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**Datasheet for the decision
of 19 July 2011**

Case Number: T 0305/09 - 3.3.10

Application Number: 96906906.1

Publication Number: 0816466

IPC: C09K 3/18

Language of the proceedings: EN

Title of invention:

Use of material having ultrahydrophilic and photocatalytic surface

Patentee:

Toto Ltd.

Opponent:

Evonik Degussa GmbH
AGC Flat Glass Europe SA

Headword:

Use of a self-cleaning composite having a photocatalytic titania surface layer/ TOTO LTD.

Relevant legal provisions:

EPC Art. 54, 56
EPC R. 80
RPBA Art. 13(3)

Keyword:

"Main request and first auxiliary request: Novelty (yes)"
"Inventive step (no): solution to technical problem obvious"
"Second auxiliary request: not admitted - Rule 80"
"Third to sixth auxiliary request: not admitted - fresh case"

Decisions cited:

T 0153/85, T 0401/95

Catchword:

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Case Number: T 0305/09 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of 19 July 2011

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Representative: -

Decision under appeal: Decision of the Opposition Division of the European Patent Office posted 24 November 2008 revoking European patent No. 0816466 pursuant to Article 101(3)(b) EPC.

Composition of the Board:

Chairman: P. Gryczka
Members: C. Komenda
D. S. Rogers

Summary of Facts and Submissions

- I. The Appellant (Patentee) lodged an appeal against the decision of the Opposition Division which revoked the European patent No. 816 466.
- II. In opposition proceedings revocation of the patent in suit in its entirety was requested based on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC), citing *inter alia* documents
- (1) English translation of JP-A-63 100042 and
(3) EP-A-0 590 477.
- III. In the decision under appeal the Opposition Division held that the subject-matter of the claims according to the then pending main request, auxiliary requests I and IV offended against Article 123(2) EPC. The subject-matter according to the then pending auxiliary request II lacked novelty over document (3), since a composite material falling within the structure defined in claim 1, when used outside with access to sunlight, will implicitly show a contact angle with water of less than 10°. The subject-matter of the claims according to the then pending auxiliary request III was regarded as being novel over document (3), since it did not disclose the use of a coated composite, wherein the photocatalytic layer comprised titanium dioxide in the anatase form. Starting from document (3) as closest state of the art the technical problem to be solved by the invention consisted merely in providing an alternative to the prior art, since there was no apparent technical effect related to the use of the anatase form of titanium dioxide. This particular form

of titanium dioxide, however, was already disclosed in the prior art. Therefore, the subject-matter of the claims of the then pending auxiliary request III did not involve an inventive step.

IV. With its letter dated 17. June 2011 the Appellant filed six auxiliary requests, the new main request and first auxiliary request corresponded to the second and third auxiliary request, respectively, which were the basis of the disputed decision. Claim 1 of the main request reads as follows:

"1. Use of a composite comprising a substrate and a photocatalytic layer coated thereon, said photocatalytic layer comprising a photocatalytic material selected from the group consisting of TiO_2 in the anatase form, ZnO , SnO_2 , SrTiO_3 , WO_3 , Bi_2O_3 , and Fe_2O_3 , said photocatalytic layer having a surface which has been rendered hydrophilic by photoexcitation with sunlight, and which has a water wettability of less than 10° in terms of the contact angle with water for washing away deposits and or/contaminants adhering on said surface, by occasional contact with rain."

Claim 1 of the first auxiliary request was based on the wording of claim 1 of the main request, wherein the list of metal oxides has been restricted to TiO_2 "in the anatase form".

Claim 1 of the second auxiliary request was based on the wording of claim 1 of the first auxiliary request, wherein the passage "which has a water wettability of less than 10° in terms of the contact angle with water"

was repeated before the passage "by occasional contact with rain".

Claim 1 of the third auxiliary request was based on the wording of claim 1 of the first auxiliary request, wherein the passage "and for precluding contaminants from adhering to the surface as rainwater laden with contaminants flows down along the surface" was appended to the end of the claim.

Claim 1 of the fourth auxiliary request was based on the wording of claim 1 of the third auxiliary request, wherein the passage "which has a water wettability of less than 10° in terms of the contact angle with water" was repeated before the passage "by occasional contact with rain".

Claim 1 of the fifth auxiliary request was based on the wording of claim 1 of the first auxiliary request, wherein the passage "wherein the deposits and/or contaminants include inorganic dusts" was appended to the end of the claim.

Claim 1 of the sixth auxiliary request was based on the wording of claim 1 of the first auxiliary request, wherein the passage "wherein the deposits and/or contaminants are both city grime and inorganic dusts" was appended to the end of the claim.

