

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 522 601 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

13.04.2005 Bulletin 2005/15

(51) Int Cl.7: **C22C 33/02, C22C 38/18**

(21) Application number: **04023061.7**

(22) Date of filing: **28.09.2004**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**

Designated Extension States:

AL HR LT LV MK

(72) Inventors:

- **Yoshihiro, Tatsuaki**
Matsudo-shi Chiba 270-2295 (JP)
- **Chikahata, Katsunao**
Matsudo-shi Chiba 270-2295 (JP)

(30) Priority: **30.09.2003 JP 2003341527**

(71) Applicant: **Hitachi Powdered Metals Co., Ltd.**
Matsudo-shi, Chiba 270-2295 (JP)

(74) Representative: **Eisenführ, Speiser & Partner**
Patentanwälte Rechtsanwälte,
Postfach 31 02 60
80102 München (DE)

(54) **Sintered component made of stainless steel with high corrosion resistance and production method therefor**

(57) A sintered component made of stainless steel with high corrosion resistance is obtained by preparing a perovskite composite oxide powder made of rare earth element, transition metal element and oxygen, and a stainless steel powder or a mixed powder having a stainless steel composition, mixing the perovskite composite oxide powder and the stainless steel powder or the mixed powder, whereby a raw powder in which the rare earth element is 0.1 to 12 mass% is prepared, compact-

ing the raw powder in a predetermined shape, whereby a green compact is obtained, and sintering the green compact. The sintered component is a component in which corrosion resistance can be increased without parts of decreasing Cr concentration and precise production processes and process control are not necessary.

EP 1 522 601 A2

Description**BACKGROUND OF THE INVENTION**

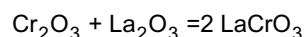
1. Field of the Invention

[0001] The invention relates to an improvement in a sintered component made of stainless steel with high corrosion resistance, and specifically relates to a sintered component made of stainless steel with high corrosion resistance having the following property; oxidation and corrosion do not easily occur even when the sintered component is exposed to corrosive atmospheres in a high temperature. The present invention is relates to a production method therefor.

2. Related Art

[0002] As a sintered component made of stainless steel with high corrosion resistance mentioned above, for example, a sintered component disclosed in Patent Document No.1 (Japanese Published Unexamined Application No. 10-183315: sections [0014] and [0015]) is known. In the Patent Document No.1, a Fe-Cr based sintered alloy, in which Cr is 14 to 35 mass%, compound of at least La and Y including O is a predetermined mass% of multiplying the Cr mass% by a coefficient "a" (range of the "a" is 0.11 to 0.16.), and the balance is Fe and inevitable impurities, and the sintered alloy has a structure in which particles of compound of at least La and Y including O are dispersed in a matrix, is disclosed.

[0003] In the above-mentioned sintered component made of stainless steel with high corrosion resistance, chrome oxide (Cr_2O_3) in the alloy surface and at least lanthanum oxide and yttrium oxide added thereto are reacted in an oxidizing atmosphere according to the reaction formula mentioned below, whereby a stable perovskite composite oxide is formed. The perovskite composite oxide acts as a protective coating, thereby suppressing the advancing of the oxidation.



[0004] According to research by the present inventors, it is apparent that although LaCrO_3 is evidently formed in the above-mentioned reaction described in the Patent Document No.1, a certain portion of the Cr used in the above-mentioned reaction is supplied from the Cr solved in a matrix. Therefore, the Cr concentration is decreased in the vicinity of an area where the LaCrO_3 is formed, whereby corrosion resistance in the vicinity is decreased.

[0005] Moreover, it is apparent that although lanthanum oxide powder is added in the case of producing the sintered component made of stainless steel with high corrosion resistance, this production method has a problem mentioned below. The lanthanum oxide powder is easily agglomerated, whereby uniform mixing is difficult. Therefore, in order to uniformly disperse the lanthanum oxide powder, cumbersome treatments, in which stainless steel powder is immersed in alcohol etc. dissolved lanthanum oxide, and is dried, whereby lanthanum oxide coating is coated stainless steel powder, are necessary. When a green compact is formed by raw powder, lanthanum oxide inside of the green compact is hydrated with moisture in the air. Then the hydroxide is formed to generate expansion, and cracks are formed in the green compact. In order to prevent the phenomenon, it is necessary to perform sintering immediately after the forming, and to carefully control the processes.

SUMMARY OF THE INVENTION

[0006] The invention aims to provide a sintered component made of stainless steel with high corrosion resistance in which corrosion resistance is increased without parts of decreasing Cr concentration and precise production processes and process control are not necessary. The invention aims to provide a production method therefor.

[0007] A sintered component made of stainless steel with high corrosion resistance of the present invention is characterized in that a rare earth element is contained at 0.1 to 12 mass%, and the rare earth element is dispersed with a transition metal element and oxygen as a perovskite composite oxide in a matrix of the stainless steel.

[0008] In the sintered component made of stainless steel with high corrosion resistance of the present invention, the rare earth element is dispersed with a transition metal element and oxygen as a perovskite composite oxide in a matrix of the stainless steel. Therefore, corrosion resistance is increased without parts of decreasing Cr concentration. That is, the Cr amount in the matrix of the sintered stainless steel with high corrosion resistance of the present invention is substantially uniform.

[0009] When a content of the rare earth element in the overall composition is less than 0.1 mass%, oxide coating in the matrix is not effectively strengthened. On the other hand, when the content is more than 12 mass%, perovskite

composite oxide in the matrix is excessive, whereby the amount of the matrix is low, resulting in decreasing strength and wear resistance of the component.

