Datasheet for the decision
of 27 September 2011

Case Number: T 0045/10 - 3.2.06
Application Number: 04745652.0
Publication Number: 1541817

Language of the proceedings: EN

Title of invention: Honeycomb structure body

Proprietor: IBIDEN CO., LTD.

Opponents: THE DOW CHEMICCAL COMPANY SAINT-GOBAIN CENTRE DE RECHERCHES ET D'ETUDES EUROPEEN

Headword: -

Relevant legal provisions: EPC Art. 123(2), 83, 84 RPBA Art. 12, 13

Relevant legal provisions (EPC 1973): -

Keyword: "Late-filed requests - not admitted; "average-particle size" neither clear without further definition - nor sufficiently disclosed without defined determination method"

Decisions cited: G 0001/99, T 1819/07
Case Number: T 0045/10 - 3.2.06

**DECISION**

of the Technical Board of Appeal 3.2.06

of 27 September 2011

**Appellant:** IBIDEN CO., LTD.
(Proprietor)
1, Kandacho 2-chome
Ogaki-shi
Gifu 503-8004   (JP)

**Representative:** HOFFMANN EITLE
Patent- und Rechtsanwälte
Arabellastraße 4
D-81925 München   (DE)

**Respondent I:** THE DOW CHEMICAL COMPANY
(Opponent 1)
2030 Abbott Road
Dow Center
Midland
Michigan 48640   (US)

**Representative:** Raynor, John
Beck Greener
Fulwood House
12 Fulwood Place
London WC1V 6HR   (GB)

**Respondent II:** SAINT-GOBAIN CENTRE DE RECHERCHES ET D'ETUDES EUROPEEN
(Opponent 2)
"Les Miroirs" - 18, Avenue d'Alsace
F-92400 Courbevoie   (FR)

**Representative:** Teyssedre, Laurent
Saint-Gobin Recherche
39, quai Lucien Lefranc
B.P. 135
F-93303 Aubervilliers Cedex   (FR)

**Decision under appeal:** Decision of the Opposition Division of the European Patent Office posted 13 November 2009 revoking European patent No. 1541817 pursuant to Article 101(3)(b) EPC.

**Composition of the Board:**

**Chairman:** M. Harrison

**Members:** G. de Crignis
K. Garnett
Summary of Facts and Submissions

I. European patent No. 1 541 817 was revoked by the opposition division by decision announced during the oral proceedings on 15 October 2009 and posted on 13 November 2009.

The non-allowability of the main request was based upon lack of inventive step in the subject-matter of claim 1 starting from either:
D7 US-A-4420316 or
A2 WO-A-03/20407,
and combining such disclosure with the teaching of
D9 US-A-5733352 or
The first and third auxiliary requests were held not to meet the requirements of Article 123(2) EPC. The second auxiliary request was found not to involve an inventive step when starting from A1 and considering
A11 WO-A-02/10562 or

II. On 11 January 2010 the appellant (patent proprietor) filed an appeal against this decision requesting maintenance of the patent in an amended form according to a main request or alternatively based on two auxiliary requests. It was emphasized that due to the features added to claim 1 of all these requests, the objection to lack of inventive step was overcome. Additionally, a complete English translation of document A1 was annexed, as well as:
D22 a drawing showing wall thicknesses,
D23 SAE 2008-01-0621; K. Ogyu, T. Oya, K. Ohno, A. G. Konstandopoulos: "Improving of the filtration and
regeneration Performance by the Sic-DPF with the Layer Coating of PM Oxidation Catalyst"; April 14 - 17, 200b, World Congress Detroit, Michigan; and

D24 a drawing showing the separation of ashes from the cell walls.

III. In a communication annexed to a summons to oral proceedings, the Board mentioned in particular that the requirements of Articles 84 and 123(2) EPC did not appear to be fulfilled in view of the features added to claim 1 of all requests.

