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- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,

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Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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(54) **Title:** METHOD FOR MANUFACTURING COLORING CERAMICS VIA COLLOIDAL DISPERSION FOLLOWED BY CONVENTIONAL PRESSING TECHNIQUES

(57) **Abstract:** A colored ceramic powder is compacted into a green state body via isostatic or biaxial pressing. The colored ceramic powder is produced from a mixture of a coloring solution consisting of metallic salts that is introduced to a ceramic slurry and subsequently dried. A coloring solution may comprise for example a metallic salt, a solvent, an organic solvent such as derivatives of propylene oxides, and an acid. Such a coloring solution can be used as a coloring agent for a ceramic body. The solution is thoroughly mixed with the ceramic slurry. Following the addition of the coloring agent, a binder can be added to the color slip. The amount of binder added can be anywhere from 0.5% to 10% by weight. Such a binder can be organic based, alcohol based, or acrylic based. Once all the constituents are thoroughly mixed to a homogeneous state, the slip is dried. The drying process can range from a conventional means to a more sophisticated methods which use spray drying equipment. The slip can be subjected to a heating process over a range of temperatures such that all residual moisture is removed, leaving only a dried press-able powder. The dried powder can then be subjected to an isostatic or biaxial press manufacturing process to create a green state ceramic body. Once pressed, the ceramic body can be subjected to a sintering process. After final sinter, the resulting ceramic body possesses an innate color that is homogenous throughout its composition. The method is especially useful for coloring zirconia dental restorations.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US13/27961

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A61C 13/00; A61K 8/28 (2013.01) USPC - 433/223; 501/134 According to International Patent Classification (IPC) or to both national classification and IPC</p>												
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) IPC(8): A61C 8/00, 9/00, 13/20 (2013.01) USPC: 433/172, 173, 214, 215</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C,B, DE-A, DE-T, DE-U, GB-A, FR-A); DialogPRO; Google; Google Scholar; IP.com; color*, colour*, dye*, pigment*, binder*, sinter*, colloid*, ceramic*, dental*, dentist*, mix*, blend*, presinter*, 'pre-sinter*', press*, tooth*, slurr*, zircon*</p>												
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>US 2011/0151411 A1 (SCHECHNER, G et al.) June 23, 2011; abstract; paragraphs [0014], [0023], [0057], [0071]-[0073], [0079], [0087]-[0089], [0095], [0102], [0134], [0135], [0141]-[0145], [0154]-[0172], [0240], [0243]</td> <td>1-25</td> </tr> <tr> <td>Y</td> <td>US 2009/0042167 A1 (VAN DER ZEL, JM) February 12, 2009; abstract; Tables 1-2; paragraphs [0028], [0060], [0261]-[0264]</td> <td>1-25</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	US 2011/0151411 A1 (SCHECHNER, G et al.) June 23, 2011; abstract; paragraphs [0014], [0023], [0057], [0071]-[0073], [0079], [0087]-[0089], [0095], [0102], [0134], [0135], [0141]-[0145], [0154]-[0172], [0240], [0243]	1-25	Y	US 2009/0042167 A1 (VAN DER ZEL, JM) February 12, 2009; abstract; Tables 1-2; paragraphs [0028], [0060], [0261]-[0264]	1-25	
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<p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/></p>												
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"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</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"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	"E" earlier application or patent but published on or after the international filing date	"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	"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)	"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	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
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<p>Date of the actual completion of the international search</p> <p>03 June 2013 (03.06.2013)</p>		<p>Date of mailing of the international search report</p> <p>28 JUN 2013</p>										
<p>Name and mailing address of the ISA/US</p> <p>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201</p>		<p>Authorized officer:</p> <p>Shane Thomas</p> <p>PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774</p>										