[0010] Moreover, a production method of a sintered component made of stainless steel with high corrosion resistance of the present invention is characterized in that a powder of perovskite composite oxide containing a rare earth element, transition metal element and oxygen is prepared, a stainless steel powder or a mixed powder having a stainless steel composition is prepared, and these powders are mixed, whereby a raw powder in which the rare earth element is 0.1 to 12 mass% is prepared, the raw powder is compacted in a predetermined shape, and is sintered.

[0011] In the production method of a sintered component made of stainless steel with high corrosion resistance of the present invention, the perovskite composite oxide containing a rare earth element, transition metal element and oxygen is added as a powder. Therefore, the reaction formula is not generated. Accordingly, the transition metal element, for example Cr, is not absorbed from the matrix to the oxide coating, whereby the concentration of the transition metal element in every part of the matrix is uniform, resulting in increasing the corrosion resistance. Moreover, the powder of the perovskite composite oxide is not easily agglomerated, and the powder is stable, whereby the above-mentioned hydration reaction is not generated.

[0012] According to the present invention, corrosion resistance can be increased by no part of decreasing the concentration of the transition metal element in the matrix. Moreover, in the present invention, cumbersome processes to uniformly disperse the rare earth element are not necessary, and the problem in which cracks are formed in the green compact does not occur even in the case of having a pause between compacting and sintering.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 is a graph showing a relationship between increase in weight by oxidation and La content in the overall composition in the Practical Example 1 of the present invention.

Fig. 2 is a graph showing a relationship between tensile strength and La content in the overall composition in the Practical Example 1 of the present invention.

Fig. 3 is a graph showing increase in weight by oxidation in the case of using various powders in the Practical Example 2 of the present invention.

Fig. 4 is a graph showing increase in weight by oxidation in the case of using various powders in the Practical Example 3 of the present invention.

Fig. 5 is a graph showing a relationship between increase in weight by oxidation and grain diameter of the LaCrO_3 powder in the Practical Example 4 of the present invention.

EMBODIMENTS OF THE INVENTION

[0014] Hereinafter, the preferable embodiments of the present invention will be described.

[0015] Any stainless steel can be used to form the matrix. For example, ferritic stainless steel in which 11 to 32 mass% of Cr is contained and corrosion resistance to oxidizing acid is high can be used. Moreover, martensitic stainless steel in which 0.15 to 1.2 mass% of C is additionally contained in the ferritic stainless steel and strength and wear resistance are comparatively increased is obtained, and this stainless steel can be used. Furthermore, an austenitic stainless steel, in which 11 to 32 mass% of Cr and 3.5 to 22 mass% of Ni is contained and corrosion resistance to nonoxidizing acid is increased, can be used.

[0016] Furthermore, 0.3 to 7 mass% of Mo can be contained in the above-mentioned stainless steels in order to improve creep resistance, acid resistance, corrosion resistance, pitting corrosion resistance or machinability. Moreover, 1 to 4 mass% of Cu can be contained in the above-mentioned stainless steels in order to improve acid resistance, corrosion resistance or pitting corrosion resistance, or to give precipitation hardening performance. Furthermore, 0.1 to 5 mass% of Al can be contained in the above-mentioned stainless steels in order to improve weldability or heat resistance, or to give precipitation hardening performance. Additionally, 0.3 mass% or less of N can be contained in the above-mentioned stainless steels in order to arrange crystal grains and to decrease Ni content, and 5.5 to 10 mass% of Mn can be contained in the above-mentioned stainless steels in order to decrease Ni content.

[0017] 0.15 to 5 mass% of Si can be contained in the above-mentioned stainless steels in order to improve oxidation resistance, heat resistance or sulfuric acid resistance, 0.45 mass% or less of Nb can be contained in the above-mentioned stainless steels in order to improve grain boundary corrosion resistance or weldability, and 0.15 mass% or less of Se, 0.2 mass% or less of P or 0.15 mass% or less of S can be contained in the above-mentioned stainless steels in order to improve machinability.

[0018] The rare earth element can be selected from at least one of Sc, Y, La, Ce and Gd, and representative elements mentioned above are Y and La. The transition metal element can be selected from at least one of Ti, V, Cr, Mn, Fe,

Co, Ni, Cu, Zr, Nb, Mo and W. When Cr is selected in the elements to form perovskite composite oxide, stability of the oxide is specifically excellent, and handling performance and corrosion resistance of the oxide are good. Additionally, as the perovskite composite oxide, RMO_3 , R_2MO_4 , $\text{R}_3\text{M}_2\text{O}_7$ and $\text{R}_4\text{M}_3\text{O}_{10}$ (R: rare earth element, M: metal element) can be cited, at least one of R and M are formed by multiple elements in some perovskite composite oxides.

[0019] Average grain diameter in the perovskite composite oxide powder is preferably 30 μm or less, whereby dispersion performance in mixing the powder and stainless steel powder can be improved. That is, when the grain diameter is increased, segregation in the matrix is increased, whereby some parts in which corrosion resistance is improved and other parts in which corrosion resistance is not improved are generated. Moreover, the sintering after compacting the raw powder into predetermined shape is preferably performed at a sintering at 1000°C or more.

