></li> </ul> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"><a href="#">EP0577116</a></td> <td style="width: 20%;">A1</td> <td style="width: 20%;">1994-01-05</td> <td style="width: 30%;">[EP-577116]</td> </tr> <tr> <td><a href="#">JPH0625774</a></td> <td>A</td> <td>1994-02-01</td> <td>[JP06025774]</td> </tr> <tr> <td><a href="#">US5397533</a></td> <td>A</td> <td>1995-03-14</td> <td>[US5397533]</td> </tr> <tr> <td><a href="#">EP0577116</a></td> <td>B1</td> <td>1998-01-14</td> <td>[EP-577116]</td> </tr> <tr> <td>DE69316273</td> <td>D1</td> <td>1998-02-19</td> <td>[DE69316273]</td> </tr> <tr> <td><a href="#">JP2743720</a></td> <td>B2</td> <td>1998-04-22</td> <td>[JP2743720]</td> </tr> <tr> <td>DE69316273</td> <td>T2</td> <td>1998-09-17</td> <td>[DE69316273]</td> </tr> </table>		<a href="#">EP0577116</a>	A1	1994-01-05	[EP-577116]	<a href="#">JPH0625774</a>	A	1994-02-01	[JP06025774]	<a href="#">US5397533</a>	A	1995-03-14	[US5397533]	<a href="#">EP0577116</a>	B1	1998-01-14	[EP-577116]	DE69316273	D1	1998-02-19	[DE69316273]	<a href="#">JP2743720</a>	B2	1998-04-22	[JP2743720]	DE69316273	T2	1998-09-17	[DE69316273]
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- **Abstract:**

(EP-577116)

A TiAP intermetallic compound source and a boride which is less stable than TiB<sub>2</sub> are mixed and melted, followed by solidification to form a TiB<sub>2</sub>-dispersed TiAP-based composite material in which the TiB<sub>2</sub> is contained in an amount of 0.3 to 10% by volume. In this process, the dispersed TiB<sub>2</sub> 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 TiB<sub>2</sub> particles.





**Claims**

(EP-577116)

1. A process for producing a TiB<sub>2</sub>-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 TiB<sub>2</sub>, and  
cooling and solidifying said molten mixture to form a TiAl-based composite material in which TiB<sub>2</sub> 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 ZrB<sub>2</sub>, NbB<sub>2</sub>, TaB<sub>2</sub>, MoB<sub>2</sub>, 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 μm.
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 TiB<sub>2</sub>.
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 TiB<sub>2</sub> dispersed in said TiAl-based composite material has a particle size of less than 10 μm.

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

JP07180025

<ul style="list-style-type: none"> <li>• <b>Patent Assignee</b> TOYOTA MOTOR</li> <li>• <b>Inventor</b> SHAMOTO HIROYUKI MORIKAWA TAKASHI</li> <li>• <b>International Patent Classification</b> C22C-014/00 C23C-008/12</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Publication Information</b> <a href="#">JPH07180025 A 1995-07-18 [JP07180025]</a>    </li> <li>• <b>Priority Details</b> 1993JP-0328716 1993-12-24</li> </ul>								
<ul style="list-style-type: none"> <li>• <b>Fampat family</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;"><a href="#">JPH07180025</a></td> <td style="width: 15%;">A</td> <td style="width: 20%;">1995-07-18</td> <td style="width: 35%;">[JP07180025]</td> </tr> <tr> <td><a href="#">JP3077867</a></td> <td>B2</td> <td>2000-08-21</td> <td>[JP3077867]</td> </tr> </table> </li> </ul>		<a href="#">JPH07180025</a>	A	1995-07-18	[JP07180025]	<a href="#">JP3077867</a>	B2	2000-08-21	[JP3077867]
<a href="#">JPH07180025</a>	A	1995-07-18	[JP07180025]						
<a href="#">JP3077867</a>	B2	2000-08-21	[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  $T+50\log H \geq 750$ ... inequality (a) and  $500+25XAl \geq T$ ... 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  $25\log H+T+0.4 < 1150$ ... 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.

