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SOLICITUD

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54. TITULO

~~POLVOS PARA PULVERIZADO DE OXIDO DE CROMO ALUMINA Y PROCESO~~
PARA ELABORAR LOS MISMOS

51. CLASIFICACION INTERNACIONAL

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71. SOLICITANTE

SAINT-GOBAIN CERAMICS & PLASTICS, INC.

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74. APODERADO

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C.c. 438.019 de Usaquén.

22. BOGOTA, D.C.,

06/10/2004



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FORMULARIO UNICO DE SOLICITUD DE PATENTE
PCT
ENTRADA EN FASE NACIONAL

SOLICITUD DE:**1**☒ Patente de Invención.☐ Patente de Modelo de Utilidad.☐ Capítulo I.☒ Capítulo II.**2****SOLICITANTE**
(71)

Nombre: **SAINT-GOBAIN CERAMICS & PLASTICS, INC**
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Domicilio: Worcester, Massachusetts, Estados Unidos de América.

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Cual _____

Número _____

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POLVOS PARA PULVERIZADO DE ÓXIDO DE CROMO ALUMINA Y
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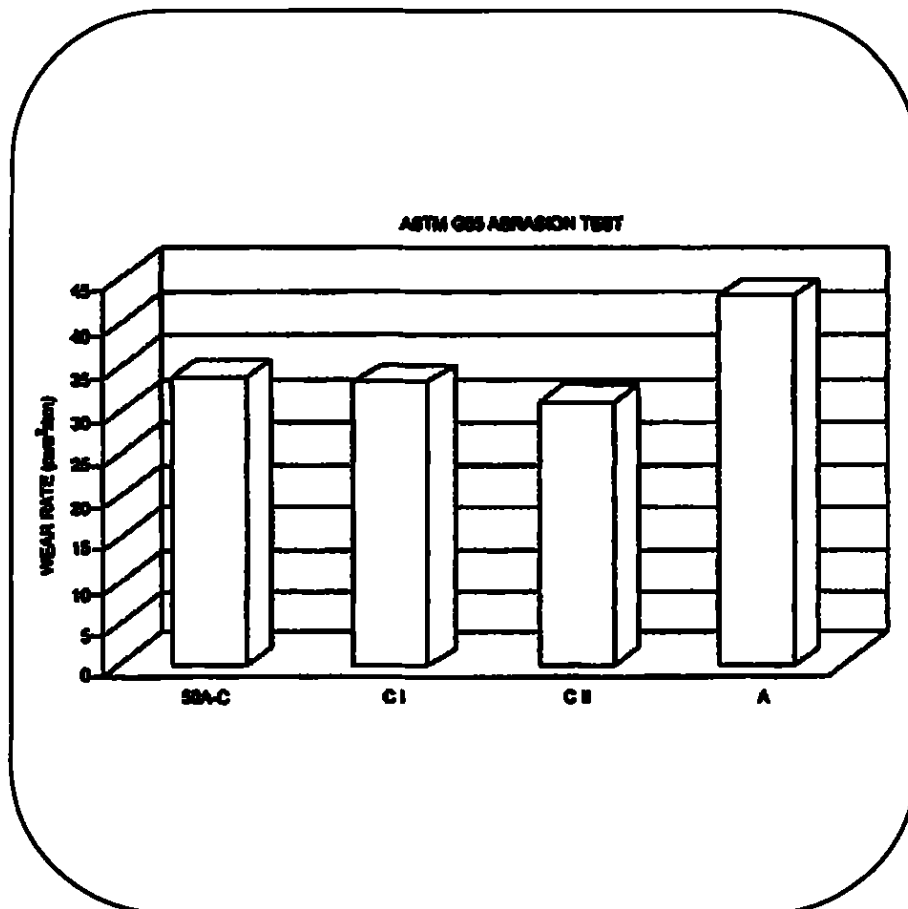
10

Anexos:

- ☒ Comprobante de pago de la tasa de presentación de la solicitud por \$ 422.000.00.
- ☐ Comprobante de pago por reivindicación de prioridad.
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☐ Poderes, si fuere el caso.
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☐ Declaraciones.
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- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- ☒ Copia del examen preliminar efectuado por la IPEA.
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- ☐ Otros

11

FIGURA CARACTERÍSTICA



12

Solicito la concesión de la patente,

NOMBRE: EMILIO FERREROFIRMA: *Emilio Ferrero*

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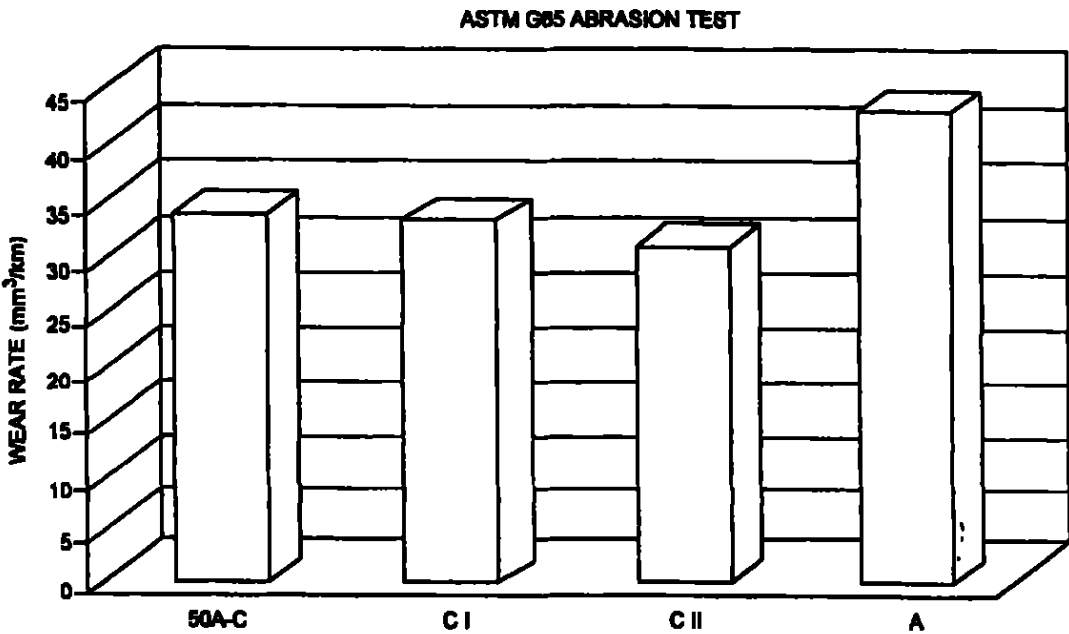
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(54) Title: CHROMIA SPRAY POWDERS AND A PROCESS FOR MAKING THE SAME



(57) Abstract: Particles particularly useful for thermal spraying a wear resistant coating on to a substrate comprise an essentially single phase crystalline structure comprising from 45 to 100 % by weight of chromia and from 0 to 55 % by weight of alpha alumina.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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CHROMIA-ALUMINA SPRAY POWDERS AND A PROCESS FOR MAKING THE SAME

[002] Background of the invention

[003] The present invention relates to chromia spray powders and to a process for making such powders. Such powders are useful in the production of thermally sprayed coatings on substrates.

[004] It is well known that placing a spray coating of chromia on a substrate, which is usually a metal, confers a very significant improvement in the hardness and wear resistance of the surface. For this reason chromia coatings on embossing rolls or rotogravure rolls are often given a chromia coating s are used on many parts that are subjected to wear such as pump bodies, shafts, rolls and printing rolls. These parts can be used as sprayed or may go through subsequent finishing processing such as grinding, lapping or polishing. Printing rolls are usually further processed by laser engraving to make a pattern of cells that are useful for carrying ink. The coatings can be applied by a number of techniques but the most frequently used is based on the use of a thermal spray process in which the ceramic particles are injected into a plasma jet directed towards the substrate. The heat of the plasma jet melts the ceramic particles and causes them, upon impact with the substrate, to form a ceramic layer with a high degree of uniformity and integrity that is capable of protecting the substrate on which it is coated, giving the substrate the superficial hardness and wear characteristics of the ceramic with which it is coated.

[005] There is however a problem because upon thermal spraying a chromia powder on to a substrate, some of the chromia reacts with oxygen and impurities in the chromia to yield very toxic hexavalent chromium compounds. The hexavalent chromium compounds are formed at elevated temperatures such as are used in thermal spraying ceramic powders and seem to be formed in the flame and especially in the outer parts of the flame. Material in this outer part is not heated to quite the same temperature and does not adhere to the surface sprayed to the same degree. The result is an undesirably high level of hexavalent chromia in the powder not adhered but remaining to be recycled or disposed of, thus presenting a significant environmental problem.

[006] In an experiment to determine the extent of this effect the amount of hexavalent chrome in a thermal spray chromia powder was measured at 39 ppm and a coating of this powder thermally sprayed on to a substrate showed a concentration of 10 ppm. However when the overspray was sampled the amount of hexavalent chrome varied between 470 and 8800 ppm. Chromia (Cr_2O_3) converts to the hexavalent state in the presence of oxygen at temperatures over 1000°C but reverts to chromia on cooling. However in the presence of alkali metal or alkaline earth metal impurities, or certain other impurities known in the art, the chromium forms complex compounds which stabilize the chromium in the hexavalent state.

[007] There is therefore a urgent need for a new coating material that does not have the tendency of present chromia-based wear-resistant coating powders to oxidize to the hexavalent state when used in a thermal spray process and does not have the significant loss of hardness and wear resistance that characterize the conventional chromia coatings.

[008] General Description of the Invention

[009] Because alpha alumina and chromia (as used herein this term relates exclusively to the Cr_2O_3 state) have the same hexagonal crystal lattice structure with lattice parameters that are not too dissimilar, it is known that crystal structures incorporating both species are very stable. The oxides are said to be "soluble" in each other in the sense that each can occupy the same position in the hexagonal crystalline lattice of the other forming a solid solution. It is now found that alumina is very effective at inhibiting the formation of the hexavalent chromium species especially in the substantial absence of alkali metal and alkaline earth metal species that are found to promote the formation of this undesirable product. It is however also possible to inhibit the formation of the hexavalent chromium by the use of a chromia source that contains minimal amounts of stabilizers for hexavalent chromium.

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[010] The invention therefore comprises an essentially single-phase, thermosprayable powder comprising from 45 to 100% chromia and correspondingly up to 55% of alumina, all proportions being by weight, and less than 200ppm, and preferably less than 50 ppm, of one or more stabilizers for hexavalent chromium.

[011] It is further preferred that, where alumina is present, at least 90% of the alumina is in the alpha phase since this occasions fewer lattice inhomogeneities in the chromia/alumina crystal structure. Thus the term "essentially single-phase" when used herein to refer to the powder according to the invention allows for the presence of alumina in phases other than the alpha phase in an amount that is less than 10% of the alumina weight in the powder.

[012] Alkali metals and alkaline earth metals are known to stabilize the hexavalent chromium compounds and, while these are often present in trace quantities in chromia, they are far more prevalent in alpha alumina made by conventional techniques. In conventional aluminas sodium tends to occur in larger quantities than the other alkali or alkaline earth metal oxides. In some cases it has proved advantageous to start the process with a precursor form of alpha alumina such as gamma alumina, kappa alumina, delta alumina, boehmite, alumina trihydrate and mixtures thereof either together or with alpha alumina itself. Such precursor forms can often be obtained in a state having very low amounts of impurities which lead to the formation of hexavalent chromium. Typically the amounts of these impurities in boehmite by comparison with a very pure alpha alumina are as follows: sodium oxide - 27 ppm rather than 50 ppm; magnesia - 22 ppm rather than 78 ppm; potassium oxide - less than 1 ppm rather than 68 ppm; and calcia - less than 1 ppm rather than 104 ppm. It is clear therefore that the use of boehmite can confer significant benefits in terms of the reduction of these troublesome species stabilizing hexavalent chromium. The boehmite can then be fired along with the chromia powder to produce the single-phase crystalline chromia/alumina product. When using boehmite, which undergoes about 28% loss of weight upon firing, the amount

added needs to be adjusted such that the proportions of alpha alumina and chromia in the finished product as in the desired range.

- [013] The essentially single-phase crystalline thermosprayable powder of the invention can be made by any suitable heat treatment technique such as for example by fusing the components by electric arc fusion, sintering powders of the components together, blending precursors in a sol-gel process and then drying and firing the gel, or by passing them through a plasma fusion process. However it is often preferred to produce the powder by sintering a mixture of the components in powder form at a temperature from 1250 to 1500°C and preferably from 1300 to 1450°C. In general a firing cycle, (which includes conventional ramp up, dwell time at the firing temperature and ramp down times), of 10 to 40 hours and preferably 15 to 30 hours, is required. The cycle time for firing depends largely on the firing temperature, with lower firing temperatures generally requiring longer firing times to achieve the desired results. If the alumina feed is in the initial form of boehmite, temperatures at the high end of the range are often required to bring about complete conversion to the alpha form. This is essential because only the alpha form has the desired crystalline structure matching that of chromia. Leaving an excessive amount of transitional alumina, (that is, more than about 10% of the total alumina weight), results in the product not having an essentially single-phase crystalline structure.
- In addition if the particle size of the chromia is of the same order of magnitude as the alpha alumina or even greater, the readiness of the chromia to absorb into the alumina lattice is reduced and longer times at the firing temperature may be needed.