[0020] Next, the overall composition of the sintered component made of stainless steel with high corrosion resistance of the present invention is, basically, Cr: 7.51 to 31.96 mass%, rare earth element: 0.1 to 12 mass%, O: 0.02 to 6.48 mass%, and balance: Fe and inevitable impurities. This overall composition is changed by selecting transition metal elements in perovskite composite oxide. For example, when Cr is selected as a transition metal element, Cr is 7.51 to 31.99 mass%. Moreover, when Ni is selected instead of selecting Cr, a composition in which 0.04 to 7.82 mass% of Ni is added to the above-mentioned composition is obtained. Similarly, when Ti is selected, a composition in which 0.02 to 6.47 mass% of Ti is added to the above-mentioned composition is obtained.

When V is selected, a composition in which 0.02 to 6.88 mass% of V is added to the above-mentioned composition is obtained.

When Mn is selected, a composition in which 0.02 to 7.42 mass% of Mn is added to the above-mentioned composition is obtained. When Co is selected, a composition in which 0.02 to 7.95 mass% of Co is added to the above-mentioned composition is obtained.

When Zr is selected, a composition in which 0.03 to 12.13 mass% of Zr is added to the above-mentioned composition is obtained. When Nb is selected, a composition in which 0.03 to 12.54 mass% of Nb is added to the above-mentioned composition is obtained. When Mo is selected, a composition in which 0.03 to 13.21 mass% of Mo is added to the above-mentioned composition is obtained. In the ranges of the respective transition metal elements, at least one of the above-mentioned transition metal elements can be added, and the overall composition becomes compositions in which at least one of the transition metal elements is added to the above-mentioned composition.

[0021] Moreover, when a stainless steel containing 3.5 to 22 mass% of Ni is selected as a matrix of stainless steel and Ni is not selected as a metal element in perovskite composite oxide, Ni content in the overall composition becomes 2.39 to 21.97 mass%. On the other hand, when a stainless steel containing 3.5 to 22 mass% of Ni is selected as a matrix of stainless steel and Ni is selected as a metal element in perovskite composite oxide, Ni content in the overall composition becomes 3.59 to 30.34 mass%.

[0022] Furthermore, when the C content in the matrix of the stainless steel is 0.15 to 1.2 mass%, C content in the overall composition becomes 0.12 to 1.20 mass%. Additionally, when at least one of Mo, Cu, Al, N, Mn, Si, Nb, P, S and Se are contained in the matrix of the stainless steel, at least one of Mo: 0.21 to 18 mass%, Cu: 0.68 to 4 mass%, Al: 0.07 to 4.99 mass%, N: 0.3 mass% or less, Mn: 3.76 to 9.99 mass%, Si: 0.1 to 4.99 mass%, Nb: 0.44 mass% or less, P: 0.2 mass% or less, S: 0.15 mass% or less, and Se: 0.15 mass% or less are added to the overall composition.

EXAMPLES

[0023] Hereinafter, the invention will be described in more detail along with Examples.

(Practical Example 1)

[0024] SUS310 powder which was defined by the JIS (Japan Industrial Standards) and was equal to 310 defined by the AISI (American Iron and Steel Institute) was prepared as a stainless steel powder forming a matrix, and LaCrO_3 powder and La_2O_3 powder which had average grain diameters of 5 μm were prepared as a rare earth-oxygen composite powder. These powders were dispensed at a rate shown in Table 1, and were mixed, whereby a raw powder was obtained. The raw powder was compacted into a cylindrical shape (diameter: 10mm, height: 10mm) and to a square block having a square cross-section (width: 60 mm, depth: 10 mm, height: 10 mm), in order to set the green density to be 6.7 g/cm³, obtained green compacts were sintered in a hydrogen atmosphere at a sintering temperature of 1250 °C for 1 hour, whereby samples shown by sample Nos. 1 to 12 were produced.

[0025] In the samples having the cylindrical shape, each sample was set in a crucible made of aluminum per test piece, all the crucibles were set in a muffle furnace, whereby oxidation test was performed by heating in an air atmosphere at 850 °C for 50 hours. Estimation was performed by measuring the difference in weight between before and after the test, by dividing the measured value by surface area, and by defining the divided value as an increase in weight by oxidation (g/m²). The results are also shown in Table 1 and are shown in Fig. 1 as a graph.

[0026] In the samples having the square block shape, each sample was machined into a tensile test piece shape in

a manner conforming to JIS Z 2241, whereby tensile strength was measured. The results are also shown in Table 1 and are shown in Fig. 2 as a graph.

Table 1

sample number	composition rate (mass%)				rare earth element content in the overall composition (mass%)	increase in weight by oxidation (g/m ²)	tensile strength (MPa)
	stainless steel powder		LaCrO ₃ powder				
	steel type	addition amount	type	addition amount			
01	SUS310	balance	-	-	0.00	360	412
02	SUS310	balance	LaCrO ₃	0.17	0.10	322	410
03	SUS310	balance	LaCrO ₃	1.72	1.00	252	411
04	SUS310	balance	LaCrO ₃	3.44	2.00	188	401
05	SUS310	balance	LaCrO ₃	6.88	4.00	154	389
06	SUS310	balance	LaCrO ₃	13.75	8.00	97	361
07	SUS310	balance	LaCrO ₃	20.63	12.00	87	335
08	SUS310	balance	LaCrO ₃	27.51	16.00	84	276
09	SUS310	balance	La ₂ O ₃	0.12	0.10	327	410
10	SUS310	balance	La ₂ O ₃	1.17	1.00	289	395
11	SUS310	balance	La ₂ O ₃	2.35	2.00	254	377
12	SUS310	balance	La ₂ O ₃	4.69	4.00	205	355
13	SUS310	balance	La ₂ O ₃	9.38	8.00	240	317
14	SUS310	balance	La ₂ O ₃	14.07	12.00	480	263
15	SUS310	balance	La ₂ O ₃	18.76	16.00	680	190

