

Written Opinion

Application No.
201200068-3

Date of mailing:	Examiner's Reference Number IPOS/XRG
Application filing date 03/01/2008	(Earliest) Priority Date 11/01/2007
Applicant: LAM RESEARCH CORPORATION	Applicant's or agent's file reference
International Patent Classification (IPC) (as indicated in the search report): B32B18/00, H01J37/32	

1. This first Written Opinion under Section 29(6) of the *Patents Act* in effect immediately before 14/02/2014 consists of a total of 6 pages.
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	☒	Unity of invention
V	☒	Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	☐	Defects in the form or contents of the application
VII	☒	Clarity, Clear and Complete Disclosure, and Support
3. The search report used was issued by the Intellectual Property Office of Singapore, and the date of completion is 11/02/2014.
4. If no reply is filed, the examination report will be established on the basis of this opinion.
5. The date by which the examination report will be established is 06/04/2015.

Date of submission of the request to the Intellectual Property Office of Singapore: 02/10/2013	Date of Written Opinion: 28/02/2014
Intellectual Property Office of Singapore 51 Bras Basah Road #04-01 Manulife Centre Singapore 189554 E-mail address: IPOS_PatentS&E@ipos.gov.sg	Authorized Officer <u>Xie</u> Rongguo (Dr.)

Written Opinion

Application No.

201200068-3

I. Basis of the opinion

1. This opinion has been drawn on the basis of:

☒ the application **as originally filed**.

2. ☐ This opinion has been established based on the exclusion of additional matter beyond the earlier application, as indicated in the supplemental box.

3. ☐ This opinion 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, as indicated in the supplemental box.

4. Additional observations, if necessary:

Written Opinion

Application No.

201200068-3

IV. Unity of invention

1. There are multiple inventions in this application, as follows:

The application does not comply with the requirements of unity of invention as required by Section 25(5)(d) of the *Patents Act* because it appears that the claims do not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

The claims define two distinct inventions based on the following special technical features:

- Group A: claims 1-14 are directed to a method of making a three-layer component by co-sintering a dual-layer green body, wherein a first layer comprises alumina particles and a second layer comprises yttria particles.
- Group B: Claims 15-19 are directed to a method of sealing an yttria plasma spray coated component by applying a liquid anaerobic sealant to the component by brushing the sealant on all yttria surfaces of the component, wet cleaning the component, curing the wet cleaned component and, applying a second sealant coat to the cured substrate by repeating the procedure used to apply the first coat.

The plurality of alleged inventions is present due to the fact that the co-sintering of a dual layer green body is considered the special technical feature of the claims of Group A, whereas the sealing steps in claim 15 are considered to be the special technical feature of the claims of Group B. In this regard, it is noted that the sealing steps defined in Claim 15 do not comprise the co-sintering of a dual-layer green body. Therefore there is no special technical feature common to all the claimed inventions and as a consequence, the claims are not linked so as to form a single general inventive concept as required by Rule 25 of the Patents Rules.

2. Consequently, only the parts relating to claim(s) no. 1-14 of the application were the subject of examination in establishing this opinion.

Written Opinion

Application No.

201200068-3

V. Reasoned statement with regard to novelty, inventive step or industrial applicability; Citation and explanation supporting such statement

1. Statement with regard to novelty, inventive step or industrial applicability

Novelty (N)	Claim(s)	1-14	YES
	Claim(s)	NONE	NO
Inventive Step (IS)	Claim(s)	NONE	YES
	Claim(s)	1-14	NO
Industrial applicability (IA)	Claim(s)	1-14	YES
	Claim(s)	NONE	NO

2. Citations and explanations:

1. Prior Art

The following citations are referred to in this opinion. Full bibliographic details are provided in the Search Report:

- D1: US 2004/033385 A1
- D2: US 2006/073349 A1
- D3: US 2005/136188 A1
- D4: US 2004/224125 A1
- D5: US 5908682 A

Documents D3-D5 are considered as general background art, which will not be further discussed.

2. Novelty (Section 14 of the *Patents Act*)

The subject matter of claims 1-14 is novel as none of the cited documents individually discloses the invention as defined in these claims.

3. Inventive Step (Section 15 of the *Patents Act*)

3.1 Claim 1

The subject matter of claim 1 does not involve an inventive step for the following reasons:

D1 is considered as the closest prior art and discloses a method of making an erosion-resistant article for use as a component in plasma process chamber. The erosion-resistant article comprises a support and an yttrium-containing oxide coating, which is disposed over the support (Abstract), wherein the support can be formed from a powdered raw mixture comprising alumina particles and the yttrium-containing oxide coating can be formed from a powdered raw mixture comprising yttrium oxide (i.e., yttria) particles or YAG particles, or a mixture of yttria particles and alumina particles (para. 0015).