- [014] Firing a powder mixture is particularly effective when the particle size of the alpha alumina is greater than that of the chromia since the smaller chromia particles have a strong tendency to become absorbed into the alpha alumina crystal lattice to produce a single phase crystalline powder material. In such a process the alumina particles can have a d_{50} that is from 5 to 20 times, and preferably from 2 to 15 times the d_{50} of the chromia particles. This is however

not essential and it is found when the particle sizes are proportioned in the opposite direction, that is with the chromia particles having the larger size range, the process is also effective. Control of the temperature of firing and the length of the firing time is an effective mechanism for controlling the size of the chromia/alumina crystals that are produced. Thus longer heating or higher temperatures are each effective to increase the crystal size from the sub-micron size by at least an order of magnitude.

[015] When an alumina component mixed with the chromia is in the form of boehmite, the particle size is typically about the same as the chromia or even smaller but the agglomeration that occurs on firing to form the alpha alumina can often result in the favorable d_{50} relationship described above.

[016] Drawings

[017] Figure 1 is a bar-graph showing the wear resistance of various samples of coatings.

[018] Detailed Description of the Invention

[019] The invention is now described with reference to the following Examples which are intended to illustrate the principles of the invention and its application to the production of coated surfaces with good wear resistance properties.

[020] A high purity alpha alumina made by a sol-gel process was analyzed for its impurity content and was found to contain the following: sodium oxide 50 ppm; magnesia 78 ppm; potassium oxide 68 ppm; and calcia 104 ppm. A powder of this alpha alumina with a particle size distribution such that the d_{10} was 5.08 micrometers; the d_{50} was 16.08 micrometers ; and the d_{90} was 29.2 micrometers was obtained. This powder was then mixed with fine chromia particles having the following particle size distribution: d_{10} 0.94 micrometer; d_{50} 1.77 micrometers ; and d_{90} 4.44 micrometers. All particle size measurements were obtained using a Microtrac measuring system.

-6-

- [021] These powders were then mixed in a 50:50 weight ratio and fired at a temperature of 1350°C with a firing cycle of approximately 20 hours. At the end of that time the particle size distribution was as follows: d_{10} 5.58 micrometers; d_{50} 17.18 micrometers ; and d_{90} 34.75 micrometers.
- [022] When this powder was thermally sprayed on a substrate it was found to have a porosity of 5% which was the same as was obtained when the chromia powder was sprayed alone. The Vickers hardness was 1183 kg/mm² whereas that obtained with chromia alone was 1257 kg/mm².
- [023] In another sample of the powder according to the invention comprising alpha alumina and chromia in a weight ratio of 50:50 the powder had a 3 ppm content of hexavalent chromium and the overspray powder contained 5 ppm of the hexavalent chromium. The particle size distribution was as follows: d_{10} 14.78 micrometers; d_{50} 28.30 micrometers ; and d_{90} 48.98 micrometers.
- [024] The comparative wear resistance qualities of four thermally sprayed coatings were then compared. The powder according to the invention comprised a single-phase crystalline alpha alumina/chromia mixture in a 50/50 weight ratio, (50A-C). This was compared with two coatings obtained using pure chromia, (C1 and C2) and one using pure alpha alumina, (A). The test method set forth in the ASTM G65 abrasion test was used. The result appear in Figure 1 and indicate that the 50A-C coating was more wear-resistant than the alumina and was only slightly worse than that obtained using chromia alone.

We Claim:

1. An essentially single-phase, thermosprayable powder comprising from 45 to 100% chromia and correspondingly from 0 to 55% of alpha alumina, all proportions being by weight, and less than 200ppm of each of any compound effective to stabilize chromium in the hexavalent state.
2. A powder according to Claim 1 in which the stabilizing compound is selected from the group consisting of alkali metals and alkaline earth metals and the content of each is less than 50 ppm.
3. A powder according to Claim 1 in which the proportion of alpha alumina is from 50 to 30% by weight.
4. A powder according to Claim 1 in which the particles have a d_{50} of from 5 to 200 micrometers.
5. A process for the production of a thermosprayable powder which comprises mixing an alumina powder having a content of alkali metal and alkaline earth metal oxide impurities of not more than 120 ppm of each, with a chromia powder also having less than 120 ppm of any impurity effective to stabilize chromium in the hexavalent state, the powders being mixed in proportions to give, upon firing, an essentially single phase crystalline powder comprising from 45 to 99% of chromia and from 55 to 1% of alpha alumina, all proportions being by weight, and firing the mixture at a temperature of from 1300 to 1500°C to produce the said essentially single-phase crystalline powder.
6. A process according to Claim 5 in which the alpha alumina particles have a d_{50} particle size that is from 5 to 20 times the corresponding d_{50} for the chromia powder.
7. A process according to Claim 5 in which the alumina powder is selected from the group consisting of alpha alumina, gamma alumina, kappa alumina, delta alumina, boehmite, alumina trihydrate and mixtures thereof.
8. A process according to Claim 7 in which the alumina powder mixed with the chromia powder is boehmite.
9. A process according to Claim 5 in which the chromia and the alumina each have alkali metal and alkaline earth metal impurity levels that do not exceed 50 ppm of any such element.

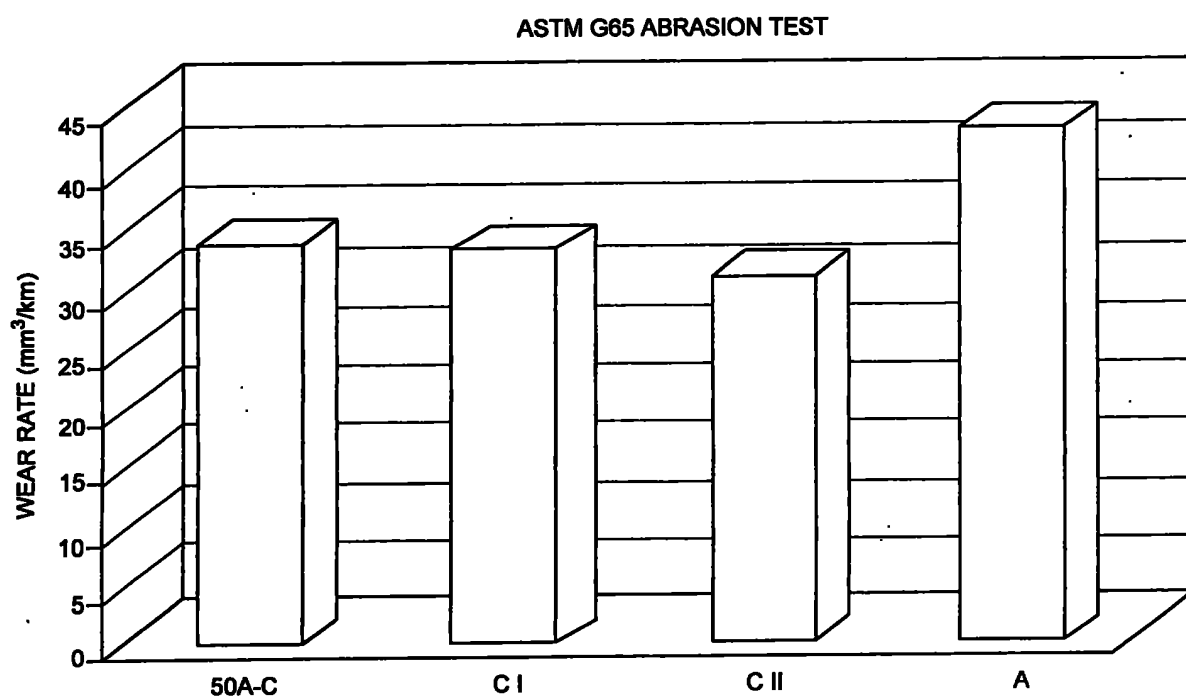


FIG. 1

INTERNATIONAL SEARCH REPORT

Int. Application No.
PCT/US 03/10605

9

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C01G37/00 C01G37/033 C01G1/02 C04B35/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C01G C04B C23C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WATANABE M ET AL: "Formation of continuous series of solid solutions from powders prepared by hydrazine method: The system Cr2O3-Al2O3" MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 31, no. 7, 1 July 1996 (1996-07-01), pages 861-868, XP004077794 ISSN: 0025-5408 experimental procedure, Table 1 — -/-	1-3

☒ Further documents are listed in the continuation of box C.☐ Patent family members are listed in annex.

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- *A* document defining the general state of the art which is not considered to be of particular relevance
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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

14 August 2003

Date of mailing of the international search report

01/09/2003

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INTERNATIONAL SEARCH REPORT

Intern. Application No.
PCT/US 03/10605

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YAMAGUCHI O ET AL: "Fabrication and mechanical properties of Cr₂O₃ solid solution ceramics in the system Cr₂O₃-Al₂O₃" MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 32, no. 5, 1 May 1997 (1997-05-01), pages 627-632, XP004088912 ISSN: 0025-5408 experimental procedure, table 1	1-4
X	SATO, KOJI ET AL.: "Preparation of alumina-chromia solid solution powder and thin film through precursor method" CERAMIC TRANSACTIONS, CERAMIC PROCESSING SCIENCE, vol. 83, 1998, pages 451-458, XP009015669 experimental procedure, figs. 1 and 3	1-3
X	L. R. ROSSI AND W. G. LAWRENCE: "Elastic Properties of Oxide Solid Solutions: The System Al₂O₃-Cr₂O₃" J. AM. CERAM. SOC., vol. 53, no. 11, 1970, pages 604-608, XP009015711 p.605, Powder Preparation examples; table 1	1

PCT
REQUEST

The undersigned requests that the present international application
be processed according to the Patent Cooperation Treaty.

For receiving Office use only	
International Application No.	
International Filing Date	
Name of receiving Office and "PCT International Application"	
Applicant's or agent's file reference (if desired)(12 characters maximum)	NORA-4171CPC

Box No. I TITLE OF INVENTION
CHROMIA SPRAY POWDERS AND A PROCESS FOR MAKING THE SAME

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☒ applicant and inventor

☐ inventor only (if this check-box is marked, do not fill in below.)

State (i.e. country) of nationality: US

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☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE, OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

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Name and Address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)</i> WALLAR, Howard PO Box 60693 Worcester, MA 01606 US	This person is: ☐ applicant only ☒ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i>
State (i.e. country) of nationality: US	State (i.e. country) of residence: US
This person is applicant for the purpose of: ☐ all designated States ☐ all designated states except the USA ☒ the United States of America only ☐ the States indicated in the Supplemental Box	
Name and Address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)</i> 	This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i>
State (i.e. country) of nationality:	State (i.e. country) of residence:
This person is applicant for the purpose of: ☐ all designated States ☐ all designated states except the USA ☐ the United States of America only ☐ the States indicated in the Supplemental Box	
Name and Address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)</i> 	This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i>
State (i.e. country) of nationality:	State (i.e. country) of residence:
This person is applicant for the purpose of: ☐ all designated States ☐ all designated states except the USA ☐ the United States of America only ☐ the States indicated in the Supplemental Box	
Name and Address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)</i> 	This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i>
State (i.e. country) of nationality:	State (i.e. country) of residence:
This person is applicant for the purpose of: ☐ all designated States ☐ all designated states except the USA ☐ the United States of America only ☐ the States indicated in the Supplemental Box	
Name and Address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)</i> 	
This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i>	
State (i.e. country) of nationality:	State (i.e. country) of residence:
This person is applicant for the purpose of: ☐ all designated States ☐ all designated states except the USA ☐ the United States of America only ☐ the States indicated in the Supplemental Box	
☐ Further applicants and/or (further) inventors are indicated on another sheet.	

Supplemental Box

If the Supplemental Box is not used, this sheet should not be included in the request.

1. If, in any of the Boxes, except Boxes Nos. VIII(I) to (v) for which a special continuation box is provided, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No." (Indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:
 - (i) If more than two persons are to be indicated as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;
 - (ii) If, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
 - (iii) If, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
 - (iv) If, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
 - (v) If, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
 - (vi) If, in Box No. VI, there are more than five earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI.
2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.

