BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

D E C I S I O N
of 13 September 2005

Case Number: T 0446/03 - 3.3.1

Application Number: 96308126.0

Publication Number: 773270

IPC: C09G 1/02

Language of the proceedings: EN

Title of invention:
Polishing slurries and a process for the production thereof

Patentee:
TOKUYAMA CORPORATION

Opponent:
DEGUSSA AG

Headword:
Polishing slurries/TOKUYAMA

Relevant legal provisions:
EPC Art. 54(3), 56, 114(2)

Keyword:
"Late filed documents - two not admitted"
"Novelty (yes)"
"Inventive step (yes) - non-obvious solution"

Decisions cited:
T 0197/86, T 0633/97

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0446/03 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 13 September 2005

Appellant: (Opponent)
Degussa AG
Rodenbacher Chaussee 4
D-63457 Hanau-Wolfgang (DE)

Representative:
-

Respondent: (Proprietor of the patent)
TOKUYAMA CORPORATION
1-1 Mikage-cho
Tokuyama-shi
Yamaguchi-ken (JP)

Representative:
Cresswell, Thomas Anthony
J.A. Kemp & Co.
14 South Square
Gray's Inn
London WC1R 5JJ (GB)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 5 March 2003 rejecting the opposition filed against European patent No. 773270 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: A. Nuss
Members: P. P. Bracke
R. Menapace

Summary of Facts and Submissions

I. The appeal lies from the Opposition Division's decision to reject the opposition against European patent No. 0 773 270.

The patent was granted with twelve claims, the independent claims reading:

"1. A polishing slurry comprising a silica-dispersed solution obtainable by dispersing, in an aqueous solvent, a fumed silica having an average primary particle size (as defined in the description) of from 5 to 30 nm, the silica-dispersed solution exhibiting a light scattering index (n) (as defined in the description) of from 3 to 6 at a silica concentration of 1.5% by weight, and the fumed silica dispersed therein having an average secondary particle size (as defined in the description) of from 30 to 100 nm on the weight basis."

"6. A process for producing a polishing slurry comprising pulverizing, using a high-pressure homogenizer, a silica-dispersed solution obtainable by dispersing a fumed silica in an aqueous solvent, so that the fumed silica possesses an average primary particle size (as defined in the description) of from 5 to 30 nm, and an average secondary particle size (as defined in the description) of from 30 to 100 nm on the weight basis, the silica-dispersed solution exhibiting a light scattering index (n) (as defined in the description) of from 3 to 6 at a silica concentration of 1.5% by weight."

"10. Use of a polishing slurry comprising a silica-dispersed solution obtainable by dispersing a fumed silica having an average primary particle as defined in the description size of 5 to 30 nm and an average secondary particle size (as defined in the description) of from 30 to 100 nm on the weight basis in an aqueous solvent, the silica-dispersed solution exhibiting a light scattering index (n) as defined in the description of from 3 to 6 at a silica concentration of 1.5% by weight as a polishing material."

II. In particular, the Opposition Division was of the opinion that the late filed document

(4) WO 93/22103

was not sufficiently relevant to be admitted into the proceedings and that the claimed subject-matter was novel and inventive over the prior art documents cited in the notice of opposition.

III. Oral proceedings before the Board took place on 13 September 2005.

IV. The Appellant (Opponent) contested the novelty of the claimed slurries over documents

(5) Journal of the Ceramic Society of Japan, Int., Edition, vol. 101, pages 690 to 695, and

(6) EP-A-0 708 160,

which were cited for the first time in the appeal proceedings. Moreover, he argued that the claimed slurries were not inventive over the teaching of document (4).

V. The Respondent (Proprietor of the patent) requested that documents (4), (5) and (6) not be admitted into the appeal proceedings and he contested whether the claimed subject-matter was obviously derivable from document (4).

VI. The Appellant requested that the decision under appeal be set aside and that the patent No. 0 773 270 be revoked.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of documents (4), (5) and (6) in the proceedings - Article 114(2) EPC*

2.1 Document (6)

2.1.1 The Appellant filed document (6) as novelty-destroying state of the art according to Article 54(3) EPC with letter dated 26 July 2005. This is long after having received the summons to oral proceedings sent out on 4 April 2005.

In particular, the Appellant submitted that document (6) disclosed a stable aqueous colloidal polishing slurry containing fumed silica having an average primary particle size of 20 nm and an average secondary particle size of 98,8 nm, as presented in Figure 3. Although document (6) was silent about the light scattering index of 3 to 6, the Appellant submitted that this was an inherent parameter obtained for silica-dispersed solutions containing fumed silica with a secondary particle size smaller than 100 nm.