[0027] According to the Table 1 and Fig. 1, increases in weight by oxidation of samples in which LaCrO₃ powder was used as a rare earth-oxygen composite powder were smaller than those of samples in which La₂O₃ powder was used as a rare earth-oxygen composite powder, whereby the samples obtained by using LaCrO₃ powder were apparently improved in corrosion resistance. This effect was seen in the samples having La content of 0.1 mass% or more. Moreover, when more than 8 mass% of La₂O₃ powder was used, the increase in weight by oxidation was adversely increased. On the other hand, in the samples in which LaCrO₃ powder was used, as the La content was increased, the increase in weight by oxidation tended to be decreased. However, when the La content was more than 8 mass%, the effect in which the increase in weight by oxidation was decreased by adding La became small for the addition.

[0028] In these samples, distribution of Cr and La in a surface layer of metal structure cross section was confirmed by an EPMA (Electron Probe Micro Analyzer) after the oxidation test. In the samples obtained by using LaCrO₃ powder, uniform distribution of Cr in the matrix was confirmed. On the other hand, in the samples obtained by using La₂O₃ powder, La and Cr were detected in the same area and a part decreasing Cr concentration was confirmed around the area.

[0029] As mentioned above, it was found that when a rare earth element was supplied as a rare earth oxide, the rare earth oxide absorbed Cr in the matrix during the oxidation test. Then a part in the matrix decreasing corrosion resistance was generated. On the other hand, it was found that when a rare earth element was supplied as a stable perovskite composite oxide, corrosion resistance in the matrix was not decreased because Cr concentration is uniform. Moreover, it was found that as the amount of La₂O₃ added was increased, decrease of corrosion resistance in the matrix was large.

[0030] As shown in the Table 1 and Fig. 2, as the added amount of the rare earth-oxygen composite powder was increased, tensile strength tended to be decreased. The tendency in the decrease of the strength was dominant in the samples using La₂O₃ powder rather than those using LaCrO₃ powder. This fact was also caused by decrease of Cr

content in the matrix. In the samples using La_2O_3 powder, the strength of a part decreasing Cr content in the matrix was decreased, and thus total strength was decrease. Moreover, it is confirmed that when the La content is more than 12 mass% in both samples using LaCrO_3 powder and La_2O_3 powder, the strength is greatly decreased.

[0031] As mentioned above, the effect of using the perovskite composite oxide powder was confirmed. When the added amount of rare earth element content in the perovskite composite oxide powder was not less than 0.1 mass%, the effect of improving the corrosion resistance was obtained. While the added amount of rare earth element content in the perovskite composite oxide powder was more than 12 mass%, strength was greatly decreased. Therefore, it was confirmed that the rare earth element content should be 0.1 to 12 mass%.

(Practical Example 2)

[0032] LaCrO_3 powder and La_2O_3 powder used in the Practical Example 1 were added to the stainless steel powder shown in the Table 2, in order to set the La content in the overall composition to 2 mass%, whereby a mixed raw powder was obtained. Test pieces were produced by using the raw powder in the same process of Practical Example 1, and oxidation testing was performed. The results are also shown in Table 2 and are shown in Fig. 3 as a graph. Additionally, SUS304 (JIS) is a steel type equal to 304 defined by the AISI, and SUS430 (JIS) is a steel type equal to 430 defined by the AISI.

Table 2

sample number	composition rate (mass%)				rare earth element content in the overall composition (mass%)	increase in weight by oxidation (g/ m ²)
	stainless steel powder		rare earth-oxygen composite powder			
	steel type	addition amount	type	addition amount		
04	SUS310	balance	LaCrO ₃	3.44	2.00	188
11	SUS310	balance	La ₂ O ₃	2.35	2.00	254
16	SUS304	balance	LaCrO ₃	3.44	2.00	335
17	SUS304	balance	La ₂ O ₃	4.69	2.00	407
18	SUS430	balance	LaCrO ₃	3.44	2.00	343
19	SUS430	balance	La ₂ O ₃	9.38	2.00	417

[0033] As shown in the Table 2 and Fig. 3, even when the steel type of the stainless steel powder was changed, increases in weight by oxidation of samples in which LaCrO_3 powder was used as a rare earth-oxygen composite powder were smaller than those of samples in which La_2O_3 powder was used as a rare earth-oxygen composite powder, as in the Practical Example 1. Therefore, it was confirmed that the effect of the perovskite composite oxide powder was obtained for any steel type.

(Practical Example 3)

[0034] Perovskite composite oxide powder having an average grain diameter of 5 μm shown in Table 3 was added to the stainless steel powder (SUS310 powder), in order to set rare earth metal element content in the overall composition to 2 mass%, and these powders were mixed, whereby a mixed raw powder was obtained. Test pieces were produced by using the raw powder in the same process of Practical Example 1, and oxidation testing was performed. The results are also shown in Table 3 and are shown in Fig. 4 as a graph.

Table 3

sample number	composition rate (mass%)				rare earth element content in the overall composition (mass%)	increase in weight by oxidation (g/m ²)
	stainless steel powder		rare earth-oxygen composite powder			
	steel type	addition amount	type	addition amount		
04	SUS310	balance	LaCrO ₃	3.44	2.00	188
11	SUS310	balance	YCrO ₃	4.25	2.00	195
16	SUS304	balance	CeCrO ₃	3.43	2.00	196
17	SUS304	balance	LaFeO ₃	3.50	2.00	210
18	SUS430	balance	LaNiO ₃	3.53	2.00	199
19	SUS430	balance	La ₂ O ₃	2.35	2.00	254

[0035] As shown in the Table 3 and Fig. 4, even when the rare earth element and the metal element in the perovskite composite oxide were changed, increase in weight by oxidation was slightly suppressed in comparison with the case of supplying the rare earth element in the rare earth oxide. Moreover, it was confirmed that stable corrosion resistance improvement was observed for any rare earth oxide and any metal element.