Continuation of Box IV

CROSBY, Mike W.; PORTER, Mary E.; SULLIVAN, Joseph P. and FIELD, Thomas G. III
 Saint-Gobain Corporation
 1 New Bond Street
 Box Number 15138
 Worcester, Massachusetts 01615-0138
 United States of America

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☐ **AP** ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZM Zambia, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT.
- ☐ **EA** Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☐ **EP** European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ **OA** OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GQ Equatorial Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (If other kind of protection or treatment desired, specify on dotted line)

National Patent (If other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
| ☐ AE United Arab Emirates | ☐ LR Liberia |
| ☐ AG Antigua and Barbuda | ☐ LS Lesotho |
| ☐ AL Albania | ☐ LT Lithuania |
| ☐ AM Armenia | ☐ LU Luxembourg |
| ☐ AT Austria | ☐ LV Latvia |
| ☐ AU Australia | ☐ MA Morocco |
| ☐ AZ Azerbaijan | ☐ MD Republic of Moldova |
| ☐ BA Bosnia and Herzegovina | ☐ MO Madagascar |
| ☐ BB Barbados | ☐ MK The former Yugoslav Republic of Macedonia |
| ☐ BG Bulgaria | ☐ MN Mongolia |
| ☐ BR Brazil | ☐ MW Malawi |
| ☐ BY Belarus | ☐ MX Mexico |
| ☐ BZ Belize | ☐ MZ Mozambique |
| ☐ CA Canada | ☐ NO Norway |
| ☐ CH and LI Switzerland and Liechtenstein | ☐ NZ New Zealand |
| ☐ CN China | ☐ OM Oman |
| ☐ CO Colombia | ☐ PH Philippines |
| ☐ CR Costa Rica | ☐ PL Poland |
| ☐ CU Cuba | ☐ PT Portugal |
| ☐ CZ Czech Republic | ☐ RO Romania |
| ☐ DE Germany | ☐ RU Russian Federation |
| ☐ DK Denmark | ☐ SD Sudan |
| ☐ DM Dominica | ☐ SE Sweden |
| ☐ DZ Algeria | ☐ SG Singapore |
| ☐ EC Ecuador | ☐ SI Slovenia |
| ☐ EE Estonia | ☐ SK Slovakia |
| ☐ ES Spain | ☐ SL Sierra Leone |
| ☐ FI Finland | ☐ TJ Tajikistan |
| ☐ GB United Kingdom | ☐ TM Turkmenistan |
| ☐ GD Grenada | ☐ TN Tunisia |
| ☐ GE Georgia | ☐ TR Turkey |
| ☐ GH Ghana | ☐ TT Trinidad and Tobago |
| ☐ GM Gambia | ☐ TZ United Republic of Tanzania |
| ☐ HR Croatia | ☐ UA Ukraine |
| ☐ HU Hungary | ☐ UG Uganda |
| ☐ ID Indonesia | ☐ US United States of America |
| ☐ IL Israel | ☐ UZ Uzbekistan |
| ☐ IN India | ☐ VN Viet Nam |
| ☐ IS Iceland | ☐ YU Yugoslavia |
| ☐ JP Japan | ☐ ZA South Africa |
| ☐ KE Kenya | ☐ ZM Zambia |
| ☐ KG Kyrgyzstan | ☐ ZW Zimbabwe |
| ☐ KP Democratic People's Republic of Korea | |
| ☐ KR Republic of Korea | |
| ☐ KZ Kazakhstan | |
| ☐ LC Saint Lucia | |
| ☐ LK Sri Lanka | |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ Any newly added PCT country
- ☐

In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that these additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM Further priority claims are indicated in the Supplemental Box ☐

The priority of the following earlier application(s) is hereby claimed:

Country (in which, or for which, the applicant was filed)	Filing Date (Day/month/year)	Application No.	Office of filing (only for regional or international application)
Item (1) US	08 April 2002	10/118,133	
Item (2) US	03 September 2002	10/234,422	
Item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☒ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): one (1) and two (2)

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen, the two-letter code may be used): ISA/ EP

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request:

Country (or regional Office): _____ Date (day/month/year): _____ Number: _____

Box No. VIII CHECK LIST

This international application contains the following number of sheets: <table> <tr> <td>1. request</td> <td>:</td> <td>5</td> <td>sheets</td> </tr> <tr> <td>2. description</td> <td>:</td> <td>6</td> <td>sheets</td> </tr> <tr> <td>3. claims</td> <td>:</td> <td>1</td> <td>sheets</td> </tr> <tr> <td>4. abstract</td> <td>:</td> <td>1</td> <td>sheets</td> </tr> <tr> <td>5. drawings</td> <td>:</td> <td>1</td> <td>sheets</td> </tr> <tr> <td>Total</td> <td>:</td> <td>14</td> <td>sheets</td> </tr> </table>	1. request	:	5	sheets	2. description	:	6	sheets	3. claims	:	1	sheets	4. abstract	:	1	sheets	5. drawings	:	1	sheets	Total	:	14	sheets	This international application is accompanied by the item(s) marked below: <table> <tr> <td>1. ☒ separate signed power of attorney</td> <td>5. ☒ fee calculation sheet</td> </tr> <tr> <td>2. ☐ copy of general power of attorney</td> <td>6. ☐ separate indications concerning deposited microorganisms</td> </tr> <tr> <td>3. ☐ statement explaining lack of signature</td> <td>7. ☐ nucleotide and/or amino acid sequence listing (diskette)</td> </tr> <tr> <td>4. ☐ priority document(s)</td> <td>8. ☒ other (specify): 1) Return Postcard, 2) Transmittal Letter - 1 page; 3) a further power of attorney;</td> </tr> </table> identified in Box No. VI as item(s): _____	1. ☒ separate signed power of attorney	5. ☒ fee calculation sheet	2. ☐ copy of general power of attorney	6. ☐ separate indications concerning deposited microorganisms	3. ☐ statement explaining lack of signature	7. ☐ nucleotide and/or amino acid sequence listing (diskette)	4. ☐ priority document(s)	8. ☒ other (specify): 1) Return Postcard, 2) Transmittal Letter - 1 page; 3) a further power of attorney;
1. request	:	5	sheets																														
2. description	:	6	sheets																														
3. claims	:	1	sheets																														
4. abstract	:	1	sheets																														
5. drawings	:	1	sheets																														
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4. ☐ priority document(s)	8. ☒ other (specify): 1) Return Postcard, 2) Transmittal Letter - 1 page; 3) a further power of attorney;																																

Figure No. 1 of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).


 Michael J. Bulold

For receiving Office use only

1. Date of actual receipt of the purported international application:	2. Drawings: ☐ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority specified by the applicant: <u>ISA/</u>	6. ☐ Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau: _____

PATENT COOPERATION TREATY

JS

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

DAVIS & BUJOLD P.L.L.C.
Attn. Bujold, Michael J.
500 N. Commercial Street,
4th floor
Manchester, New Hampshire 03101
UNITED STATES OF AMERICA

SEP - 2 2003

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year) 01/09/2003	
Applicant's or agent's file reference NORA-4171CPC	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US 03/ 10605	International filing date (day/month/year) 04/04/2003
Applicant SAINT-GOBAIN CERAMICS & PLASTICS, INC.	

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 48):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date, the International application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the International application, or of the priority claim, must reach the International Bureau as provided in Rules 80bis.1 and 80bis.3, respectively, before the completion of the technical preparations for International publication.

Within 18 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 18 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5518 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer José-Antonio Almalé Murillo
--	---

Form PCT/ISA/220 (July 1998)

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference NORA-4171CPC	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 03/ 10605	International filing date (day/month/year) 04/04/2003	(Earliest) Priority Date (day/month/year) 08/04/2002
Applicant SAINT-GOBAIN CERAMICS & PLASTICS, INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

CHROMIA-ALUMINA SPRAY POWDERS AND A PROCESS FOR MAKING THE SAME

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 39.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

Int. Application No
PCT/US 03/10605

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C01G37/00 C01G37/033 C01G1/02 C04B35/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C01G C04B C23C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WATANABE M ET AL: "Formation of continuous series of solid solutions from powders prepared by hydrazine method: The system Cr2O3-Al2O3" MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 31, no. 7, 1 July 1996 (1996-07-01), pages 861-868, XP004077794 ISSN: 0025-5408 experimental procedure, Table 1 --- -/--	1-3

☒ Further documents are listed in the continuation of box C.☐ Patent family members are listed in annex.

* Special categories of cited documents:

- 'A' document defining the general state of the art which is not considered to be of particular relevance
- 'E' earlier document but published on or after the international filing date
- 'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- 'O' document referring to an oral disclosure, use, exhibition or other means
- 'P' document published prior to the international filing date but later than the priority date claimed

- 'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- 'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- 'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- 'A' document member of the same patent family

Date of the actual completion of the international search

14 August 2003

Date of mailing of the international search report

01/09/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Munro, B

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/10605

18

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YAMAGUCHI O ET AL: "Fabrication and mechanical properties of Cr2O3 solid solution ceramics in the system Cr2O3-Al2O3" MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 32, no. 5, 1 May 1997 (1997-05-01), pages 627-632, XP004088912 ISSN: 0025-5408 experimental procedure, table 1	1-4
X	SATO, KOJI ET AL.: "Preparation of alumina-chromia solid solution powder and thin film through precursor method" CERAMIC TRANSACTIONS, CERAMIC PROCESSING SCIENCE, vol. 83, 1998, pages 451-458, XP009015669 experimental procedure, figs. 1 and 3	1-3
X	L. R. ROSSI AND W. G. LAWRENCE: "Elastic Properties of Oxide Solid Solutions: The System Al2O3-Cr2O3" J. AM. CERAM. SOC., vol. 53, no. 11, 1970, pages 604-608, XP009015711 p.605, Powder Preparation examples; table 1	1

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 29 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 18 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 28, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 18, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Office, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

From the INTERNATIONAL BUREAU

PCTNOTICE INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

BUJOLD, Michael, J.
Davis & Bujold, P.L.L.C.
Fourth Floor
500 North Commercial Street
Manchester, NH 03102
ETATS-UNIS D'AMERIQUE

NOV - 3 2003

DAVIS & BUJOLD, P.L.L.C.

IMPORTANT NOTICE

Date of mailing(day/month/year) 23 October 2003 (23.10.03)			
Applicant's or agent's file reference NORA-4171CPC			
International application No. PCT/US03/10605	International filing date(day/month/year) 04 April 2003 (04.04.03)	Priority date(day/month/year) 08 April 2002 (08.04.02)	
Applicant SAINT-GOBAIN CERAMICS & PLASTICS, INC.			

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this notice:

AU, AZ, BY, CH, CN, CO, DE, DZ, HU, JP, KG, KP, KR, MD, MK, MZ, RU, TM, US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE, AG, AL, AM, AP, AT, BA, BB, BG, BR, BZ, CA, CR, CU, CZ, DK, DM, EA, EC, EE, EP, ES, FI, GB, GD, GE, GH, GM, HR, ID, IL, IN, IS, KE, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PH, PL, PT, RO, SC, SD, SE, SG, SK, SL, TJ, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this notice is a copy of the international application as published by the International Bureau on 23 October 2003 (23.10.03) under No. 03/088974

4. **TIME LIMITS** for filing a demand for international preliminary examination and for entry into the national phase

The applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be 30 MONTHS from the priority date, not only in respect of any elected Office if a demand for international preliminary examination is filed before the expiration of 19 months from the priority date, but also in respect of any designated Office, in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see *PCT Gazette* No. 44/2001 of 1 November 2001, pages 19926, 19932 and 19934, as well as the *PCT Newsletter*, October and November 2001 and February 2002 issues.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain designated or elected Offices. For regular updates on the applicable time limits (20, 21, 30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

For filing a demand for international preliminary examination, see the *PCT Applicant's Guide*, Volume I/A, Chapter IX. Only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

It is the applicant's sole responsibility to monitor all these time limits.

The applicant is hereby notified that, at the time of establishment of this Notice, the time limit under Rule 46.1 for making amendments under Article 19 has not yet expired and the International Bureau had received neither such amendments nor a declaration that the applicant does not wish to make amendments.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Judith Zahra
Facsimile No.(41-22) 740.14.35	Telephone No.(41-22) 338.91.11

The demand must be filed directly with the competent International Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ _____

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty.

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference
		NORA-4171CPC
International application No.	International filing date (day/month/year)	(Earliest) Priority date (day/month/year)
PCT/US03/10605	April 04, 2003	08 April 2002
Title of invention		
CHROMIA-ALUMINA SPRAY POWDERS AND A PROCESS FOR MAKING THE SAME		
Box No. II APPLICANT(S)		
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)		Telephone No.: 508-795-5712
SAINT-GOBAIN CERAMICS & PLASTICS, INC. 1 New Bond Street Box Number 15138 Worcester, MA 01615-0138 US		Facsimile No.: 508-795-2653
State (i.e. country) of nationality: US		State (i.e. country) of residence: US
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)		
YU, Sung H. 50 Commons Drive Apartment 9 Shrewsbury, MA 01545 US		
State (i.e. country) of nationality: US		State (i.e. country) of residence: US
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)		
WALLAR, Howard PO Box 60695 Worcester, MA 01606 US		
State (i.e. country) of nationality: US		State (i.e. country) of residence: US
☐ Further applicants are indicated on a continuation sheet.		

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is ☒ agent ☐ common representative

and ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.
☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.
☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

Michael J. Bujold
Customer No. 020210
Davis & Bujold, P.L.L.C.
Fourth Floor
500 North Commercial Street
Manchester NH 03101
US
E-mail: patent@davisandbujold.com

Telephone No.:

603 624-9220

Facsimile No.:

603 624-9229

Teleprinter No.:

☐ Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV STATEMENT CONCERNING AMENDMENTS

The applicant wishes the International Preliminary Examining Authority*

(i) ☒ to start the international preliminary examination on the basis of the international application as originally filed.