D1 further discloses the erosion-resistant article is fabricated by hot pressing followed by sintering (para. 0050-0056). In a specific embodiment, a thin layer of YAG powder with desired additives such as polymer binders (para. 0051), i.e., a green sheet of YAG, is placed within a die cavity and then is covered by a layer of alumina powder with desired additives such as polymer binders (para. 0051), i.e., a green sheet of alumina. After the powder mixture is compressed within the die cavity, the resulting shaped power mixture body is subjected to a hot pressing operation i.e., co-sintering (para.0056). While in this specific embodiment YAG was used as an example for yttrium-containing oxide coating, D1 further discloses that the method can be applied for other yttrium-containing oxide particle, such as yttria particles (see claims 25-29). Due to the close match in coefficient of thermal expansion (CTE) between the support material and

Written Opinion

Application No.

201200068-3

V. Reasoned statement with regard to novelty, inventive step or industrial applicability; Citation and explanation supporting such statement

the yttrium-containing oxide coating, thermal stress within the final component is minimized, thereby preventing the coating to crack and delaminate (para. 0047).

While D1 does not specifically disclose an intermediate layer comprising a solid solution of yttria and alumina, it is inherent that the third layer comprising yttria-alumina solution, will be inevitably formed between a green sheet of alumina and a green sheet of yttria that are co-sintered by hot pressing operation.

Therefore, the method disclosed in D1 differs from that defined in claim 1 only in that D1 does not expressly disclose machining the pressed together layers to the desired dimensions.

However, D1 specifically discloses the powder raw mixture is manipulated into the desired shape and shaping may be accomplished by any suitable process, which transforms the powdered raw mixture into a shape of desired particle packing (para. 0052). D1 further discloses that after sintering the sintered body is subjected to a final shaping step, for example, a grinding, lapping or polishing step and these methods for shaping a rough product are well known in the art (para. 0055). Therefore, starting from D1, it would be merely a matter of routine for a skilled person to apply suitable shaping process, including those well-known machining process, to shape the powdered raw mixture into the desired shape, thus arriving at the claimed invention without the exercise of inventive skills.

Therefore, claim 1 does not involve an inventive step in view of D1.

For the sake of completeness, it should be noted that claim 1 also lacks an inventive step in view of D2 because D2 (see para. 0072) discloses the co-sintering of alumina presintered body (i.e., the first layer comprising alumina particles, see para. 0055-0057) and the yttria compact (i.e., the second layer comprising yttria compact, see para. 0062) into 3-layer component (see para. 0038-0039), wherein the first layer and the second would be pressed together by gravity force.

3.2 Claims 2-14

The additional features defined in claims 2-14 are either disclosed in D1 or D2, which cannot render the claimed invention inventive:

Claim 2: see D1, para. 0056 and claim 29. It is inherent that the third layer comprising YAG will form between a green sheet of alumina and a green sheet of yttria that are co-sintered by hot pressing operation (D2, para.0038-0039);

Claims 3-4: D2 discloses that the relative density of the alumina sintered body and the yttria sintered body is preferably 98% or greater, i.e., the porosity is preferably 2% or less (para. 0027 and 0034). It would be merely a matter of routine for the skilled person to practice the method of D2 to achieve the porosity of any of the three layers being less than 3% or 1% for a particular application;

Claims 5: see "hot pressing" in D1, para. 0056;

Claims 6, 7 and 10: see D1, para. 0052;

Claims 8 and 9: the dimensions of the three-layer component are merely some obvious design options that the skilled person would choose according to the shape of the plasma process chamber component, which cannot render the claimed invention inventive;

Claims 11-14: see D1, para.0035, 0043-0044, 0047;

4. Industrial Applicability (Section 16 of the *Patents Act*)

The industrial applicability of the subject matter of claims 1-14 is considered to be evident.

Written Opinion

Application No.

201200068-3

VII. Clarity, Clear and Complete Disclosure, and Support

The following observations on the clarity of the claim(s), on the question whether the disclosure is clear and complete, or on the question whether the claim(s) is (are) supported by the description, are made:

Lack of Clarity (Section 25(5)(b) of the *Patents Act*)

1. Claim 6

Note “smooth” is a relative term which renders the subject matter of claim 6 unclear: the specification does not provide a standard for ascertaining the degree of smoothness, as such it is unclear to a skilled person as to how smooth the surface must be so as to fall inside the scope of the claim.

2. Claim 10

In claim 10 the term “selected from the group consisting of **and/or**...” is not clear. It appears that it would have been “selected from the group consisting of **and** ...”.

3. Claim 16

Claim 16 is dependent on claim 13 but the term “the sealant” defined in claim 16 has no antecedent in claim 13. For the examination purpose, it is assumed that claim 16 would have been dependent on claim 15 wherein “the sealant” is defined. Accordingly, claim 16 is grouped with claim 15 in group B for assessing unity of invention (see box IV).