IV. With letter of 26 August 2011, the appellant replaced all its requests by a main request and first to fifth auxiliary requests. The following document was also submitted:


Subsequently, with letter of 21 September 2011, the appellant filed:

D25 Test report comparing the exfoliation of ashes from cordierite and silicon carbide; and
D26 Catalogue No. 4368, Mitutoyo, 5 pages concerning surface roughness.
V. Oral proceedings were held before the Board on 27 September 2011, in the absence of respondent OI (opponent OI).

The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or on the basis of one of the first to fifth auxiliary requests, all as filed during the oral proceedings, and also requested that the case be remitted to the opposition division for further prosecution. The appellant also submitted D27 a print-out of the internet publication www.alphamaterials.com/SiC_powder.ht of Alpha Materials, Inc.: "Crystalline Silicon Carbide nano and sub-micron powder", dated 27-09-2011 13:07.

Respondent 2 (opponent OII), which was represented during the oral proceedings, requested that the appeal be dismissed. Respondent 1 (opponent OI) was not present at the oral proceedings and had not filed any request.

VI. Claim 1 of the main request reads:
"A honeycomb structural body (30) made of a columnar porous ceramic block (35) of silicon carbide in which a large number of through holes (31a, 31b) are placed in parallel with one another in the length direction of the said through holes with a wall portion (33) interposed therebetween,

wherein

said large number of through holes comprises: a large-capacity through hole group and a small-capacity through hole group, the total sum of the areas of the
through holes constituting the said large-capacity through hole group on a cross-section perpendicular to the length direction of the said through holes being greater than the total sum of the areas of the through holes constituting the said small-capacity through hole group on the said cross-section, each of said through holes in the large-capacity through hole group is sealed at an end on an exhaust gas outlet side of said honeycomb structural body and has an open end on an exhaust gas inlet side, each of said through holes in the small-capacity through hole group is sealed at an end on an exhaust gas inlet side of said honeycomb structural body and has an open end on an exhaust gas outlet side, and a surface roughness (greatest height) $R_y$, measured based upon JIS B0601, of the wall face of said through holes is set in a range from 10 to 100 $\mu$m, wherein

the large number of through holes are constituted by two kinds of through holes, that is, large-capacity through holes each of which has a relatively greater area on a cross-section perpendicular to the length direction of the said through holes and small-capacity through holes each of which has a relatively smaller area on said cross-section perpendicular to the length direction of the said through holes, and wherein

the shape of a cross section of a through hole perpendicular to the length direction of each of the through holes is an octagonal shape for each of the
large-capacity through holes and a quadrangle shape for each of the small-capacity through holes."

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the feature "formable by mixing 100 parts by weight of a first type of particles having an average particle size from 0.3 to 50 \( \mu \text{m} \) with 5 to 65 parts by weight of a second type of particles having an average particle size of 0.1 to 1.0 \( \mu \text{m} \) and a smaller average particle size than the first-type of particles," is added before the first "wherein" in the wording of the claim.

Claim 1 of the second auxiliary request differs from claim 1 of the first auxiliary request in that a feature concerning the thickness of the wall portion is added following the feature of the surface roughness of the wall face of the through holes which reads as follows:

"and a wall thickness of the wall portion (33) is 0.35 to 0.41 mm,".
Moreover the following feature is added at the end of the claim:

"the said columnar porous ceramic block comprises one or a plurality of columnar porous ceramic members (20), and the porosity of the porous ceramic member(s), as measured by using an Archimedes method, is at least 42\% and at most 50\%.".

Claim 1 of the third auxiliary request differs from claim 1 of the second auxiliary request in that the feature

"formable by mixing 100 parts by weight of a first type of particles having an average particle size from 0.3
to 50 µm with 5 to 65 parts by weight of a second type of particles having an average particle size of 0.1 to 1.0 µm and a smaller average particle size than the first-type of particles,

has been replaced by

"formable by mixing 100 parts by weight of α-type silicon carbide particles having an average particle size from 0.3 to 50 µm with 5 to 65 parts by weight of β-type silicon carbide particles having an average particle size of 0.1 to 1.0 µm and a smaller average particle size than the α-type silicon carbide particles,"

Claim 1 of the fourth auxiliary request includes the above replacement feature concerning the silicon carbide particles and their particle sizes. The further amendments made to the final feature of the claim are not relevant for the present decision and relate to data of Table 1 of the patent in suit, concerning combinations of wall thickness, surface roughness, density of through-holes and porosity.