(ii) ☐ to take into account the amendments under Article 34 of

☐ the description (amendments attached).
☐ the claims (amendments attached).
☐ the drawings (amendments attached).

(iii) ☐ to take into account any amendments of the claims under Article 19 filed with the International Bureau (a copy is attached).

(iv) ☐ to disregard any amendments of the claims made under Article 19 and to consider them as reversed.

(v) ☐ to postpone the start of the international preliminary examination until the expiration of 20 months from the priority date unless that Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

*

Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Box No. V ELECTION OF STATES

☒ The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)* except

.....

(If the applicant does not wish to elect certain eligible States, the name(s) or country code(s) of those States must be indicated above.)

Box No. VI CHECKLIST

The demand is accompanied by the following documents for the purposes of international preliminary examination:

1. amendments under Article 34
 - description : sheets
 - claims : sheets
 - drawings : sheets
2. letter accompanying amendments under Article 34 : sheets
3. copy of amendments under Article 19 : sheets
4. copy of statement under Article 19 : sheets
- 5 other (specify): : sheets

For International Preliminary Examining Authority use only

received not received

- | | |
|--------------------------|--------------------------|
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |

The demand is also accompanied by the item(s) marked below:

- | | | | |
|-----------------------------|--|--|----------------------------------|
| 1. ☐ | separate signed power of attorney | 4. ☒ | fee calculation sheet |
| 2. ☐ | copy of general power of attorney | 5. ☒ | other (specify): Check 1,689 Eur |
| 3. ☐ | statement explaining lack of signature | | |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).


Michael J. Buford

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.
4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.
5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

From the INTERNATIONAL BUREAU

PCTINFORMATION CONCERNING ELECTED
OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

TAC

To:

BUJOLD, Michael, J.
Davis & Bujold, P.L.L.C.
Fourth Floor
500 North Commercial Street
Manchester, NH 03101
ETATS-UNIS D'AMERIQUE**RECEIVED**

NOV - 3 2003

DAVIS & BUJOLD, P.L.L.C.

Date of mailing(day/month/year)

23 October 2003 (23.10.03)

Applicant's or agent's file reference
NORA-4171CPC**IMPORTANT INFORMATION**International application No.
PCT/US03/10605International filing date(day/month/year)
04 April 2003 (04.04.03)Priority date(day/month/year)
08 April 2002 (08.04.02)

Applicant

SAINT-GOBAIN CERAMICS & PLASTICS, INC.

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

EP: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR
National: AU, BG, CA, CN, DE, GB, IL, JP, KP, KR, MN, NI, NO, PL, RO, RU, SK, US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

AP: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW

EA: AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

OA: BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

National: AE, AG, AL, AM, AT, AZ, BA, BB, BR, BY, BZ, CH, CO, CR, CU, CZ, DK, DM, DZ, EC, EE, ES, FI,
GD, GE, GH, GM, HR, HU, ID, IN, IS, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MW,
MX, MZ, NZ, OM, PH, PT, SC, SD, SE, SG, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM,
ZW

3. The applicant is reminded that he must enter the "national phase" before the expiration of 30 months from the priority date before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into European regional phase is postponed until 31 months from the priority date for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Judith Zahra

Facsimile No.(41-22) 740.14.35

Telephone No.(41-22) 338.91.11

RECEIVED

JUL 7 2003

DAVIS & BUJOLD, P.L.L.C.

PATENT COOPERATION TREATY

26

PCT

TAC

From the INTERNATIONAL BUREAU

**NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT**

(PCT Administrative Instructions, Section 411)

To:

BUJOLD, Michael, J.
Davis & Bujold, P.L.L.C.
Fourth Floor
500 North Commercial Street
Manchester, NH 03101
United States of America

Date of mailing (day/month/year)

16 June 2003 (16.06.03)

Applicant's or agent's file reference

NORA-4171CPC

IMPORTANT NOTIFICATION

International application No.

PCT/US03/10605

International filing date (day/month/year)

04 April 2003 (04.04.03)

International publication date (day/month/year)

Not yet published

Priority date (day/month/year)

08 April 2002 (08.04.02)

Applicant

SAINT-GOBAIN CERAMICS & PLASTICS, INC. et al

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, the attention of the applicant is directed to Rule 17.1(d) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
08 April 2002 (08.04.02)	10/118,133	US	07 May 2003 (07.05.03)
03 Sept 2002 (03.09.02)	10/234,422	US	07 May 2003 (07.05.03)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 338.87.20

Authorized officer

Bernard THORAX

Telephone No. (41-22) 338 8213

Form PCT/IB/304 (July 1998)

005892157

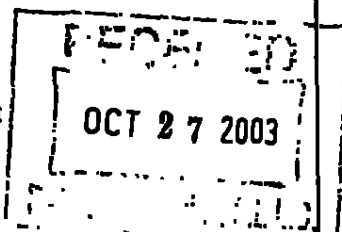
PATENT COOPERATION TREATY

22

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Michael J. Bujold
Davis & Bujold, P.L.L.C.
Fourth Floor
500 North Commercial Street
Manchester, NH 03101
ETATS-UNIS D'AMERIQUE



✓
18-04 PCT
NAY
3
WRITTEN OPINION
(PCT Rule 66)

Date of mailing (day/month/year) 22.10.2003	
Applicant's or agent's file reference NORA-4171CPC	REPLY DUE within 3 month(s) from the above date of mailing
International application No. PCT/US03/10805	International filing date (day/month/year) 04/04/2003
Priority date (day/month/year) 08/04/2002	
International Patent Classification (IPC) or both national classification and IPC C01G37/00	
Applicant SAINT-GOBAIN CERAMICS & PLASTICS, INC. et al.	

1. This written opinion is the first drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain document cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application
3. The applicant is hereby invited to reply to this opinion.

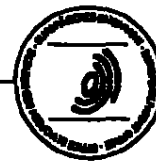
When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 08/08/2004.

Name and mailing address of the international preliminary examining authority: European Patent Office D-80286 Munich Tel. +49 89 2399 - 0 Tx: 523856 apmu d Fax: +49 89 2399 - 4485	Authorized officer / Examiner Munro, B Formalities officer (incl. extension of time limits) DA ROCHA, O. Telephone No. +49 89 2399 8101
---	---



WRITTEN OPINION

International application No. PCT/US03/10605

I. Basis of the opinion

1. With regard to the elements of the international application (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"):

Description, pages:

1-6 as originally filed

Claims, No.:

1-9 as originally filed

Drawings, sheets:

1/1 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINION

International application No. PCT/US03/10605

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement
- | | | |
|-------------------------------|--------|---------------------|
| Novelty (N) | Claims | 1-4 (no), 5-9 (yes) |
| Inventive step (IS) | Claims | 1-9 (no) |
| Industrial applicability (IA) | Claims | |

2. Citations and explanations
see separate sheet

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/US03/10605

Section V

1. Reference is made to the following documents:

D1: Materials Research Bulletin, Elsevier Science Publishing, New York, Us
(01-07-1996), 31(7), 861-868

D2: Materials Research Bulletin, Elsevier Science Publishing, New York, Us
(01-05-1997), 32(5), 627-632

D3: Ceramic Transactions, Ceramic Processing Science (1998), 83, 451-458

D4: J. Am. Ceram. Soc. (1970), 53(11), 604-608

2. The examination with regard to novelty an inventive step was carried out in light of the description and in light of the objections/comments made below:

2.1 The subject-matter of claim 1 lacks clarity (Article 6 PCT), because the feature "essentially single-phase" is insufficiently defined. The definition given in the description (p. 3, l. 8-11) should be incorporated.

2.2 The subject-matter of claim 1 does not fulfil the requirements of Article 6 PCT, because the phrase "any compound effective to stabilize chromium in the hexavalent state" does not constitute a precise definition and thus leads to uncertainty regarding the precise scope of the claim. The applicant should not amend or delete this feature, but is invited to comment.

2.3 In the examples, only the level of impurities in the alpha alumina are given. However, neither the level of impurities in the chromia nor the level of impurities in the end product are given. Thus, as the level of impurities in the end product are not given, the examples do not fall within the scope of the claims. The applicant is invited to comment.

2.4 It is apparent from the description as a whole that the application concerns chromia-alumina powders. However, the current wording of claim 1 includes also 100% chromia powders. Claim 1 should be amended accordingly, to limit the scope to chromia-alumina powders.

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/US03/10605

- 2.5 The feature "thermosprayable" in claim 1 was not considered to imply any further product features and as such was not considered to be limiting for the purposes of the examination with regard to novelty and inventive step.
- 2.6 The claims also lack clarity, because in claim 2 the impurities are alkali and alkaline earth metals, whereas in claim 5 the impurities are their oxides. Moreover, the limits in ppm are inconsistent in the claims (cl. 1 : <200 ppm, cl. 5 < 120ppm).
3. The subject-matter of claims 1-4 does not appear to be new (Art. 33(2) PCT). The reasoning is as follows:
- 3.1 Document D1 (experimental procedure, table 1) discloses chromia/alumina solid solution powders with varying proportions of chromia to α -alumina. Moreover, it is to be expected that the powders contain a very low level of impurities such as alkali and alkaline earth, because the products separated from suspension are washed 10 times with hot water. Water soluble cations such as alkali and alkaline earth cations are removed by washing. Thus, D1 appears to be prejudicial to the novelty of claims 1-3.
- 3.2 Document D2 (experimental procedure) employs the same preparation method as is used in D1. Furthermore, D2 (Table 1) discloses grain sizes falling within the range defined in claim 4. Thus, D2 appears to be prejudicial to the novelty of claims 1-4.
- 3.3 Document D3 (experimental procedure, figure 3) describes the preparation of an alumina-chromia powder using organometallic precursors. It can be assumed that the use of such precursors does not introduce impurities such as alkali and alkaline earth compounds into the end product. Thus, D3 appears to be prejudicial to the novelty of claims 1-3.
- 3.4 Document D4 (p. 605, Powder Preparation and Table, examples) discloses Cr_2O_3 - Al_2O_3 solid solutions, which after recalculation from mol%, appear to contain less than 200 ppm Na_2O . Document D4 is prejudicial to the novelty of claim 1.

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/US03/10605

4. The subject-matter of claims 5-9 lack the involvement of an inventive step (Art. 33(3) PCT). The reasoning is as follows:

It is apparent from the description (p. 2, paragraph 6) that the person skilled in the art knows that impurities such alkali or alkaline earth compounds stabilize chromium in the hexavalent state. Thus, a person skilled in the art, who wants to provide a chromia-alumina powder suitable for thermal spraying, would realise that in order to reduce the formation of hexavalent chromium he should avoid introducing alkali or alkaline earth compounds. There is nothing unusual about the method of preparation employed (see eg. fig 1, D3). Thus, the involvement of an inventive step cannot be acknowledged.

The applicant is invited to comment.

PATENT

PATENT COOPERATION TREATY

Applicant(s): Saint-Gobain Ceramics and Plastics, Inc.

International App. No.: PCT/US03/10605 International filing date: April 4, 2003

Examiner: B. Monro Priority Date: April 8, 2002, September 3, 2002

Applicant or Agent's Ref.: 1035-A4171C

EUROPEAN PATENT OFFICE

ATTN: IPEA

D-80298 Munich, GERMANY

Fax No.: 011-49-89-2399-4465

ARTICLE 34 AMENDMENT

Sir:

In response to the Written Opinion dated October 22, 2003, please amend the application by substituting replacement sheets 7 and 8, as enclosed.

REMARKS

Turning to the text of the Written Opinion, Applicants comment as follows.

2.1. As requested, Claim 1 has been amended herein to incorporate the definition of "essentially single-phase" provided on page 3, lines 8-11 of the present specification.

2.2. Applicants respectfully submit that the present recitation of "any compound effective to stabilize chromium in the hexavalent state" is sufficiently precise. In this regard, as described in the present specification page 2, lines 7-10, compounds effective to stabilize chromium include alkali metals, alkaline earth metals, and other impurities known in the art. In any event, claim 1 has been amended herein to specifically recite alkali and alkaline earth metals to overcome this issue.

Applicants submit that, at least, one cannot properly conclude that the resulting chromia-alumina powder formed according to the process described in D3 meets the purity levels of the claimed invention, and further, that use of commercially available raw materials introduces contaminants that form powders beyond the scope of the present claims.

3.4. Claim 1 has been amended herein to incorporate the features of claim 2, and D4 is no longer relevant to the pending claims.