The Respondent, however, contested in its telefax dated 8 September 2005 that the average aggregate particle size of 98.8 nm in Figure 3 of document (6) corresponded to an average secondary particle size of 98.8 nm **on the weight basis** as required by the wording of granted Claim 1 of the patent in suit. In particular, the Respondent submitted that it clearly follows from Figure 3 of document (6) that the value 98.8 nm is the **number mean value** and that this corresponds to a weight mean secondary particle size calculated as 153.4 nm. Therefore, document (6) did not disclose all features of the claimed subject-matter.

At the oral proceedings before the Board, the Appellant, in turn, contested the reliability of the Respondent's submissions and contended that according to other documents the number mean value and the weight mean particle size were identical.

2.1.2 Once oral proceedings have been arranged in appeal cases, the decision to admit new evidence and/or submissions into the proceedings is governed primarily by a general interest in the appeal proceedings being

conducted in an effective manner, i.e. in dealing with as many of the issues raised by the parties as possible, while still being brought to a close within a reasonable time. Therefore, new evidence is normally disregarded if the complexity of the technical issues raised by that new evidence and/or submissions is such that neither the Board nor the other party can be clearly expected to deal with them without adjournment of the oral proceedings. Complex fresh subject matter filed at short notice before or during oral proceedings thus runs the risk of not being admitted into the proceedings without any consideration of its relevance (see T 633/97, point 2.2).

Since in the present case the question of whether or not the secondary particle size presented in Figure 3 of document (6) is embraced by the range of 30 to 100 nm on the weight basis cannot be decided without extensive discussions, Appellant's submissions on the identity of the number mean value and the weight mean particle size are disregarded.

2.1.3 As a consequence thereof, the features of the claimed subject-matter cannot be considered to be directly and unambiguously derivable from document (6). Since document (6) is state of the art under Article 54(3) EPC, which is only relevant for assessing novelty, its content is not *prima facie* sufficiently relevant to be admitted into the proceedings.

2.2 Document (5)

2.2.1 The Appellant filed document (5), which is cited in paragraph [0036] of the patent in suit, with the

statement setting out the grounds of appeal dated 27 May 2003.

In particular, he submitted that document (5) disclosed under paragraph 3.2.1 aqueous silica-dispersed compositions, which contain fumed silica having an average primary particle size of 20, 13, 9 or 8 nm and an average secondary particle size of 125, 120, 115 or 110 nm and which exhibit a light scattering index within the range of 3 to 6. Since in paragraph [0036] of the patent in suit it was stated that the average secondary particle size found from a particle size distribution curve shown in Figure 4 of document (5) is about 160 nm which becomes about 130 nm when measured under the same conditions as those of the patent in suit, the Appellant concluded that the disclosed secondary particle size measured under the same conditions as those of the patent in suit was to be reduced by 30 nm and, thus, that document (5) effectively disclosed fumed silica suspensions having a secondary particle size of 95, 90, 85 or 90 nm.

2.2.2 However, the statement in paragraph [0036] of the patent in suit only concerns the particle diameter distribution data presented in Figure 4 of document (5), which are related with dispersibility tests described in paragraph 3.1. Nowhere may it be derived from paragraph 3.2.1 of document (5) that the values for the average secondary particle sizes of 25, 120, 115 or 110 nm cited therein should be reduced by 30 nm.

2.2.3 Therefore, aqueous silica-dispersed compositions, which contain fumed silica having an average secondary

particle size of 95, 90, 85 or 90 nm are not directly and unambiguously derivable from document (5).

2.2.4 Moreover, document (5) only mentions the application of fumed silica as a thickener for various resins and solvents such as silicone resin and unsaturated polyester resin; it is completely silent on the application thereof in polishing slurries.

2.2.5 Since, thus, document (5) neither discloses all features of the claimed silica-dispersed solutions nor the application of such solutions in a polishing slurry, its content is *prima facie* not sufficiently relevant to be admitted into the proceedings.

2.3 Document (4)

The Opposition Division did not consider document (4) to be that *prima facie* relevant to admit it in the proceedings, because document (4) is mentioned in the patent in suit as only one of several documents related to polishing compositions comprising fumed silica and the problem of obtaining products which have smooth, defect-free surfaces is very common in the field of polishing slurries.

Document (4), which is cited in paragraph [002] of the patent in suit, discloses, however, polishing slurries applicable in the very specialised field of semiconductor and microelectronic component preparation and containing fumed silica having a most preferred particle size of about 10 to about 30 nm.

Since document (4) is concerned with the use of fumed silica dispersions in the same very specialised technical problem area as the one solved by the claimed subject-matter, its content is most relevant in assessing inventive step of the claimed subject-matter. Hence, its content being *prima facie* sufficiently relevant, document (4) is admitted into the proceedings.