- V. The Appellant submitted that the subject-matter of claim 1 was novel over document (1), as this document did not disclose that the metal oxide film of titanium dioxide was crystallized in the anatase form. Further, it was also novel over document (3), which did not

disclose that the metal oxide thin film in the Example of use 5 had a wettability of less than 10° in terms of the contact angle with water. Starting from documents (3) as closest state of the art the subject-matter of the claims involved an inventive step, as none of the cited documents taught the skilled person that an improvement of the self-cleaning property could be achieved by the use of a composite having a wettability of less than 10° in terms of the contact angle with water. The auxiliary requests 2 to 6 were filed at a late stage, but the amendments made to the claims clarify the subject-matter thereof and the features added were rather simple features introduced in response to the Respondent's arguments in appeal proceedings.

VI. The Respondent II argued that the subject-matter of claim 1 of the main request and of the first auxiliary request lacked novelty with regard to documents (1) and (3). Starting from document (3) as closest state of the art the claimed subject-matter did not involve an inventive step since it was known from document (1) that the self-cleaning property of the composite is improved when the wettability of the surface is increased, which corresponds to a decrease of the contact angle with water, as can be seen from Figure 1 of document (1). He objected to the Appellant's auxiliary requests 2 to 6 as being late filed and, requested that these requests were not admitted into the appeal proceedings.

VII. Former Opponent III withdrew its opposition and is, therefore, no longer a party to the proceedings.

VIII. The Appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of claims 1 to 10 according to his main request, or, subsidiarily, on the basis of claims 1 to 10 according to any of the first to sixth auxiliary requests submitted with letter dated 17 June 2011.

The Respondent II requested that the appeal be dismissed.

The Respondent I filed neither comments nor requests and informed the Board that he will not participate at the oral proceedings.

IX. At the end of oral proceedings held on 19 July 2011 the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.
2. The main request and the first auxiliary request are identical to the second and third auxiliary requests, respectively, on which the decision under appeal is based. No objection was raised concerning their admissibility into the proceedings.

Main request

3. *Amendments (Article 123 EPC)*

It was not contested in the decision under appeal that the claims of the main request had a basis in the application as filed and did not extend the protection conferred (Article 123 (2) and (3) EPC). In view of the negative outcome with respect to the issue of inventive step in the appeal proceedings, it is unnecessary to go into more detail with respect to this issue.

4. *Novelty (Article 54 EPC)*

In the appeal proceedings the Respondent II argued that the subject-matter of claim 1 of the main request was not novel in view of the disclosure of document (1).

4.1 Document (1) discloses a glass composite product, which comprises a glass substrate that has been coated with a photocatalytic layer of titanium dioxide. This product is used for windows of buildings or vehicles, which, consequently, may come in contact with rain (page 1, lines 10 to 12). Due to irradiation with light the photocatalytic titanium dioxide layer of the glass composite decomposes the stains and removes them (page 1, line 35 to page 2, line 2; page 2, lines 23 to 27). At the same time a decrease of the contact angle with water is observed, which is even reduced to values below 10° for the samples 3, 6, 7 and 5, corresponding to an increased hydrophilicity of the photocatalytic titanium dioxide surface (Figure 1; page 3, lines 18 to 27). Further, document (1) mentions various methods for depositing the titanium dioxide

onto the surface of the glass substrate, which are known to lead to different crystallographic forms of titanium dioxide. These methods also mention the CVD method (page 2, lines 8 to 11) which leads to the deposition of titanium dioxide in the anatase form. However, a specific composite having a surface coated with a photocatalytic layer of titanium dioxide in the anatase form in combination is not directly and unambiguously derivable from document (1).

- 4.2 The decision under appeal stated that the technical feature defining that the wettability of the photocatalytic layer, which in terms of the contact angle with water was below 10° , was inherently achieved when exposing the photocatalytic surface disclosed in document (3) to irradiation with sunlight. Since, however, there is no indication which could support this allegation, the Board accepts that document (3) does not disclose this technical feature required by claim 1. As document (3) was no longer cited against novelty in the appeal proceedings the Board sees no need to go into more detail with respect to this issue.
- 4.3 Thus, the Board accepts that the subject-matter of claim 1 of the main request is novel over documents (1) and (3).
- 4.4 The Respondent II further submitted that the subject-matter of the claims according to the main request should not be entitled to claim a priority date of 14. June 1995 based on JP-A-182019/95. As a consequence thereof document EP-B-850 204, which was filed after the priority date constituted prior art according to

Article 54(3) EPC. Further, the disclosure of this document anticipated the subject-matter of claim 1.

As, however, this document is not relevant in the discussion of inventive step and in the light of the negative conclusion on inventive step (see below) the Board will not discuss this matter further.

5. *Inventive step (Article 56 EPC)*

5.1 For the assessment of inventive step in accordance with the "problem-solution approach", it is necessary to establish the closest prior art in order to determine in the light thereof the technical problem which the invention addresses and solves. The "closest prior art" is normally represented by a prior art document disclosing subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common.

5.2 The present application is directed to a use of a composite for rendering a surface self-cleaning when exposed to sunlight and rain. A similar use is disclosed in document (3), which was considered as representing the closest prior art in the decision under appeal. The Board considers also that this document represents the closest state of the art and, hence, takes it as the starting point for assessing inventive step.