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NORA-4171CPC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/16)	
International application No. PCT/US 03/10605	International filing date (day/month/year) 04.04.2003	Priority date (day/month/year) 08.04.2002
International Patent Classification (IPC) or both national classification and IPC C01G37/00		
Applicant SAINT-GOBAIN CERAMICS & PLASTICS, INC. et al.		
1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 6 sheets, including this cover sheet. ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of 2 sheets.		
3. This report contains indications relating to the following items: I ☒ Basis of the opinion II ☐ Priority III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV ☐ Lack of unity of invention V ☒ Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI ☐ Certain documents cited VII ☐ Certain defects in the international application VIII ☐ Certain observations on the international application		
Date of submission of the demand 12.09.2003	Date of completion of this report 25.06.2004	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tlx 523658 epmu d Fax +49 89 2399 - 4465	Authorized Officer Munro, B Telephone No. +49 89 2399-8529 	

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US 03/0605

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-6 as originally filed

Claims, Numbers

1-9 filed with telefax on 19.01.2004

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/US 03/10605**

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	5-9
	No: Claims	1-4
Inventive step (IS)	Yes: Claims	5-9
	No: Claims	1-4
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	-

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US 03/10605

Section I: Basis of the Report

1. The following amendment to claims 1 and 4 does not fulfil the requirements of Article 34(2)(b) PCT:

"and less than 50 ppm of alkali and alkaline earth metals"

The reasoning is as follows:

The applicant (fax dated 19.01.04) cites original claim 2 as the basis for this amendment. However, according to claim 2, the stabilizing compound is selected from the group consisting of alkali metals and alkaline earth metals and the content of each is less than 50 ppm (emphasis added). Thus, according to the amended wording of claim 1, the amount of alkali and alkaline earth metals in total is less than 50 ppm, whereas according to the wording of original claim 2, the content of each of alkali metals and alkaline earth metals is less than 50 ppm. The amendment is therefore not allowable in accordance with Article 34(2)(b) PCT.

For the purposes of the examination with regard to novelty and inventive step, claims 1 and 4 were considered as if this amendment had not been made, ie. the these claims were considered to contain the original feature instead, namely: "less than 200 ppm of each of any compound effective to stabilize chromium in the hexavalent state".

Section V

2. Reference is made to the following documents:

- D1: WATANABE M ET AL: "Formation of continuous series of solid solutions from powders prepared by hydrazine method: The system $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ " MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 31, no. 7, 1 July 1996 (1996-07-01), pages 861-868, XP004077794 ISSN: 0025-5408
- D2: YAMAGUCHI O ET AL: "Fabrication and mechanical properties of Cr_2O_3 solid solution ceramics in the system $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ " MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 32, no. 5, 1 May 1997 (1997-05-01), pages 627-632, XP004088912

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US 03/10605

ISSN: 0025-5408

- D3: SATO, KOJI ET AL.: "Preparation of alumina-chromia solid solution powder and thin film through precursor method" CERAMIC TRANSACTIONS, CERAMIC PROCESSING SCIENCE, vol. 83, 1998, pages 451-458, XP009015669
- D4: L. R. ROSSI AND W. G. LAWRENCE: "Elastic Properties of Oxide Solid Solutions: The System $\text{Al}_2\text{O}_3\text{-Cr}_2\text{O}_3$ " J. AM. CERAM. SOC., vol. 53, no. 11, 1970, pages 604-608, XP009015711

3. The examination with regard to novelty and inventive step was carried out in light of the description and in light of the following comments and objections:

3.1 A lack of clarity arises (Art. 6 PCT), because according to claims 1 and 4 (see Section I for the interpretation of claims 1 and 4 used for examination purposes) the powder should contain less than 200 ppm of each of any stabilizing compound, whereas according to original claim 2 the powder need only contain less than 50 ppm of either alkali metals or alkaline earth metals. Thus, it is not clear which features are essential for the invention: minimizing all stabilizing compounds minimizing either alkali or alkaline earth metals.

Furthermore, claim 2 refers to stabilizing compounds selected from alkali metals and alkaline earth metals, but metals are not compounds?

3.2 The feature "thermosprayable" in claim 1 was not considered to imply any further product features and as such was not considered to be limiting for the purposes of the examination with regard to novelty and inventive step.

Claims 1-4

4. Document D4 (p. 605, Powder Preparation and Table, examples) discloses $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ solid solutions, which after recalculation from mol%, appear to contain less than 200 ppm Na_2O . Document D4 appears to be prejudicial to the novelty of claims 1 and 4.

Documents D1-D3 disclose $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ solid solutions, whereby relatively low amounts of impurities might be expected due to the methods of preparation

employed. However, the levels of impurities are not explicitly disclosed in D1-D3 and thus, novelty is acknowledged for claims 1 and 4 over D1-D3.

Note: Claim 1 also includes powders comprising 100% chromia. However, it appears from the description of the current application (page 3, paragraph 012) that the main source of impurities is the alumina powder and that chromia powders containing impurities in only trace amounts are already known. In any case, the teaching of the application (see description, paragraph 009) appears to be that alumina is effective at inhibiting the formation of hexavalent chromium species especially in the substantial absence of alkali metal and alkaline earth metal species. Thus, the presence of alumina appears to be essential.

5. The subject-matter of claims 2 and 3 does not appear to include any features which would justify the acknowledgement of an inventive step. These features do not appear to be unusual for a person skilled in the art, nor do they appear to be associated with a particular additional technical effect.

Claim 5-9

6. The subject-matter of claims 5-9 appears to fulfil the requirements of Articles 33(2) and 33(3) PCT. The reasoning is as follows:

None of the prior art documents cited in the International Search Report discloses a process for preparing a $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ powder, wherein alumina and chromia powders are used, which have less than 120 ppm of alkali and alkaline earth metal impurities. Moreover, the problem of avoiding hexavalent chromium is not mentioned in the cited prior art.

We Claim:

1. A thermosprayable powder comprising from 45 to 100% chromia and correspondingly from 0 to 55% of alpha alumina, all proportions being by weight, and less than 50 ppm of alkali metals and alkaline earth metals, which stabilize chromium in the hexavalent state, wherein the thermosprayable powder is essentially single-phase such that alumina in phases other than alpha phase does not exceed 10 wt% of the total alumina content.
2. A powder according to Claim 1 in which the proportion of alpha alumina is from 50 to 30% by weight.
3. A powder according to Claim 1 in which the particles have a d_{50} of from 5 to 200 micrometers.
4. An alumina-chromia thermosprayable powder comprising chromia in an amount not less than 45% by weight, alpha-alumina in an amount not greater than 55% by weight, and less than 50 ppm of alkali metals and alkaline earth metals, which stabilize chromium in the hexavalent state, wherein the thermosprayable powder is essentially single-phase such that the alumina in phases other than alpha phase does not exceed 10 wt% of the total alumina content.
5. A process for the production of a thermosprayable powder which comprises mixing an alumina powder having a content of alkali metal and alkaline earth metal oxide impurities of not more than 120 ppm of each, with a chromia powder also having less than 120 ppm of any impurity effective to stabilize chromium in the hexavalent state, the powders being mixed in proportions to give, upon firing, an essentially single phase crystalline powder comprising from 45 to 99% of chromia and from 55 to 1% of alpha alumina, all proportions being by weight, and firing the mixture at a temperature of from 1300 to 1500°C to produce the said essentially single-phase crystalline powder.
6. A process according to Claim 5 in which the alpha alumina particles have a d_{50} particle size that is from 5 to 20 times the corresponding d_{50} for the chromia powder.
7. A process according to Claim 5 in which the alumina powder is selected from the group consisting of alpha alumina, gamma alumina, kappa alumina, delta alumina, boehmite, alumina trihydrate and mixtures thereof.

REPLACEMENT SHEET

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Empf.nr.: 686 P.006

AMENDED SHEET

8. A process according to Claim 7 in which the alumina powder mixed with the chromia powder is boehmite.

9. A process according to Claim 5 in which the chromia and the alumina each have alkali metal and alkaline earth metal impurity levels that do not exceed 50 ppm of any such element.

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REPLACEMENT SHEET

National Stage Preliminary Amendment

Please amend the claims in the present national stage application to be consistent with the claims provided below. During pendency of the corresponding PCT Application, an Article 34 Amendment was made on January 19, 2004. However, the requested amendments to claims 1-4 were not entered by the IPEA. This Preliminary Amendment is made to correct claims 1 and 4 (as noted by the modifications below) and secure entry of the amendments in the present national stage application.

The IPEA deemed claims 5-9 to meet the requisite novelty, inventive step, and industrial applicability requirements. For the reasons stated in the Article 34 Amendment, claims 1-4 also meet those requirements.

1. A thermosprayable powder comprising from 45 to 100% chromia and correspondingly from 0 to 55% of alpha alumina, all proportions being by weight, and less than 50 ppm of each of any alkali metals and alkaline earth metals, which that stabilize chromium in the hexavalent state, wherein the thermosprayable powder is essentially single-phase such that alumina in phases other than alpha phase does not exceed 10 wt% of the total alumina content.

2. A powder according to Claim 1 in which the proportion of alpha alumina is from 50 to 30% by weight.

3. A powder according to Claim 1 in which the particles have a d_{50} of from 5 to 200 micrometers.

4. An alumina-chromia thermosprayable powder comprising chromia in an amount not less than 45% by weight, alpha-alumina in an amount not greater than 55% by weight, and less than 50 ppm of each of any alkali metals and alkaline earth metals, which that stabilize chromium in the hexavalent state, wherein the thermosprayable powder is essentially single-phase such that the alumina in phases other than alpha phase does not exceed 10 wt% of the total alumina content.

5. A process for the production of a thermosprayable powder which comprises mixing an alumina powder having a content of alkali metal and alkaline earth metal oxide impurities of not more than 120 ppm of each, with a chromia powder also having less than 120 ppm of any impurity effective to stabilize chromium in the hexavalent state, the

powders being mixed in proportions to give, upon firing, an essentially single phase crystalline powder comprising from 45 to 99% of chromia and from 55 to 1% of alpha alumina, all proportions being by weight, and firing the mixture at a temperature of from 1300 to 1500°C to produce the said essentially single-phase crystalline powder.

6. A process according to Claim 5 in which the alpha alumina particles have a d_{50} particle size that is from 5 to 20 times the corresponding d_{50} for the chromia powder.

7. A process according to Claim 5 in which the alumina powder is selected from the group consisting of alpha alumina, gamma alumina, kappa alumina, delta alumina, boehmite, alumina trihydrate and mixtures thereof.

8. A process according to Claim 7 in which the alumina powder mixed with the chromia powder is boehmite.

9. A process according to Claim 5 in which the chromia and the alumina each have alkali metal and alkaline earth metal impurity levels that do not exceed 50 ppm of any such element.

REPLACEMENT SHEET

[001] POLVOS PARA PULVERIZADO DE ÓXIDO DE CROMO-
ALUMINA Y PROCESO PARA ELABORAR LOS MISMOS.

[002] **Antecedentes de la Invención**

[003] La presente invención se relaciona con polvos para pulverizado de óxido de cromo y a un proceso para la elaboración de tales polvos. Tales polvos son útiles en la producción de recubrimientos térmicamente pulverizados sobre sustratos.

[004] Es bien conocido que colocar un recubrimiento de pulverizado de óxido de cromo sobre un sustrato, que usualmente es un metal, le confiere una mejora muy significativa a la dureza y a la resistencia desgaste de la superficie. Por esta razón los recubrimientos de óxido de cromo sobre rodillos de repujado o rodillos de rotograbado a los que le son dados a menudo un recubrimiento de óxido de cromo son utilizados en muchas partes que son sometidas a desgaste tales como cuerpos de bombas, ejes, rodillos y rodillos de impresión. Estas partes pueden ser utilizadas como pulverizado o pueden ir a través de procesamientos determinados subsecuentes tales como molido, rectificado, esmerilado o pulido. Los

rodillos de impresión son usualmente adicionalmente procesados mediante gravado láser para hacer un patrón de celdas que sean útiles para portar tinta. Los recubrimientos pueden ser aplicados mediante un número de técnicas pero las más frecuentemente utilizadas están basadas en el uso de un proceso de pulverizado térmico en el cual las partículas cerámicas son inyectadas en un chorro de plasma dirigido hacia el sustrato. El calor del chorro de plasma funde las partículas cerámicas y hace que ellas luego del impacto con el sustrato, formen una capa cerámica con un alto grado de uniformidad e integridad que sea capaz de proteger el sustrato sobre el cual está recubierto, dándole al sustrato la dureza y resistencia superficial características de la cerámica con la cual es recubierta.

[005] Existe sin embargo un problema por que luego del rociado térmico de un polvo de óxido de cromo sobre un sustrato, algo del óxido de cromo reacciona con oxígeno y las impurezas en el óxido de cromo para producir compuestos de cromo hexavalentes muy tóxicos. Los compuestos de óxido de cromo hexavalentes se forman a elevadas temperaturas tales como las que son utilizadas en los polvos cerámicos pulverizados térmicos y parece

que se forman en la llama y específicamente en las partes exteriores de la llama. El material en esta parte exterior no es calentado a aproximadamente la misma la temperatura y no se adhiere a la superficie pulverizada en el mismo grado. El resultado es un nivel indeseablemente alto de óxido de cromo hexavalente en el polvo no adherido pero que permanece para ser reciclado o desechado, evitando así un problema ambiental significativo. En un experimento para determinar la proporción de este efecto la cantidad de cromo hexavalente en un polvo de óxido de cromo de pulverizado térmico fue medido en 39 ppm y un recubrimiento de este polvo térmicamente pulverizado sobre un sustrato mostró una concentración de 10 ppm. Sin embargo cuando el sobre pulverizado fue muestreado la cantidad de cromo hexavalente varió entre 470 y 8800 ppm. El óxido de cromo (Cr_2O_3) convierte el estado hexavalente en la presencia de oxígeno a temperatura sobre 1000°C pero se revierte a óxido de cromo al enfriarse. Sin embargo en la presencia de sales alcalino o impurezas de metales alcalino térreos, o en ciertas otras impurezas conocidas en la técnica, el cromo forma compuestos complejos que estabilizan el cromo en el estado hexavalente.