Claim 1 of the fifth auxiliary request differs from claim 1 of the fourth (and third) auxiliary request in that the feature concerning the silicon carbide particles and their particle sizes has been replaced by the following:

"formable by wet-mixing 60% by weight of α-type silicon carbide particles having an average particle size of 11 µm with 40% by weight of β-type silicon carbide particles having an average particle size of 0.5 µm,". Again, further amendments have been made to the final feature but are not relevant for the present decision and relate to specific data of Table 1 of the patent in
suit concerning a single combination of wall thickness surface roughness, density of through holes, porosity and average pore diameter.

VII. The arguments of the appellant may be summarised as follows:

The appeal was directed generally against the decision of the opposition division revoking the patent. The refusal of the then second auxiliary request by the opposition division could not be taken as *prima facie* evidence that such request did not involve an inventive step. In the grounds of appeal, in particular sections 3 to 5 dealt with the feature of surface roughness and its relevance for the claimed honeycomb structural body.

The main request should be admitted into the proceedings. The subject-matter of its claim 1 was limited to a honeycomb structural body made of silicon carbide. Additionally, the determination method for the surface roughness has been inserted and accordingly the objections concerning lack of clarity or lack of disclosure had been overcome. The limitation of the material to silicon carbide in combination with the claimed range for the surface roughness of the structural body represented crucial features of the invention, which combination had not been considered by the opposition division. The test results in D25 provided evidence for the effectiveness of such combination. The deletion of the features to which objections had been made during the written appeal proceedings could have been expected and this deletion limited the issues to be dealt with by the respondents.
The subject-matter of claim 1 of all the auxiliary requests was amended such that it referred to a product-by-process claim ("formable by...").
Additionally, the subject-matter of claim 1 was limited to a honeycomb structural body made of a columnar porous ceramic block of two types of silicon carbide having different average particle sizes. Such features were originally disclosed in paragraph [0032] of the patent specification and via the examples. Hence, the requirement of Article 123(2) EPC was met.

Concerning the subject-matter of claim 1 of the first to fourth auxiliary requests, this was further limited to the second type of particles being smaller in average particle size than the first type of particles, which was consistent with the examples. The term "average particle size" would be clear to the skilled person, and the corresponding values could be determined via any appropriate method. D27 was evidence of this. Furthermore, such requests could not be surprising because the examples and paragraph [0032] referred to such a combination of silicon carbides having smaller/greater particle sizes and accordingly, such limitation constituted an appropriate approach to overcome the objections raised.

The same arguments applied for the fifth auxiliary request, which specified the types of silicon carbide and their proportions exactly, and also in a manner consistent with example 1.

Remittal to the opposition division was appropriate for consideration of the new requests now on file.
VIII. The arguments of the respondent (opponent OII) may be summarised as follows:

Neither the main request nor the auxiliary requests should be admitted into the proceedings. The main request could have been submitted with the grounds of appeal as it was substantially identical to the second auxiliary request before the opposition division. The appellant had never argued against the conclusions of the opposition division concerning lack of inventive step of such subject-matter. Such broadening of claim 1 could not have been expected. The framework of the appeal would be changed entirely and new arguments would need to be presented for the first time in the appeal proceedings. Admittance of the requests should be refused in accordance with Article 13 of the Rules of Procedure of the Boards of Appeal (RPBA).

The subject-matter of claim 1 of the first to fifth auxiliary requests was not disclosed in the application as originally filed (Article 123(2) EPC). There was no general originally filed disclosure concerning a ceramic block formable by two types of silicon carbide having the claimed ranges. Moreover, such subject-matter was not clear since it was not stated which definition of average particle size was meant nor was any method for the determination of the average particle size disclosed in the specification. In this respect decision T 1819/07 (see keyword) already found that the term "average particle size" rendered a claim unclear as long as the particular type of average (eg, volume, surface or number) and a method for its determination was not specified in a claim. D27 was not prior art and anyway referred to particular kinds of
silicon carbide determined by a particular determination method. Such evidence did not overcome the objections raised.