3. *Novelty*

3.1 The Appellant submitted that example 1 of document (4) was novelty-destroying for the claimed subject-matter, because sample 2 of example 1 concerned an aqueous slurry prepared by adding 100 grams of fumed silica having a particle size of 15 to 25 nm in 900 ml deionised water in a high shear blender and such slurry was taught to remove amounts of material from a silicon wafer without causing stains, scratches or other surface defects on the surface of the wafers (see page 21, lines 6 to 9 and 15 to 17). Although example 1 was silent on the average secondary particle size, that feature was, he argued, implicitly disclosed by the fact that abrasion took place.

3.2 According to the jurisprudence of the Boards of Appeal, in order to be novelty-destroying, all features in the claimed combination must be directly and unambiguously derivable from the teaching of one single document.

3.3 However, there is nothing in document (4), neither in its example 1, nor elsewhere, from which the average secondary particle size of the fumed silica in the aqueous slurry can be unambiguously derived. Moreover, the Appellant's contention that the removal of amounts

of material from a silicon wafer would implicitly mean that the average secondary particle size of the fumed silica would be embraced within the range of 30 to 100 nm is not supported by any evidence. Therefore, the content of document (4) does not destroy the novelty of the claimed subject-matter.

4. *Inventive step of Claim 1*

4.1 The Appellant submitted that the claimed polishing slurries were obvious from document (4).

4.2 In accordance with the "problem-solution approach" applied by the Boards of Appeal to assess inventive step on an objective basis, it is in particular necessary to establish the closest state of the art forming the starting point, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art.

4.3 Since document (4) is the only cited document concerned with the problem of providing polishing slurries useful in semiconductor and microelectronic component preparation (see the first paragraph on page 6), it is considered to represent the closest state of the art.

4.4 In order to obtain the necessary extraordinarily planar surfaces, document (4) proposes abrasive compositions comprising cerium oxide, fumed silica and precipitated silica, wherein the fumed silica has a most preferable particle size of 10 to 30 nm (see the paragraph bridging pages 6 and 7 and page 9, lines 14 to 17).

Moreover, from the paragraph bridging pages 10 and 11 it follows that both fumed silica and precipitated silica must be used in combination with cerium oxide to produce the desired planarisation action of the abrasive compositions, which is further illustrated by the data provided in Table I of example 1.

4.5 Starting from document (4), the Respondent submitted that the problem underlying the invention was the provision of polishing slurries suitable for polishing semiconductor wafers and microelectronic components having improved polishing and stability properties.

Thus, the question arises whether such improvement has been made plausible.

It was not contested that the only data available in support of such improvement are those in Tables 1 to 4 in the patent in suit. These data concern the polishing and stability properties of slurries comprising fumed silica having average primary and secondary particle and light scattering indexes inside and outside the ranges defined in present Claim 1.

According to the jurisprudence of the Boards of Appeal of the EPO, in order to show a superior effect, the nature of the comparison with the closest state of the art must be such that the effect is convincingly shown to have its origin in the distinguishing feature of the invention (see decision T 197/86 OJ EPO, 1989, 371, Reason 6.1.3).

Since in the patent in suit comparison has not been made with the polishing slurries disclosed in document

(4), the comparison has not been made with the closest state of the art and is, thus, not suitable for making an improvement plausible.

4.6 Therefore, the problem must rather be seen in providing **further** polishing slurries suitable for polishing semiconductor wafers and microelectronic components having good polishing and stability properties.

4.7 The present patent in suit claims to solve this problem by the slurries defined in Claim 1.

4.8 The Board sees no reason to contest that this problem has successfully been solved by the slurries according to Claim 1.

4.9 Therefore, it remains to be decided, whether in the light of the teaching of document (4) a skilled person seeking to solve the problem mentioned under point 4.6 would have arrived at the slurries of Claim 1 in an obvious way or not.

From document (4) one understands that slurries suitable for polishing semiconductor and microelectronic components providing excellent planarisation action need three components, namely cerium oxide, fumed silica and precipitated silica. In particular, document (4) states on page 11, lines 10 to 14, that a superior polishing and planarisation effect may only be obtained if a combination of those three abrasives is present and that such effect is not obtained with aqueous slurries of fumed silica alone or in combination of precipitated silica.

It may not also be deduced from document (4) that polishing slurries having similar properties as those described therein could be obtained by preparing fumed silica dispersions wherein the fumed silica particles have an average secondary particle size between 30 and 100 nm on the weight basis, such silica-dispersed solution having a light scattering index of from 3 to 6, as in Claim 1 of the patent in suit.

Therefore, the slurries claimed therein are not obvious from document (4).

5. The claims dependent on Claim 1, the process claims and the use claims are inventive over the teaching of document (4) for the same reasons as given under point 4 above.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin A. Nuss