[007] Existe por lo tanto necesidad urgente de un nuevo material de recubrimiento que no tenga la tendencia de los actuales polvos de recubrimiento resistentes al desgaste basados en cromo a oxidarse al estado hexavalente cuando se utilizan en un proceso de pulverizado térmico y no tengan una pérdida significativa de dureza y resistencia al desgaste que caracteriza los recubrimientos de óxido de cromo convencionales.

[008] **Descripción general de la Invención**

[009] En razón a que la alúmina alfa y el óxido de cromo (como se utiliza aquí este término se relaciona exclusivamente con el estado Cr_2O_3) tienen la misma estructura de celosía de cristal hexagonal con parámetros de celosía que no son muy diferentes, es conocido que las estructuras cristalinas que incorporan ambas especies son muy estables. Los óxidos se dicen que son "solubles" uno en el otro en el sentido de que cada uno puede ocupar la misma posición en la celosía cristalina hexagonal del otro formando una solución sólida. Se encuentra ahora que la alúmina es muy efectiva al inhibir la formación de especies de cromo hexavalentes especialmente en la ausencia sustancial de metal alcalino y especies de metal

alcalino térreo que son encontradas para promover la formación de este producto indeseable. Es sin embargo también posible inhibir la formación del cromo hexavalente mediante el uso de fuentes de oxido de cromo que contienen cantidades mínimas de estabilizadores para cromo hexavalente.

[010] La invención por lo tanto comprende un polvo termo pulverizable esencialmente de fase simple que comprende de 45 a 100% de oxido de cromo y correspondientemente hasta el 55% de alúmina, todas las porciones están en peso, y menos de 200 ppm, y preferiblemente menos de 50 ppm de uno o más estabilizadores para el cromo hexavalente.

[011] Adicionalmente se prefiere que, cuando está presente la alúmina, al menos el 90% de la alúmina este en la fase alfa en razón a que esto ocasiona más pocas deshomogenidades de celosía en la estructura cristalina oxido de cromo/alúmina. Así el término "esencialmente de fase simple" cuando se utiliza aquí para referirse al polvo de acuerdo con la invención permite la presencia de alúmina en fases diferentes de la fase alta en una

cantidad que es menor del 10% del peso de alúmina en el polvo.

[12] Los metales alcalinos y los metales alcalino térreos son conocidos por estabilizar los compuestos de cromo hexavalentes y, aunque estos están a menudo presentes en cantidades en trazas en el óxido de cromo, ellos son mucho más prevalentes en la alúmina alfa hecha mediante técnicas convencionales. En las alúminas convencionales el sodio tiende a presentarse en cantidades mayores que en otros óxidos de metal alcalino y alcalino terreo. En algunos casos se ha probado ser ventajoso iniciar el proceso con una forma precursora de alfa alúmina tal como gama alúmina, kappa alúmina, delta alúmina, boemita, trihidrato de alúmina y mezclas de estos juntos o con alúmina alfa mínima. Tales formas precursoras pueden a menudo ser obtenidas en un estado que tiene muy pocas cantidades de impurezas que conducen a la formación de óxido de cromo hexavalente. Típicamente las cantidades de estas impurezas en boemita por comparación con una alúmina alfa muy pura son como sigue: óxido de sodio-27 ppm en lugar de 50 ppm; magnesio-22 ppm en lugar de 78 ppm; óxido de potasio-menos de 1 ppm en lugar de en lugar de 68 ppm; y cal-menos de 1 ppm en lugar de 104 ppm. Es

claro por lo tanto que el uso de boemita puede conferir beneficios significativos en términos de la reducción de estas especies problemáticas que estabilizan cromo hexavalente. La boemita puede entonces ser quemada junto con el polvo de óxido de cromo para producir el producto de óxido de cromo/alúmina cristalino de fase simple. Cuando se utiliza boemita, que sufre aproximadamente el 28% de pérdida en peso luego de quemado, la cantidad agregada necesita ser ajustada tal como las proporciones de la alúmina alfa y el cromo en el producto terminado como en el rango deseado.

[013] El polvo termo pulverizable cristalino esencialmente de fase simple de la invención puede ser hecho mediante cualquier técnica de tratamiento con calor adecuada tal como por ejemplo al fusionar los componentes mediante fusión de arco eléctrico, polvos de sinterizado de los componentes juntos, mezcla de precursores en procesos de sol-gel y luego secado y quemado del gel, o al pasarlos a través de un proceso de fusión de plasma. Sin embargo se prefiere a menudo producir el polvo al sinterizar una mezcla de componentes en forma de polvo a una temperatura de 1250 a 1500°C y preferiblemente de 1300 a 1450 °C. En general se requiere un ciclo de fuego

(que incluye un tiempo de residencia de asenso convencional a la temperatura de fuego y tiempos de descenso), de 10 a 40 horas y preferiblemente de 10 a 30 horas. El tiempo del ciclo para el fuego depende grandemente de la temperatura del fuego, con temperaturas de fuego inferiores que generalmente requieren tiempos de fuego mayores para lograr los resultados deseados. Si la alimentación de alúmina es en la forma inicial de boemita, las temperaturas en el extremo alto de rango se requieren a menudo para efectuar la conversión completa a la forma alfa. Esto es esencial por que solamente la forma alfa tiene la estructura cristalina deseada que caza con la del óxido de cromo. Dejando una cantidad excesiva de alúmina transicional, (esto es, más de aproximadamente 10% del peso de alúmina), da como resultado el producto que no tiene una estructura cristalina esencialmente de fase simple. Además si el tamaño de partícula del óxido de cromo es del mismo orden de magnitud que el de la alúmina alfa o aún mayor, la disposición del óxido de cromo absorberse en la celosía de la alúmina se reduce y se pueden requerir mayores tiempos a la temperatura de fuego.

[014] Quemar una mezcla de polvo es particularmente efectiva cuando el tamaño de la partícula de la alúmina alfa es mayor que aquella del óxido de cromo en razón a que las partículas de óxido de cromo más pequeñas tienen una tendencia fuerte a ser absorbidas en la celosía de cristal de alúmina alfa para producir un material de polvo cristalino de fase simple. En tal proceso las partículas de alúmina pueden tener un d_{50} que va de 5 a 20 veces, y preferiblemente de 2 a 15 veces en d_{50} de las partículas de óxido de cromo. Esto son embargo no es esencial y se encuentra cuando los tamaños de partículas son proporcionados en la dirección opuesta, esto es cuando las partículas de cromo tienen un rango de tamaño mayor, el proceso también es efectivo. El control de la temperatura de fuego y la longitud del tiempo de fuego es un mecanismo efectivo para controlar el tamaño de los cristales de óxido de cromo/alúmina que son producidos. Así calentamientos más prolongados o temperaturas mayores son cada una efectivas para incrementar el tamaño del cristal desde un tamaño de sub-micrómetro en al menos un orden de magnitud.

[015] Cuando el componente de alúmina mezclado con el óxido de cromo está en la forma de boemita, el tamaño de

la partícula es típicamente aproximadamente el mismo que el óxido de cromo o aún más pequeño pero la aglomeración que ocurre al quemarlo para formar en la alúmina alfa pueda a menudo dar como resultado la relación d_{50} favorable descrita anteriormente.

[016] **Dibujos**

[017] La figura 1 es una gráfica de barras que muestra la resistencia al desgaste de varias muestras de recubrimiento.

[018] **Descripción Detallada de invención**

[019] La invención se describe ahora con referencia a los siguientes ejemplos que están destinados a ilustrar los principios de la invención y su aplicación a la producción de superficies recubiertas con buenas propiedades de resistencia al desgaste.

[020] Una alúmina alfa de alta pureza hecha por un proceso de sol-gel se analizó en su contenido de impurezas y se encontró que contenía lo siguiente: óxido de sodio 50 ppm; magnesio 78 ppm; óxido de potasio 68

ppm; y cal 104 ppm. Un polvo de esta alúmina alfa con una distribución de tamaño de partícula tal que el d_{10} era 5,08 micrómetros; el d_{50} era 16,08 micrómetros; y el d_{90} era 29,2 micrómetros, se obtuvo. Este polvo fue entonces mezclado con las partículas de óxido de cromo que tenían la siguiente distribución de tamaño de partícula: d_{10} 0,94 micrómetros, d_{50} 1,77 micrómetros; y d_{90} 4,44 micrómetros. Todas las mediciones de tamaño de partícula fueron obtenidas utilizando un sistema de medición Microtrac.

[021] Estos polvos fueron entonces mezclados en una proporción en peso 50:50 y quemados a una temperatura de 1350°C con un ciclo de fuego de aproximadamente 20 horas. Al final de ese tiempo la distribución del tamaño de partícula fue como sigue: d_{10} 5,58 micrómetros; d_{50} 17,18 micrómetros; y d_{90} 34,75 micrómetros.

[022] Cuando este polvo fue térmicamente pulverizado sobre un sustrato se encontró que tenía una porosidad del 5% que era la misma que se tenía cuando el polvo de óxido de cromo era pulverizado solo. La dureza Vickers fue 1183 kg/mm² mientras que la obtenida con el óxido de cromo solo fue de 1257 gk/mm².

[023] En otra muestra del polvo de acuerdo con la invención que comprende alúmina alfa y óxido de plomo en una proporción en peso de 50:50 el polvo tenía un contenido de 3 ppm de cromo hexavalente y el polvo sobre pulverizado contenía 5 ppm de cromo hexavalente. La disminución del tamaño de partícula fue como sigue: d_{10} 14,78 micrómetros; d_{50} 28,30 micrómetros; y d_{90} 48,98 micrómetros.

[24] Las calidades de resistencia al desgaste comparativas de 4 recubrimientos térmicamente pulverizados fue entonces comparada. El polvo de acuerdo con la invención comprendió una mezcla de alúmina/cromo alfa cristalino de fase simple en una proporción en peso 50/50, (50A-C). Esto se comparó con dos recubrimientos obtenidos utilizando óxido de cromo puro, (C1 y C2) y uno utilizando alúmina alfa pura, (A). Se utilizó el método de ensayo establecido en el ensayo de abrasión ASTM G65. El resultado aparece e la figura 1 e indica que el recubrimiento 50A-C fue más resistente al desgaste que la alúmina y fue solo ligeramente peor que aquella obtenida utilizando óxido de cromo solo.

REIVINDICACIONES

1. Un polvo termo pulverizable esencialmente de fase simple que comprende de 45 a 100% de óxido de cromo y correspondientemente de 0 a 55% de alúmina alfa, todas las proporciones son en peso, y menos de 200 ppm de cada uno de cualquiera compuesto efectivo para estabilizar óxido de cromo en el estado hexavalente.
2. Un polvo de acuerdo a la reivindicación 1 en el cual el compuesto estabilizante se selecciona del grupo que consiste de metales alcalinos y metales alcalino térreos y el contenido de cada uno es menor de 50 ppm.
3. Un polvo de acuerdo a la reivindicación 1 en el cual la proporción de alúmina alfa es de 50 a 30% en peso.
4. Un polvo de acuerdo a la reivindicación 1 en el cual las partículas tienen un d_{50} de 5 a 200 micrómetros.
5. Un proceso para la producción de un polvo termo pulverizable que comprende mezclar un polvo de alúmina que tiene un contenido de impurezas de óxido de metal alcalino y metal alcalino terreo de no más de 120 ppm de

cada uno, en la que el polvo de óxido de cromo también tiene menos de 120 ppm y cualquier impureza efectiva para estabilizar el óxido de cromo en el estado hexavalente, los polvos son mezclados en proporciones para dar, luego de quemado, un polvo cristalino de fase esencialmente de fase simple que comprende de 45 a 99% de óxido de cromo y de 55 a 1% de alúmina alfa, estando todas las proporciones en peso, y quemando la mezcla a una temperatura de desde 1300 a 1500°C para producir dicho polvo cristalino esencialmente de fase simple.

6. Un proceso de acuerdo a la reivindicación 5 en el cual las partículas de alúmina alfa tienen un tamaño de partícula d_{50} que va de 50 a 20 veces el correspondiente d_{50} para el polvo de óxido de cromo.

7. Un proceso de acuerdo a la reivindicación 5 en el cual el polvo de alúmina se selecciona del grupo que consiste de alúmina alfa, alúmina gama, alúmina kappa, alúmina delta, boemita, trihidrato de alúmina y mezclas de este.