(Practical Example 4)

[0036] LaCrO₃ powders having various average grain diameters shown in the Table 4 were prepared. These LaCrO₃ powders were added to stainless steel powder (SUS310 powder), in order to set the rare earth element content in the overall composition to 2 mass%, whereby a mixed raw powder was obtained. Test pieces were produced by using the raw powder in the same process as in Practical Example 1, and oxidation testing was performed. The results are also shown in Table 4 and are shown in Fig. 5 as a graph.

Table 4

sample number	composition rate (mass%)				rare earth element content in the overall composition mass%	increase in weight by oxidation (g/m ²)	tensile strength (MPa)
	stainless steel powder		LaCrO ₃ powder				
	steel type	addition amount	grain diameter (μm)	addition amount			
04	SUS310	balance	5	3.44	2.00	188	411
24	SUS310	balance	15	3.44	2.00	206	378
25	SUS310	balance	30	3.44	2.00	222	367
26	SUS310	balance	75	3.44	2.00	560	278

[0037] As shown in the Table 4 and Fig. 5, when the average grain diameter of the LaCrO₃ powder was increased, increase in weight by oxidation tended to be slightly increased. However, when the average grain diameter was more than 30μm, increase in weight by oxidation was greatly increased. Therefore, it is confirmed that perovskite composite

oxide powder having an average grain diameter of 30 μ m or less is preferably used. The reason is that, in a condition of setting the added amount of LaCrO₃ powder to be constant, as the average grain diameter is increased, segregation in the matrix is increased, whereby some parts in which corrosion resistance is improved and other parts in which corrosion resistance is not improved are produced.

Claims

1. A sintered component made of a stainless steel with high corrosion resistance, comprising 0.1 to 12 mass% of a rare earth element, the rare earth element being dispersed with transition metal elements and oxygen as a perovskite composite oxide in a matrix of the stainless steel.
2. The sintered component made of a stainless steel with high corrosion resistance according to claim 1, wherein Cr amount in the matrix of the stainless steel is substantially uniform.
3. The sintered component made of a stainless steel with high corrosion resistance according to claim 1 or 2, wherein the matrix of the stainless steel is made of a stainless steel containing 11 to 32 mass% of Cr.
4. The sintered component made of a stainless steel with high corrosion resistance according to claim 1 or 2, wherein the matrix of the stainless steel is made of a stainless steel containing 11 to 32 mass% of Cr and 3.5 to 22 mass% of Ni.
5. The sintered component made of a stainless steel with high corrosion resistance according to claim 3, wherein the matrix of the stainless steel contains 0.15 to 1.2 mass% of C.
6. The sintered component made of a stainless steel with high corrosion resistance according to any one of claims 3 to 5, wherein the matrix of the stainless steel contains at least one of 0.3 to 7 mass% of Mo, 1 to 4 mass% of Cu, 0.1 to 5 mass% of Al, 0.3 mass% or less of N, 5.5 to 10 mass% of Mn, 0.15 to 5 mass% of Si, 0.45 mass% or less of Nb, 0.2 mass% or less of P, 0.15 mass% or less of S, and 0.15 mass% or less of Se.
7. The sintered component made of a stainless steel with high corrosion resistance according to any one of claims 1 to 6, wherein the rare earth element is selected from at least one of Sc, Y, La, Ce and Gd.
8. The sintered component made of a stainless steel with high corrosion resistance according to any one of claims 1 to 7, wherein the transition metal element is selected from at least one of Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zr, Nb, Mo and W.
9. A production method for a sintered component made of a stainless steel with high corrosion resistance, comprising the following steps of
 - preparing a perovskite composite oxide powder made of rare earth element, transition metal element and oxygen, and a stainless steel powder or a mixed powder having a stainless steel composition,
 - mixing the perovskite composite oxide powder and the stainless steel powder or the powder having a stainless steel composition, thereby preparing a raw powder in which the rare earth element is 0.1 to 12 mass%,
 - compacting the raw powder in a predetermined shape, thereby obtaining a green compact, and sintering the green compact.
10. The production method for a sintered component made of a stainless steel with high corrosion resistance according to claim 9, wherein the stainless steel powder or the mixed powder having a stainless steel composition contains 11 to 32 mass% of Cr.
11. The production method for a sintered component made of a stainless steel with high corrosion resistance according to claim 9, wherein the stainless steel powder or the mixed powder having a stainless steel composition contains 11 to 32 mass% of Cr and 3.5 to 22 mass% of Ni.
12. The production method for a sintered component made of a stainless steel with high corrosion resistance according to claim 10, wherein the stainless steel powder or the mixed powder having a stainless steel composition contains 0.15 to 1.2 mass% of C.