Thus, all the late-filed requests were *prima facie* not allowable and therefore should not be admitted into the proceedings.

IX. With letter of 29 April 2010, the respondent (opponent OI) argued only that it no longer had any commercial interest in taking an active part in the appeal proceedings in view of the requests filed with the grounds of appeal but that this would not apply to any claims of broader scope.

**Reasons for the Decision**

1. The appeal is admissible.

2. *Procedural aspects*

   2.1 In the statement setting out the grounds of appeal, the requests made during the first instance proceedings were no longer pursued. All requests filed in the written phase of the appeal proceedings, whether with the grounds of appeal or following receipt of the communication of the Board (annexed to the summons to oral proceedings), comprised an amended claim 1 containing additional features with regard to the manufacturing process of the honeycomb body and with respect to the functioning of the honeycomb body when in use.
2.2 Contrary thereto, the subject-matter of claim 1 of the main request as filed during oral proceedings and now under consideration is substantially identical to the subject-matter of claim 1 of the second auxiliary request before the opposition division (the only amendments being the limitation to silicon carbide as material for the ceramic block and the specification of the method for determination of the surface roughness Ry). The amendments made in all requests filed in the written phase of the appeal proceedings thus included additional features which were then the subject of objections in the appeal proceedings. These additional features were then in effect deleted as the result of the new request filed during oral proceedings. In this way, claim 1 has been broadened significantly with respect to claim 1 of the various requests filed during the written phase of the appeal proceedings. Thus, the framework of the appeal would be altered completely if the new main request were to be admitted.

2.3 Article 12(1)(a) RPBA states inter alia that appeal proceedings are to be based on the notice of appeal and statement of grounds of appeal filed pursuant to Article 108 EPC. So far as concerns an appellant, Article 12(2) RPBA requires that the statement of grounds of appeal should contain its complete case and set out clearly and concisely the reasons why it is requested that the decision under appeal be reversed, or amended, and should specify expressly all the facts, arguments and evidence relied on.

2.4 According to Article 13(1) RPBA, it lies within the discretion of the Board to admit any amendment to a party's case after it has filed its grounds of appeal
or reply and states that "the discretion shall be exercised in view of *inter alia* the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy."

3. **Application of these procedural principles to the main request**

3.1 Comparing the subject-matter of claim 1 with the subject-matter of claim 1 as granted, the subject-matter of dependent claims 2, 3 and 5 has been added. Such subject-matter corresponds essentially to the subject-matter of claim 1 of the second auxiliary request before the opposition division, which was found to lack an inventive step.

3.2 Beyond these amendments, claim 1 has been further limited to specify the material of the columnar porous ceramic block as being silicon carbide, and the surface roughness has been defined as being "measured based upon JIS B0601".

3.3 Such specification of the material of the porous ceramic block and the insertion of the determination method do not *prima facie* alter the reasons which were given by the opposition division concerning lack of inventive step of the then second auxiliary request. It is also noted that A1, used by the opposition division as a starting document for the problem/solution approach, already cites in its paragraph [0016] silicon carbide as a suitable ceramic material. Hence, this amendment is *prima facie* not appropriate for overcoming the objection of lack of inventive step. The insertion of the determination method for the surface roughness
has no influence on the reasons for the refusal of the patent either. The opposition division already implicitly assumed such a determination method in its reasoning. Accordingly, the reasons given by the opposition division for its finding of lack of inventive step still apply *prima facie* and have not been commented on otherwise during the written appeal proceedings.

3.4 When taking into account the proposed amendments / deletions of features in claim 1, it is clear that they raise issues which neither the Board nor the other parties could be expected to deal with since the appeal had not been based at all upon such subject-matter. In order to be admitted, any late-filed request should, for procedural economy reasons at least, be *prima facie* allowable, which is not the case here in view of the subject-matter having been held non-inventive by the opposition division.