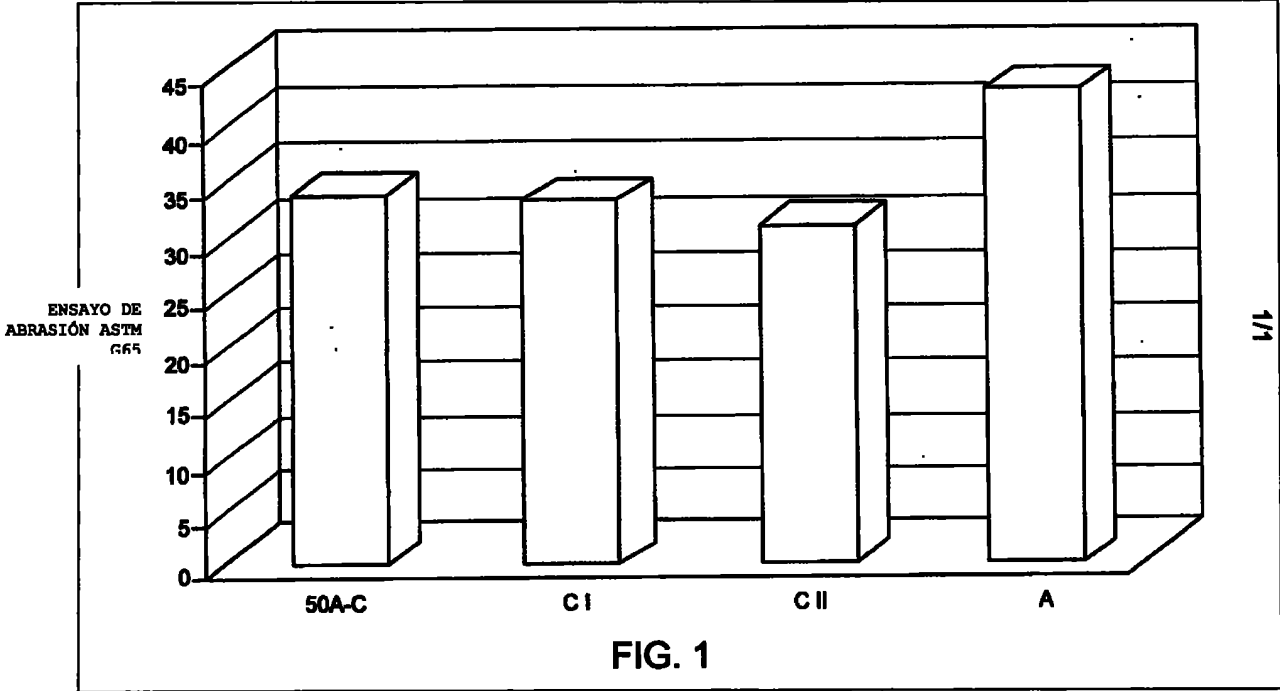
8. Un proceso de acuerdo a la reivindicación 7 en el cual el polvo de alúmina mezclado con el polvo de óxido de cromo es boemita.

9. Un proceso de acuerdo a la reivindicación 5 en el cual el óxido de cromo y la alúmina tienen cada una niveles de impureza de metales alcalinos y metales alcalino térreos que no exceden 50 ppm de cualquiera de tales elementos.

RESUMEN

Partículas particularmente útiles para pulverizar térmicamente un recubrimiento resistente al desgaste sobre un sustrato que comprende una estructura cristalina esencialmente de fase simple que comprende de 45 a 100% el peso de óxido de cromo y de 0 a 55% en peso de alúmina alfa.

PROPORCIÓN DE DESGASTE EN (mm³/km)



**REPORTE DEL EXAMEN PRELIMINAR INTERNACIONAL - HOJA
SEPARADA**

Solicitud Internacional

No. PCT/US 03/10605

Sección 1: Base del Reporte

1. Las siguientes correcciones de las reivindicaciones 1 y 4 no llenan los requisitos del artículo 34 (2) (b) PCT:

"y menos de 50 ppm de metales alcalinos y alcalino
térreos"

La ración es como sigue:

El solicitante (fax fechado 19.01.04) cita la reivindicación original 2 como base para esta corrección. Sin embargo, de acuerdo a la reivindicación 2, el compuesto estabilizante se selecciona del grupo que consiste de metales alcalino y metales alcalino térreos y el contenido de cada uno es menor de 50 ppm (énfasis agregado). Así, de acuerdo a la redacción corregida de la reivindicación 1, la cantidad de metales alcalinos y alcalino térreos en total es menor de 50 ppm, mientras

que de acuerdo a la redacción de la reivindicación original 2, el contenido de cada uno de los metales alcalino y los metales alcalino térreos es menor de 50 ppm. La corrección es por lo tanto no permisible de acuerdo con el artículo 34 (2) (b) PCT.

Para los propósitos de el examen con relación a la novedad y el nivel inventivo, las reivindicaciones 1 y 4 fueron consideradas como si esta corrección no hubiera sido hecha, es decir se consideró que estas reivindicaciones contenían la característica original en lugar de: "menos de 200 ppm de cada uno de cualquier compuesto efectivo para estabilizar cromo en el estado hexavalente".

Sección V

2. Se hace referencia a los siguientes documentos:

D1: WATANABE M ET AL: "formation of continuous series of solid solutions from powders prepared by hydrazine method: The system Cr₂O₃-Al₂O₃" MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 31, no. 7, 1 july 1996 (1996-07-01), pages 861-868, XP004077794 ISSN: 0025-5408

D2: YAMAGUCHI O ET AL: "Fabrication and mechanical properties of Cr₂O₃ solid solution ceramics in the system Cr₂O₃-Al₂O₃" MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING; NEW YORK US, vol. 32 no. 5 1 May 1997 (1997-05-01), pages 627-632, XP004088912 ISSN: 0025-5408

D3: SATO, KOJI ET AL.: "Preparation of alumina-chromia solid solution powder and thin film through precursor method" CERAMIC TRANSACTIONS, CERAMIC PROCESSING SCIENCE, vol.83, 1998, pages 451-458, XP009015669

D4: L.R.ROSSI AND W.G. LAWRENCE: "Elastic Properties of Oxide Solid Solutions: The system Al₂O₃-Cr₂O₃" J. AM. CERAM. SOC., vol.53, no. 11, 1970, pages 604-608, XP009015711

3. El examen con relación a la novedad y el nivel inventivo fue llevado a cabo a la luz de la descripción y a la luz de los siguientes comentarios y objeciones:

65

3.1 Existe falta de claridad (Art. 6 PCT), por que de acuerdo alas reivindicaciones 1 y 4 (ver Sección 1 para la interpretación de las reivindicaciones 1 y 4 utilizadas para los propósitos del examen) el polvo debe contener menos de 200 ppm de cada uno de cualquiera del compuesto estabilizante, mientras que de acuerdo a la reivindicación original 2 el polvo necesita solo contener menos de 50 ppm de cualquiera metales alcalinos o metales alcalino térreos. Así, no es claro cual de las características es esencial para la invención: minimizar todos los compuestos estabilizantes minimizar los metales alcalinos o los metales alcalino térreos.

Adicionalmente, la reivindicación 2 se refiere a compuestos estabilizantes seleccionados de metales alcalinos y metales alcalino térreos, pero los metales no son compuestos?

3.2 La característica "termo pulverizable" en la reivindicación 1 no fue considerada por implicar ninguna de las características de producto adicionales y como tal no fue considerada por ser ilimitante para los propósitos del examen con relación a la novedad y el nivel inventivo.

Reivindicaciones 1-4

4. Documento D4 (p. 605, Preparación de Polvo y Tabla, ejemplos) describe soluciones sólidas de $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$, que después de recalcado de mol $\%$ parece contener menos de 200 ppm de Na_2O . El documento D4 parece ser perjudicial para la novedad de las reivindicaciones 1 y 4.

Los documentos D1-D3 describen soluciones sólidas de $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ por medio de los cuales relativamente pequeñas cantidades de impureza podrían ser esperadas debido a los métodos de preparación empleados. Sin embargo, los niveles de las impurezas no son explícitamente descritos en D1-D3 y así, la novedad es reconocida para las reivindicaciones 1 y 4 sobre D1-D3.

Nota: La reivindicación también incluye polvos que comprenden 100% de óxido de cromo. Sin embargo, parece de la descripción de la solicitud el estudio (página 3, párrafo 012) que la fuente principal de las impurezas es el polvo de alúmina y que los polvos de óxido de cromo que contienen impurezas en solo cantidades en trazas ya son conocidos. En cualquier caso, la enseñanza de la

solicitud (ver descripción, párrafo 009) parece ser que la alúmina es efectiva para inhibir la formación de las especies de cromo hexavalente especialmente en la ausencia sustancial de especies de metal alcalino y metal alcalino térreo. Así, la presencia de alúmina parece ser esencial.

La materia objeto de las reivindicaciones 2 y 3 no parece incluir ninguna característica que justifique el reconocimiento de un nivel inventivo. Estas características no parecen ser inusuales para una persona experta en la técnica, ni ellas parecen estar asociadas con un efecto técnico adicional particular.

Reivindicación 5-9

6. La materia objeto de las reivindicaciones 5-9 parece llenar los requisitos de los artículos 33 (2) y 33 (3) PCT. El razonamiento es como sigue:

Ninguno de los documentos de los documentos de la técnica anterior citados en el Reporte de la Búsqueda Internacional describe un proceso para preparar polvo de $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ en donde los polvos de alúmina y óxido de

cromo se utilicen, que tengan menos de 120 ppm de impurezas de metal alcalino y metal alcalino térreo. Más aún, el problema de evitar el cromo hexavalente no se menciona en la técnica anterior citada.

REIVINDICACIONES CORREGIDAS

1. Un polvo termo pulverizable que comprende de 45 a 100% de óxido de Cromo y correspondientemente de 0 a 55% de alúmina alfa, todas las proporciones son en peso, y menos de 50 ppm de metales alcalinos y metales alcalino térreos, que estabilizan el cromo en el estado hexavalente, en donde el polvo termo pulverizable es esencialmente de fase simple de tal forma que la alúmina en fase diferente a la fase alfa no excede el 10% en peso del contenido total de alúmina.
2. Un polvo de acuerdo a la reivindicación 1 en el cual la proporción de alúmina alfa es de 50 30% en peso.
3. Un polvo de acuerdo a la reivindicación 1 en el cual las partículas tienen un d_{50} de desde 5 a 200 micrómetros.
4. Un polvo de acuerdo termo pulverizable de alúmina-óxido de cromo que comprende óxido de cromo en una cantidad no menor de 45% en peso, alúmina alfa en una cantidad no mayor de 55% en peso, y menos de 50 ppm de metales alcalinos y metales alcalino térreos, que estabilizan el cromo en el estado hexavalente, en donde

el polvo termo pulverizable es esencialmente de fase simple de tal forma que la alúmina en fases diferentes de fase alfa no excede el 10% en peso del contenido total de alúmina.

5. Un proceso para la producción de un polvo termo pulverizable que comprende mezclar un polvo de alúmina que tiene un contenido de impurezas de óxido de metal alcalino y metal alcalino terreo de no más de 120 ppm de cada uno, en la que el polvo de óxido de cromo también tiene menos de 120 ppm y cualquier impureza efectiva para estabilizar el óxido de cromo en el estado hexavalente, los polvos son mezclados en proporciones para dar, luego de quemado, un polvo cristalino de fase esencialmente de fase simple que comprende de 45 a 99% de óxido de cromo y de 55 a 1% de alúmina alfa, estando todas las proporciones en peso, y quemando la mezcla a una temperatura de desde 1300 a 1500°C para producir dicho polvo cristalino esencialmente de fase simple.

6. Un proceso de acuerdo a la reivindicación 5 en el cual las partículas de alúmina alfa tienen un tamaño de partícula d_{50} que va de 50 a 20 veces el correspondiente d_{50} para el polvo de óxido de cromo.

7. Un proceso de acuerdo a la reivindicación 5 en el cual el polvo de alúmina se selecciona del grupo que consiste de alúmina alfa, alúmina gama, alúmina kappa, alúmina delta, boemita, trihidrato de alúmina y mezclas de este.

8. Un proceso de acuerdo a la reivindicación 7 en el cual el polvo de alúmina mezclado con el polvo de óxido de cromo es boemita.

9. Un proceso de acuerdo a la reivindicación 5 en el cual el óxido de cromo y la alúmina tienen cada una niveles de impureza de metales alcalinos y metales alcalino térreos que no exceden 50 ppm de cualquiera de tales elementos.

Corrección Preliminar Para Fase Nacional

Por favor corrija las reivindicaciones en la presente solicitud de fase nacional para ser consistente con las reivindicaciones suministradas adelante. Durante el trámite de la correspondiente solicitud PCT, se hicieron correcciones de acuerdo con el artículo 34 en Enero 19, 2004. Sin embargo, las correcciones solicitadas a las reivindicaciones 1-4 no fueron ingresadas por la IPEA. Esta corrección preliminar es hecha para corregir las reivindicaciones 1 y 4 (como se anota en las modificaciones adelante) y aseguran la entrada de las correcciones en la presente solicitud de fase nacional.

La IPEA considera que las que las reivindicaciones 5-9 cumplen el requisito de novedad, a nivel inventivo, y aplicación industrial. Por las razones establecidas en la corrección de acuerdo con el artículo 34, las reivindicaciones 1-4 también cumplen con aquellos requisitos.