13. The production method for a sintered component made of a stainless steel with high corrosion resistance according to any one of claims 10 to 12, wherein the stainless steel powder or the mixed powder having a stainless steel composition contains at least one of 0.3 to 7 mass% of Mo, 1 to 4 mass% of Cu, 0.1 to 5 mass% of Al, 0.3 mass% or less of N, 5.5 to 10 mass% of Mn, 0.15 to 5 mass% of Si, 0.45 mass% or less of Nb, 0.2 mass% or less of P, 0.15 mass% or less of S, and 0.15 mass% or less of Se.
14. The production method for a sintered component made of a stainless steel with high corrosion resistance according to any one of claims 9 to 13, wherein the rare earth element is selected from at least one of Sc, Y, La, Ce and Gd.
15. The production method for a sintered component made of a stainless steel with high corrosion resistance according to any one of claims 9 to 14, wherein the transition metal element is selected from at least one of Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zr, Nb, Mo and W.
16. The production method for a sintered component made of a stainless steel with high corrosion resistance according to any one of claims 9 to 15, wherein an average grain diameter of the perovskite composite oxide powder is 30 μm or less.
17. The production method for a sintered component made of a stainless steel with high corrosion resistance according to any one of claims 9 to 16, wherein the sintering is performed at a sintering at 1000°C or more.