3.5 Neither in the statement of the grounds of appeal nor in any subsequent submission did the appellant explain why the decision of the opposition division on inventive step of the second auxiliary request should be overturned. The appellant's argument that sections 3 to 5 in the grounds of appeal equally applied to the requests before the opposition division is not convincing. Section 3 refers in particular to the functional feature relating to the release of ashes, which feature was not present in the first instance requests. Section 4 specifically comments on the improvements added via the manufacturing process of extrusion moulding, which feature was also not present in the requests before the opposition division.
Section 5 adds further statements concerning the mechanism to remove ashes and hence only provides arguments for the functioning of the honeycomb body when in use. Thus, all arguments previously filed in the appeal proceedings concern the impact of additional features. Although not decisive, it may also be added that D25 highlights the function of removing ashes as a crucial feature of the invention and compares the exfoliation of ashes when applying silicon carbide sheets in comparison to cordierite sheets. However, this test is not related to a honeycomb structural body having the claimed features and is also not related to the use in an exhaust gas purifying device. Therefore, the test results of D25 lack relevance for the claimed subject-matter.

3.6 Furthermore, the communication of the Board had already highlighted clarity objections to the amended features. Hence, in view of the maintenance of similar features in all subsequent written submissions, it could not have been expected that a request deleting these features would have to be considered at the oral proceedings for the first time.

3.7 If the request were admitted, the Board as well as the parties would be faced for the first time with new arguments as to why this claimed subject-matter would be inventive and why the opposition division's decision was incorrect. Accordingly, the deletion of these features has the effect of changing the appellant's case from that set out in the grounds of appeal and in a direction which, objectively, could not be expected. Such a request and supporting arguments could have been submitted earlier and their submission is thus not
consistent with the requirements set out in Articles 12 and 13 RPBA.

3.8 Hence, the Board exercised its discretion under Article 13(1) RPBA not to admit the main request.

4. Auxiliary requests 1 to 4

4.1 Amendments

The subject-matter of claim 1 of all these requests is limited to specific ranges for the average particle sizes of a first and a second type of particles (first and second auxiliary requests) or of α- and β-type silicon carbide particles (third and fourth auxiliary requests). The numerical ranges for the different average particle sizes are always the same and correspond to the ranges defined originally for "particles" in general. Hence, the "first type" or the "α-type" silicon carbide particles are claimed to have an average particle size in the range of from 0.3 to 50 µm and to be present in an amount of 100 parts by weight of particles. They are to be mixed with an amount of between 5 and 65 parts by weight of the "second type" or the "β-type" silicon carbide particles, which are claimed to have an average particle size in the range of from 0.1 to 1.0 µm.

4.2 Article 123(2) EPC

4.2.1 No clear and unambiguous disclosure concerning such "first" and "second" "type" silicon carbide particles (as defined in the first and second auxiliary requests) is present in the application as originally filed, let
alone any disclosure linking such particles to the defined range of particle size.

4.2.2 The disclosure of \( \alpha \)-type and \( \beta \)-type silicon carbide particles (as defined in the third and fourth auxiliary requests) in the examples in the application as originally filed is linked to specific particle sizes and mixing relationships, whereas no disclosure is present which links these two types of silicon carbides to the ranges for the average particle sizes and the mixing relationship such as defined in claim 1 of the third and fourth auxiliary requests.

4.2.3 The appellant stated that "type" means the same as "size" and referred to paragraph [0032]. Paragraph [0032], however, refers to "two kinds of powders" but does not specify whether two different types of material or whether two different types of the same material should be considered. This ambiguous description therefore does not clearly disclose the two types of silicon carbide as claimed. The ranges disclosed in paragraph [0032] are not linked to silicon carbide, let alone to silicon carbide of particular types and particle sizes. The examples in the patent in suit do not provide a basis for such generally claimed two types of silicon carbide particles either, since they exclusively refer to a mixture of an \( \alpha \)-type silicon carbide having a particle size of either 11 \( \mu \text{m} \) or of 50 \( \mu \text{m} \) and a \( \beta \)-type silicone carbide having a particle size of 0.5 \( \mu \text{m} \), rather than disclosing any ranges of particle sizes as in claim 1.