1. Un polvo termo pulverizable que comprende de 45 a 100% de óxido de cromo y correspondientemente de 0 a 55% de alúmina alfa, todas las proporciones son en peso, y

menos de 50 ppm de cada uno de cualquiera de los metales alcalinos y metales alcalino térreos, que estabilizan el cromo en el estado hexavalente, en donde el polvo termo pulverizable es esencialmente de fase simple de tal forma que la alúmina en fase diferente a la fase alfa no excede el 10% en peso del contenido total de alúmina.

2. Un polvo de acuerdo a la reivindicación 1 en el cual la proporción de alúmina alfa es de 50 30% EN PESO.

3. Un polvo de acuerdo a la reivindicación 1 en el cual las partículas tienen un d_{50} de desde 5 a 200 micrómetros.

4. Un polvo de acuerdo termo pulverizable de alúmina-óxido de cromo que comprende óxido de cromo en una cantidad no menor de 45% en peso, alúmina alfa en una cantidad no mayor de 55% en peso, y menos de 50 ppm de cada uno de cualquiera de los metales alcalinos y metales alcalino térreos, que estabilizan el cromo en el estado hexavalente, en donde el polvo termo pulverizable es esencialmente de fase simple de tal forma que la alúmina en fases diferentes de fase alfa no excede el 10% en peso del contenido total de alúmina.

5. Un proceso para la producción de un polvo termo pulverizable que comprende mezclar un polvo de alúmina que tiene un contenido de impurezas de óxido de metal alcalino y metal alcalino terreo de no más de 120 ppm de cada uno, en la que el polvo de óxido de cromo también tiene menos de 120 ppm y cualquier impureza efectiva para estabilizar el óxido de cromo en el estado hexavalente, los polvos son mezclados en proporciones para dar, luego de quemado, un polvo cristalino de fase esencialmente de fase simple que comprende de 45 a 99% de óxido de cromo y de 55 a 1% de alúmina alfa, estando todas las proporciones en peso, y quemando la mezcla a una temperatura de desde 1300 a 1500°C para producir dicho polvo cristalino esencialmente de fase simple.

6. Un proceso de acuerdo a la reivindicación 5 en el cual las partículas de alúmina alfa tienen un tamaño de partícula d_{50} que va de 50 a 20 veces el correspondiente d_{50} para el polvo de óxido de cromo.

7. Un proceso de acuerdo a la reivindicación 5 en el cual el polvo de alúmina se selecciona del grupo que consiste de alúmina alfa, alúmina gama, alúmina kappa,

alúmina delta, boemita, trihidrato de alúmina y mezclas de este.

8. Un proceso de acuerdo a la reivindicación 7 en el cual el polvo de alúmina mezclado con el polvo de óxido de cromo es boemita.

9. Un proceso de acuerdo a la reivindicación 5 en el cual el óxido de cromo y la alúmina tienen cada una niveles de impureza de metales alcalinos y metales alcalino térreos que no exceden 50 ppm de cualquiera de tales elementos.

TRATADO DE COOPERACIÓN DE PATENTES**PCT****REPORTE DE EXAMEN PRELIMINAR INTERNACIONAL****(Artículo 36 y Regla 70 PCT)**

Archivo de referencia del agente o solicitante

NORA-4171 CPC**PARA ACCIÓN COMPLEMENTARIA**Ver Notificación de Reporte de Examen Preliminar
Internacional (del PCT/IPEA/416)

Solicitud Internacional No.

PCT/US 03/10605

Fecha de presentación internacional (día/mes/año)

04.04.2003

Fecha de Prioridad (día/mes/año)

08.04.2002Clasificación de Patente Internacional (IPC) o
clasificación nacional e IPC**C01G37/00**

Solicitante

SAINT GOBAIN CERAMICS & PLASTICS, INC. et Al.

1. Este Reporte de Examen Preliminar Internacional ha sido preparado por esta Autoridad Examinadora Preliminar Internacional y se remite al solicitante de acuerdo con el Artículo 36.
 2. Este REPORTE consiste de un total de 6 hojas, incluyendo esta hoja de portada.

☒ Este reporte también se acompaña por ANEXOS, es decir hojas de la descripción, reivindicaciones y/o dibujos que han sido corregidos y son la base para este reporte y/o hojas que contienen rectificaciones hechas antes a esta Autoridad (ver Regla 70.16 y Sección 607 de las Instrucciones Administrativas de acuerdo con el PCT).
- Estos anexos consisten de un total de 2 hojas.
3. Este Reporte contiene indicaciones relacionadas con los siguientes ítems:

- I ☒ Base del Reporte
- II ☐ Prioridad
- III ☐ Concepto de sin fundamento con respecto a novedad, nivel inventivo y aplicabilidad industrial
- IV ☐ Falta de unidad de invención
- V ☒ Declaración motivada de acuerdo con el Artículo 66.2(a)(ii) con respecto a novedad, nivel inventivo o aplicabilidad industrial; las citaciones y explicaciones ayudan a dicha declaración
- VI ☐ Ciertos documentos citados
- VII ☐ Ciertos defectos en la solicitud internacional
- VIII ☐ Ciertas observaciones sobre la solicitud internacional

Fecha de presentación de la petición

12.09.2003

Fecha de terminación de este reporte

25.06.2004

Nombre y dirección de correspondencia de la autoridad
examinadora preliminar internacional

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Oficial Autorizado

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Forma PCT/IPEA/409 (hoja de portada) (Enero 2004)

REPORTE DE EXAMEN**PRELIMINAR INTERNACIONAL**

Solicitud Internacional No.

PCT/US 03/10605

I. Bases del Reporte

1. Con respecto a los **elementos** de la solicitud internacional: (reemplazo de las hojas que han sido suministradas a la Oficina de recepción en respuesta a una invitación de acuerdo con el Artículo 14 se refieren a en este reporte como "presentadas originalmente" y no se anexan a este reporte ya que ellas no contienen correcciones (Reglas 70.16 y 70.17)):

Descripción, Páginas:

1-6	como se presentó originalmente
-----	--------------------------------

Reivindicaciones, Números:

1-9	presentada con telefax en 19.01.2004
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2. Con respecto al **idioma**, todos los elementos marcados anteriormente estuvieron disponibles o fueron suministrados a esta Autoridad en el idioma en el que la solicitud internacional se presentó, a menos que se indique lo contrario de acuerdo con este ítem.

Estos elementos estuvieron disponibles o fueron suministrados a esta Autoridad en el siguiente idioma:

,que es:

☐ el idioma de una traducción suministrada para propósitos de búsqueda internacional (de acuerdo con la regla 23.1(b)).

☐ el idioma de publicación de la solicitud internacional (de acuerdo con la regla 48.3(b)).

☐ el idioma de la traducción suministrado para propósitos de examen preliminar internacional (de acuerdo con la regla 55.2 y/o 55.3).

3. Con respecto a cualquier **secuencia de ácido amino y/o nucleótido** descrito en la solicitud internacional, el concepto escrito se emitió sobre la base de la lista de secuencia:

- ☐ Contenida en la solicitud internacional en forma impresa
- ☐ Presentada junto con la solicitud internacional en forma legible por computador
- ☐ Suministrada posteriormente a esta Autoridad en forma escrita
- ☐ Suministrada posteriormente a esta Autoridad en forma escrita forma legible por computador
- ☐ La declaración de que el listado de secuencias escrito suministrado posteriormente no va más allá de la descripción en la solicitud internacional como se presentó se ha suministrado.
- ☐ La declaración de que la información registrada en forma legible por computador es idéntica al listado de secuencias escrito que se ha suministrado.

4. Las correcciones han dado como resultado la cancelación de:

- ☐ la descripción, páginas:

- ☐ las reivindicaciones, Nos.:
- ☐ Los dibujos, hojas:

5. ☒ Este reporte ha sido emitido como si (algunas de) las correcciones no hubieran sido hechas, ya que ellas han sido consideradas que van más allá de la descripción como se presentó, como se indicó en la casilla complementaria (Regla 70.2(c)):

(Cualquier reemplazo de hojas que contengan dichas correcciones se debe referir de acuerdo al ítem 1 y anexadas a este reporte)

6. Observaciones adicionales, si es necesario:

- V. Declaración motivada de acuerdo con el Artículo 35(2) con respecto a novedad, nivel inventivo o aplicabilidad industrial; las citaciones y explicaciones ayudan a dicha declaración

1. Declaración

Novedad (N)

Si: Reivindicaciones	5-9
No: Reivindicaciones	1-4

Nivel inventivo (IS)

Si: Reivindicaciones	5-9
No: Reivindicaciones	1-4

Aplicabilidad Industrial (IA)

Si: Reivindicaciones	1-9
No: Reivindicaciones	

2. Citaciones y Explicaciones**Ver hoja separada****forma PCT/IPEA/409 (Enero 2004)**

Expediente No		No de Folios
Item		
	04099829	
	No de unidades	✓
1	CD	
2	DVD	
3	REVISTA	
4	LIBRO	
5	PERIODICO	
6	DISQUETES	
7	SOBRE DE MANILA	
8	SOBRE BLANCO TAMAÑO CARTA	✓
9	SOBRE BLANCO TAMAÑO OFICIO	
10	OTROS:	
Observaciones: ore final		

86

SUPERINTENDENCIA I COMERCIO
Radicación : 04499829 00000000 Folios: 86
Fecha (MM): 2004-10-06 17:29:00
Trámite : 011 PCT-PATENT 379 FASE NNCI 411 PRESENTAR
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

NIT : 900176089-2

RECIBO OFICIAL DE CAJA : 04 - 76,092
FECHA : SEPTIEMBRE 27 DE 2004

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
CAVELIER ABOGADOS	CONSIGNACION	BANCO POPULAR	050-00110-6	32758684	27/09/2004	39,426,000.00

***** CONCEPTO *****

CANT. REMISIVO	CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE IN	422,000.00
	TOTAL :	422,000.00

SOM: CUATROCIENTOS VEINTIDOS MIL PESOS

RESPONSABLE : 

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

06 14496-841-001-5

REQUISITOS NECESARIOS PARA PRESENTACION Y AGILIZACION DEL TRAMITE

	USUARIO	RADICADOR
PATENTE DE INVENCION	()	()
MODELO DE UTILIDAD	()	()
- Indicación de que se solicita la concesión de una patente.	()	()
- Datos de identificación del solicitante o de la persona que se presenta la solicitud.	()	()
- Descripción de la invención.	()	()
- Dibujos de ser estos pertinentes.	()	()
- Comprobante de Pago de las tasas establecidas.	()	()

COMPLETA () **INCOMPLETA** () ()

DISEÑO INDUSTRIAL ()

- Indicación de que se solicita el registro de Diseño Industrial	()	()
- Datos de identificación del solicitante o de la persona que presenta la solicitud.	()	()
- Representación gráfica o fotográfica del Diseño Industrial o muestra del Material que incorpora el diseño.	()	()
- Comprobante de pago de las tasas establecidas	()	()

COMPLETA () **INCOMPLETA** () ()

ESQUEMA DE TRAZADO ()

- Indicación de que solicita el registro de un Esquema de trazado.	()	()
- Datos de identificación del solicitante o de la persona que presenta La solicitud.	()	()
- Representación gráfica del esquema de trazado	()	()
- Comprobante de pago de las tasas establecidas.	()	()

COMPLETA () **INCOMPLETA** () ()

Firma Responsable:

Fecha:

SUPERINDUSTRIA Y COMERCIO
Radicación : 04099029 00000000 Folios: 66
Fecha (UMB): 2004-10-06 17:39:00
Trámite : 011 PCT-PATENT 379 FASE INCI 411 PRESENTA
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

89
88

2020
Bogotá D C

Doctor(a)
EMILIO FERRERO
Apoderado(a)
SAINT-GOBAIN CERAMICS & PLASTICS, INC.

Oficio N°
10465

ASUNTO:

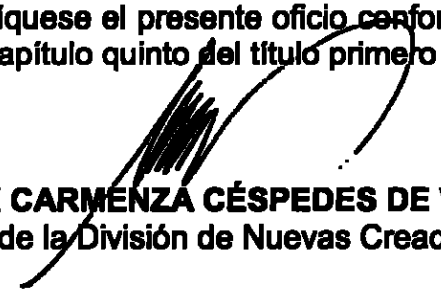
Radicación N°	04-99829
Solicitud internacional	PCT/US03/10605
Fecha inicio fase nacional	08/11/2004
Trámite	011
Evento	379
Actuación	430
Folios	001

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

- La solicitud no contiene copia del documento en que consta la cesión del derecho de patente del inventor al solicitante o a su causante (Art. 26-k Decisión 486).
- La solicitud no contiene el poder debidamente otorgado, con el lleno de requisitos exigidos por los artículos 63 y subsiguientes del Código de Procedimiento Civil. Adicionalmente deberá presentar el documento que acredita la existencia y representación legal de la sociedad solicitante, cuando éste fuere una persona jurídica.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de la División de Nuevas Creaciones.

El anterior requerimiento fue notificado por fijación en lista de fecha,
12 NOV. 2004

202044

Sede Centro: Carrera 13 No. 27-00 Pisos 2, 5, 7 y 10
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Sede CAN: Tr. 40A No. 38-50 3153265 al 69
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Bogotá D.C. - Colombia