**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,

 $T+50\log H \geq 750$ ... (a) $500. +25xAl \geq T$ ..... (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.  $\log H + T + 0.4P < 1150$ ... (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

<ul style="list-style-type: none"> <li>• <b>Patent Assignee</b> TOYOTA MOTOR</li> <li>• <b>Inventor</b> MORIKAWA TAKASHI SHAMOTO HIROYUKI TSUNEKAWA YOSHIKI</li> <li>• <b>International Patent Classification</b> C22C-001/02 C22C-014/00 C22C-021/00 C23C-004/06 C23C-004/08 C23C-004/12 C23C-016/50</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Publication Information</b> <a href="#">JPH0421756 A</a> 1992-01-24 [JP04021756]</li> </ul> <div style="text-align: right;">  </div> <ul style="list-style-type: none"> <li>• <b>Priority Details</b> 1990JP-0123307 1990-05-14</li> </ul>								
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<a href="#">JPH0421756</a>	A	1992-01-24	[JP04021756]						
<a href="#">JP2767972</a>	B2	1998-06-25	[JP2767972]						

- **Abstract:**

(JP2767972)

**PURPOSE:**To easily form a coating layer excellent in wear resistance and oxidation resistance by carrying out reactive low-pressure 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 low-pressure plasma spraying by the use of a Ti powder containing 20-63%, by weight ratio, of Al 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 N<sub>2</sub> 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.

**Claims**

(JP2767972)

Claims machine translated from Japanese


1. The Ti powder which contains the Al 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 decomposition plasma between the TiAl metal which feature that it sprays

Production method of chemical compound layer.

## Production method of TiAl intermetallic sintering component JP02228403

<ul style="list-style-type: none"> <li>• <b>Patent Assignee</b> TOYOTA MOTOR</li> <li>• <b>Inventor</b> NATSUME TOSHIO</li> <li>• <b>International Patent Classification</b> B22F-003/10 C22C-001/04</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Publication Information</b> <a href="#">JPH02228403 A 1990-09-11 [JP02228403]</a></li> </ul>  <ul style="list-style-type: none"> <li>• <b>Priority Details</b> 1989JP-0050685 1989-03-02</li> </ul>								
<ul style="list-style-type: none"> <li>• <b>Fampat family</b></li> </ul> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"><a href="#">JPH02228403</a></td> <td style="width: 10%; text-align: center;">A</td> <td style="width: 20%;">1990-09-11</td> <td style="width: 40%;">[JP02228403]</td> </tr> <tr> <td><a href="#">JP2762520</a></td> <td style="text-align: center;">B2</td> <td>1998-06-04</td> <td>[JP2762520]</td> </tr> </table>		<a href="#">JPH02228403</a>	A	1990-09-11	[JP02228403]	<a href="#">JP2762520</a>	B2	1998-06-04	[JP2762520]
<a href="#">JPH02228403</a>	A	1990-09-11	[JP02228403]						
<a href="#">JP2762520</a>	B2	1998-06-04	[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 Al 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 Al super fine powder having  $<+0.1\ \mu\text{m}$  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  $\text{TiAl}(\text{sub } 3)$  and Al closely combined. This mixed layer is gradually oxidized at the time of using to form the close  $\text{Al}(\text{sub } 2)\text{O}(\text{sub } 3)$  protecting layer. By this method, the TiAl intermetallic compound sintered body having excellent oxidizing resistance even at high temp. of  $\geq$  about 800 deg.C, is obt'd. COPYRIGHT: (C)1990,JPO&Japio



**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 Al 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 sintering component.



**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.



**Claims**

(JP05230570)

1. Atomic % With Al of 45-50% and, 0.3

To contain Cu of the -4.0%, the remainder Ti and inevitably 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.