4.2.4 Hence, although the examples refer to a mixture of \( \alpha \)- and \( \beta \)-type silicon carbide, they do not cover the
ranges disclosed in paragraph [0032] but refer to specific $\alpha$-type silicon carbide and $\beta$-type silicone carbide. Therefore, the examples do not provide a disclosure of the claimed ranges for $\alpha$- and $\beta$-type silicon carbide nor do they provide disclosure of the claimed ranges of particle sizes for any other types or kinds of compounds either.

4.2.5 Accordingly, there is no disclosure of "a first type" and "a second type", or "$\alpha$-type silicon carbide" and "$\beta$-type silicon carbide", linked to the claimed ranges and proportions. Thus the amendments to claim 1 result in subject-matter which is not disclosed in the application as filed, contrary to the requirement of Article 123(2) EPC.

4.3 Articles 83 and 84 EPC

The term "average particle size" is not further specified in the specification. There are two issues related to this terminology.

4.3.1 The first issue is that it is not clear (Article 84 EPC), whether the "average particle size" should be understood as the arithmetic mean diameter $d$, the volume or the mass mean diameter $d_v$ or the mean surface area diameter $d_s$ (see e.g. T 1819/07, reasons 3.2). These different definitions are commonly applied by the skilled person for particles having asymmetric shapes. The patent in suit also discloses no information in this respect.

4.3.2 The second issue is linked to the method of determination of the average particle size and concerns
the availability of different methods for determining the values and ranges for the different definitions of average particle sizes. Again, there is no disclosure in this respect in the patent in suit.

4.3.3 The appellant referred, with regard to "average particle size" and its determination methods, to the disclosure in paragraph [0032] as providing sufficient information for the skilled person, who could therefore apply any well-known method to reliably reproduce such data. However, paragraph [0032] neither defines the kind of average particle size to be considered nor does it refer to a method for its determination. Claim 1 thus lacks clarity, contrary to Article 84 EPC.

4.3.4 In a further argument, the appellant relied upon D27. D27, however, only discloses a particular sort of α- and β-type silicon carbide particles which could be purchased via one supplier. The method (TEM electron microscopy) applied by this supplier for the determination of the particle size is not further defined with regard to its specific determination characteristics, something that would be necessary in order to allow reliable reproducibility of the results. D27 is also an internet-printout from 2011 and thus, being published well after the filing date of the patent, lacks relevance.

4.3.5 The lack of any indication as to which type of average particle size is meant, and the lack of any determination method in the patent specification, also result in a lack of sufficient disclosure. Although the appellant referred to well-known sieving methods, not only does the patent not disclose such a method, but in
view of the claimed nm- and µm-ranges of the particle sizes it is evident that a detailed description of such a method would be required. The requirements of Article 83 EPC are therefore also not met.

4.4 It follows from the above that these requests are clearly not allowable. Under these circumstances and since they were filed at a very late stage of the proceedings, namely during the oral proceedings, the Board exercised its discretion under Article 13(1) RPBA not to admit these requests.

5. **Auxiliary request 5**

5.1 Since claim 1 also defines an "average particle size", the objections under Article 83 and 84 EPC applicable to the first to fourth auxiliary requests above apply equally to this request.

5.2 At least for these reasons also this request is clearly not allowable. Hence, the Board exercised its discretion under Article 13(1) RPBA not to admit this request into the proceedings.

6. **Appellant's request for remittal of the case to the opposition division**

Since none of the late-filed requests could be admitted into the proceedings, remittal of the case to the opposition division would not serve any useful purpose.

Whilst under Article 111(1) EPC the Board has a power *ex officio* to remit the case to the opposition division for further prosecution, it would only be appropriate
to do this in a case where, as a minimum, there were materials before it which indicated that one or more of the claims under attack in the appeal proceedings were prima facie highly likely to be valid (see e.g. T 1002/92, paragraph 3.4 (OJ EPO 1995, 605)). In the present case, no such materials exist. The request for remittal is therefore refused.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar     The Chairman

M. Patin     M. Harrison