Fig. 1

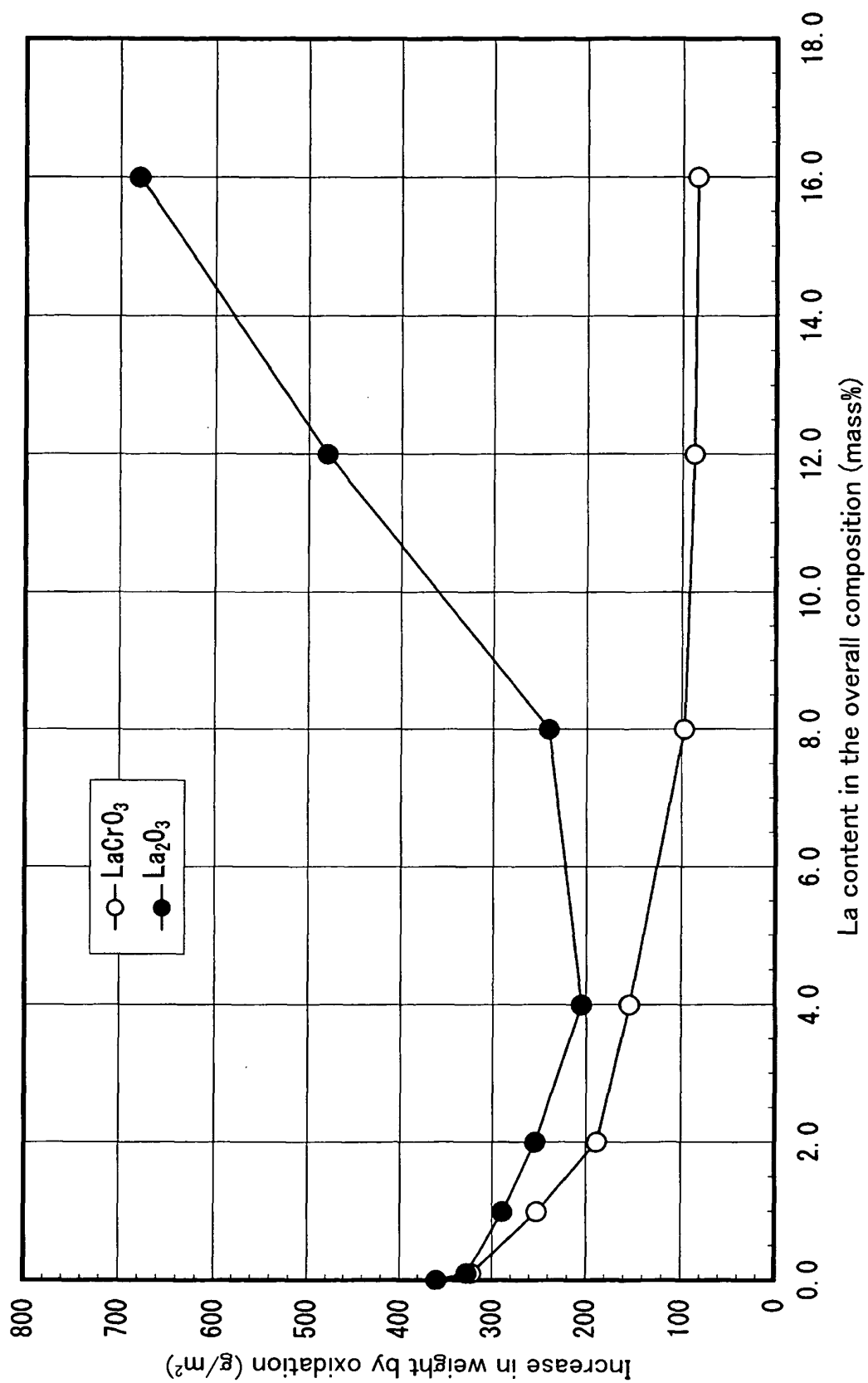


Fig. 2

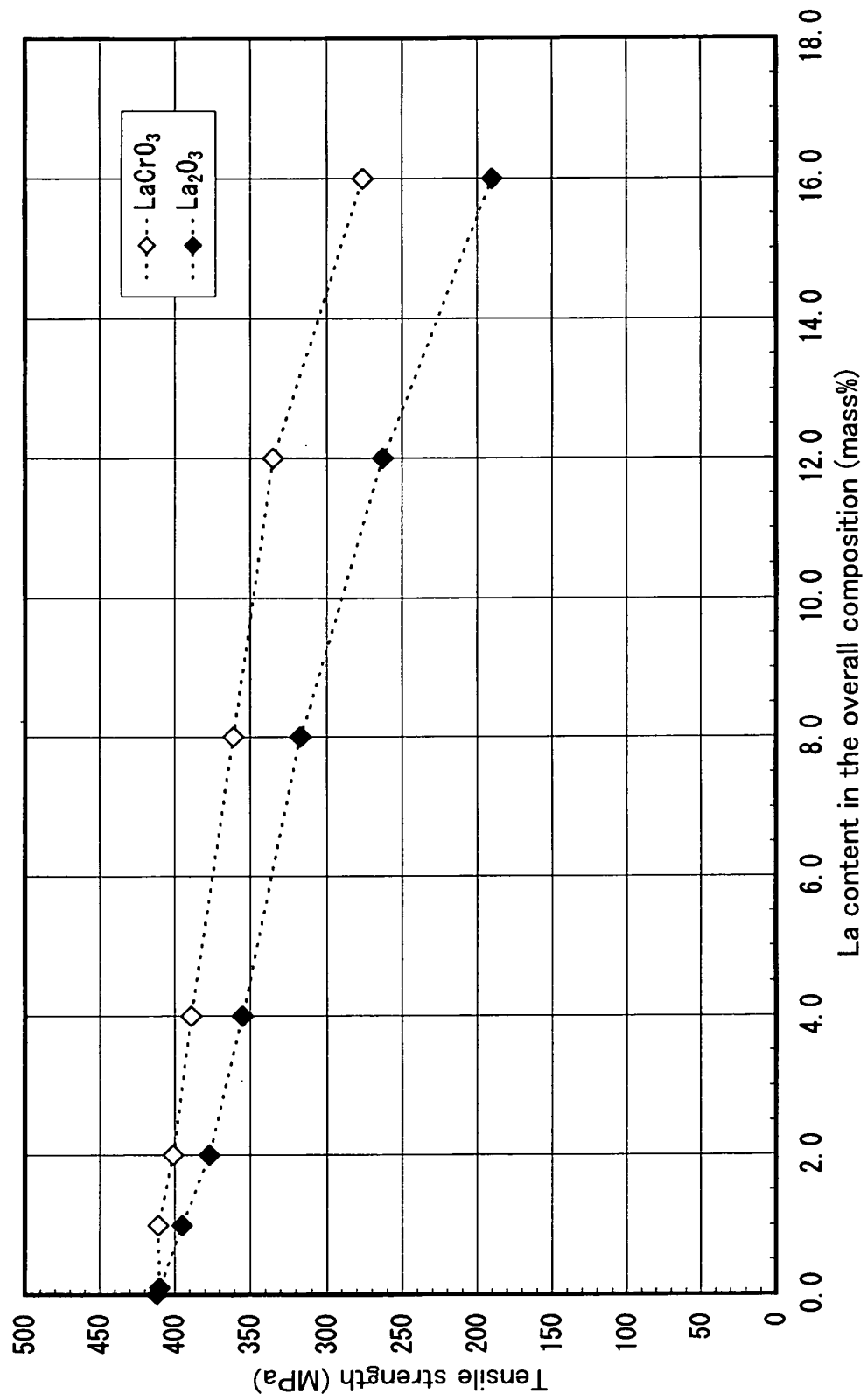


Fig. 3

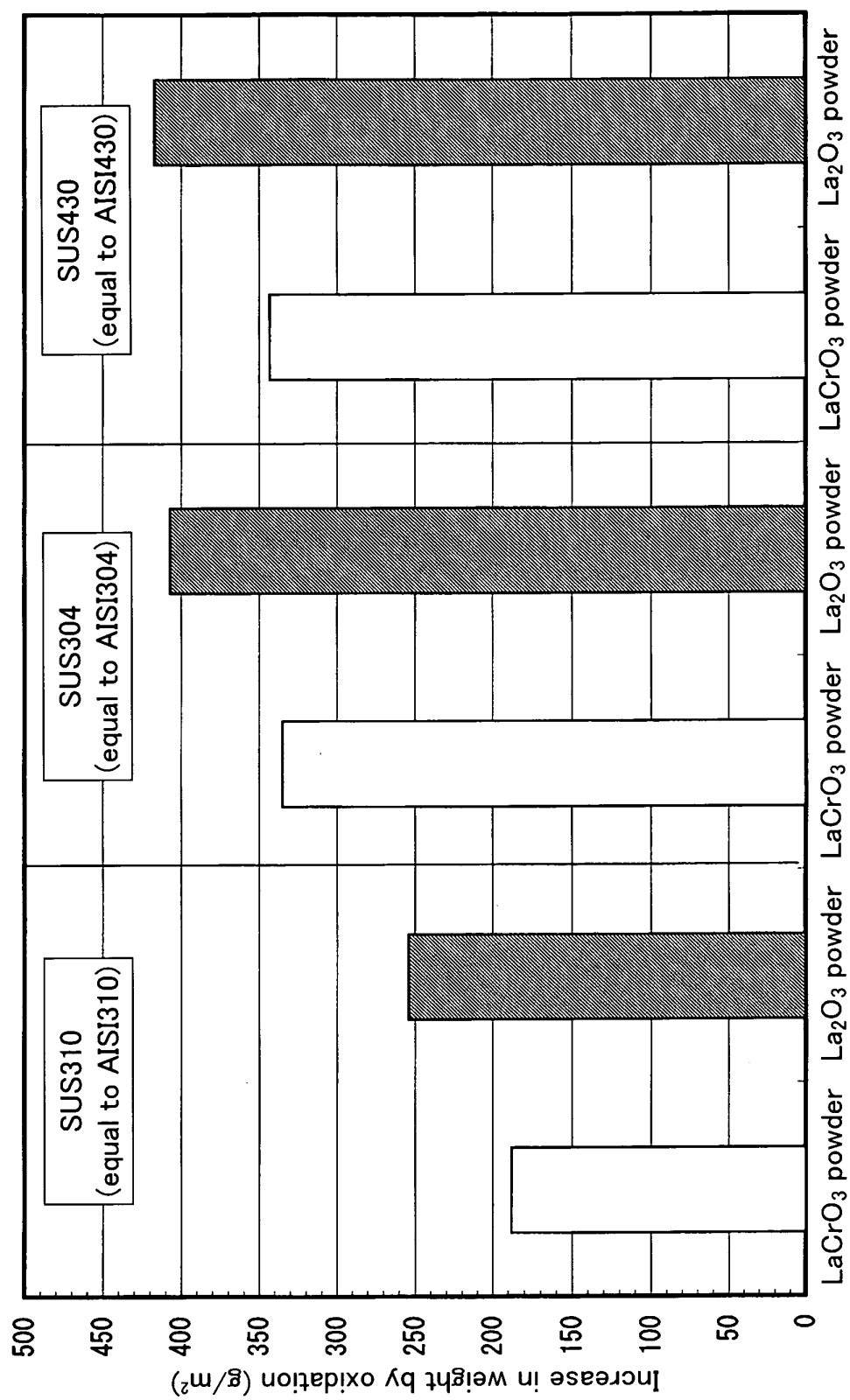


Fig. 4

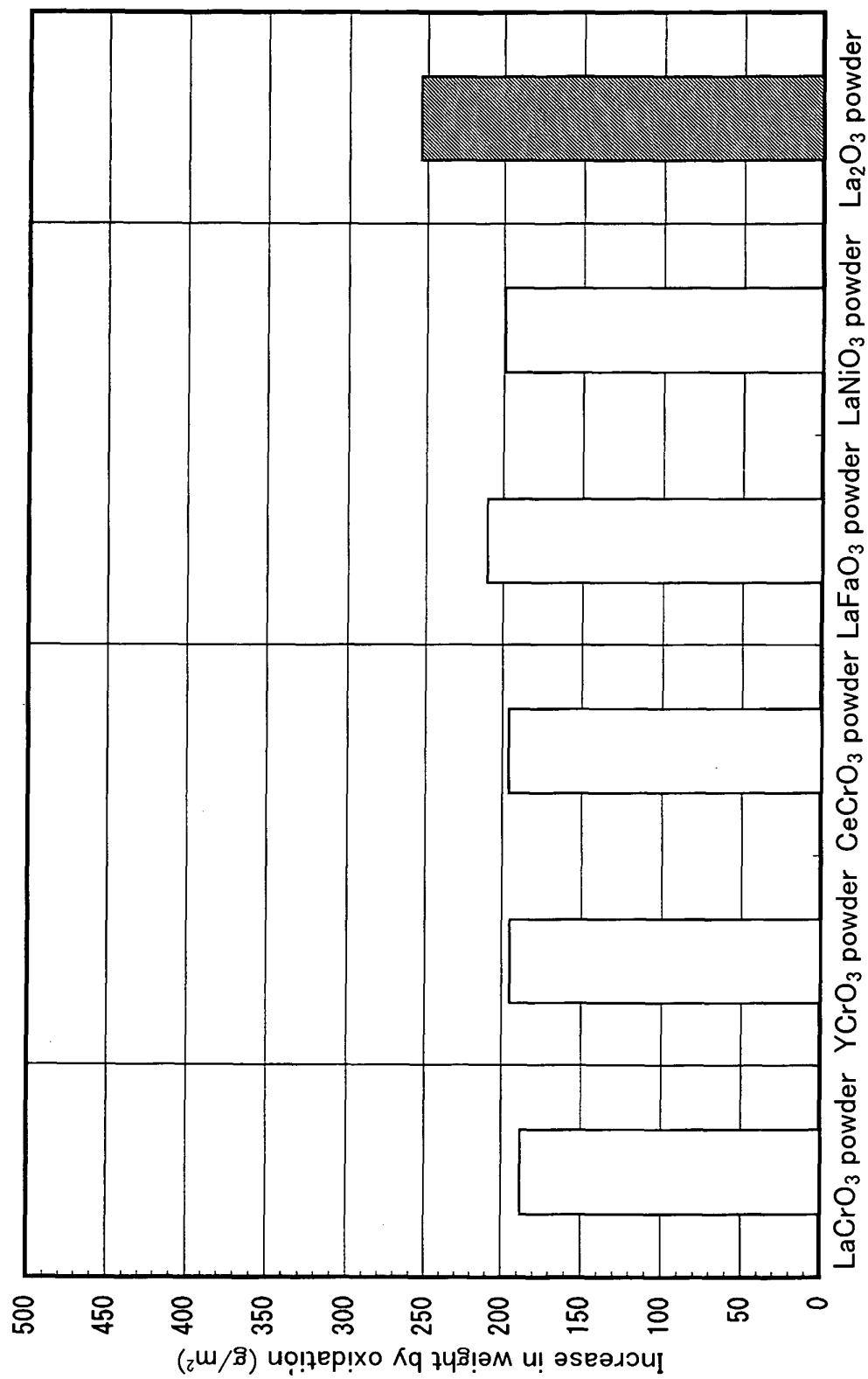


Fig. 5