Document (3) discloses in its "Example 5 of use" an architectural material with self-cleaning properties, which is used for external walls or roof parts. This material exhibits on its outer surface a thin film of a

photocatalytic metal oxide, which can be titanium dioxide (claim 1; or column 3, line 55 to column 4, line 5). The surface carrying the photocatalytic metal-oxide thin film is exposed to weathering conditions. When this photocatalytic metal-oxide film is irradiated with sunlight it decomposes contaminants adhering to its surface through photocatalytic activity and by contact with rainwater the contaminants are washed away (column 5, line 28 to column 9, line 1).

- 5.3 According to the Appellant when starting from this closest state of the art the problem to be solved by the invention was to improve the self-cleaning properties.
- 5.4 As solution to this problem the patent in suit proposes the use of composites, characterized in that the photocatalytic metal oxide layer has a surface that has been rendered hydrophilic having a water wettability of less than 10° in terms of the contact angle with water.
- 5.5 According to the Appellant it can be derived from Example 3 of the patent in suit that the samples having a wettability of less than 10° in terms of the contact angle with water show less change in gloss and colour when subjected to outdoor contamination which indicates improved self-cleaning properties.

This was not contested by Respondent II. The Board can therefore accept in favour of the Appellant that the technical problem as formulated above (see paragraph 5.3 *supra*) has been successfully solved.

- 5.6 Finally, it remains to be decided whether or not the proposed solution to the technical problem, namely the use of composites according to claim 1, which have a water wettability of less than 10° in terms of the contact angle with water, is obvious in view of the state of the art.
- 5.7 Document (1) concerns the same technical field as the patent in suit and addresses the problem of removing contaminants and preventing build up of new contamination on the surface exposed to outdoor conditions. This document discloses a glass composite product, which comprises a glass substrate that has been coated on its outer surface with a photocatalytic layer of titanium dioxide, which may also be in the anatase form (see paragraph 4.1 *supra*). Under the normal using conditions, which is the use outside and the exposition to sunlight, the contact angle with water is very small and even below 10° as can be derived from Figure 1. As disclosed on page 3, lines 17 to 27, the surface of the photocatalytic metal oxide layer has an increased hydrophilicity, as it becomes easily wet, and becomes extremely difficult to stain. A skilled person, when looking for a solution to the technical problem mentioned above (see paragraph 4.3 *supra*) would, therefore, have a clear incentive from document (1) to increase the hydrophilicity of the photocatalytic metal oxide layer by lowering the contact angle with water below 10° in order to improve the self-cleaning properties of the metal oxide coated composites known from document (3). Consequently, he would have arrived at the subject-matter of claim 1 according to the main request without having to exercise any inventive skill.

5.8 The Appellant argued that the photocatalytic titanium dioxide films of document (1) always contained dopant metals, such as platinum, rhodium or palladium. Therefore, the results as shown in Figure 1 could not be transferred to undoped titanium dioxide, let alone to titanium dioxide in the anatase form.

However, the wording of claim 1 does not exclude the presence of dopants, thus photocatalytic titanium dioxide metal films containing further dopant metals thus fall within the ambit of claim 1. As titanium dioxide in the anatase form is encompassed by document (1) (see paragraph 4.1 *supra*) the use of this crystallographic form in the claimed composites is also obvious from that document.

Therefore, the claims of the Main Request do not satisfy the requirements of Article 56 EPC.

First auxiliary request

6. *Amendments (Article 123 EPC)*

The use as claimed in claim 1 according to the first auxiliary request is based on the wording of claim 1 of the main request, in which all the oxides other than titanium dioxide in the form of anatase have been deleted (see paragraph IV *supra*). The Board is satisfied that this restriction of the oxide meets the requirements of Article 123(2) EPC and restricts the protection conferred by the patent as granted according to Article 123(3) EPC.

7. As novelty was acknowledged for the subject-matter of the broader claim 1 of the main request, the same arguments and considerations for novelty also apply to the subject-matter of claim 1 of the first auxiliary request.

8. *Inventive step (Article 56 EPC)*

The arguments on inventive step for the main request focussed on the use of composites with titanium dioxide in the anatase form as metal oxide for the photocatalytic layer. Consequently, the restriction in the first auxiliary request to the photocatalytic layer comprising only titanium dioxide in the anatase form as metal oxide does not alter the arguments for inventive step as already brought forward for the main request. Therefore, the same arguments and considerations as set out already for the discussion of inventive step of the main request also apply to the subject-matter of claim 1 of the first auxiliary request. Consequently, the Board comes to the conclusion that the subject-matter of claim 1 of the first auxiliary request does not involve an inventive step in the sense of Article 56 EPC.

Second to sixth auxiliary request

9. *Admissibility of the late filed requests*

One month before the oral proceedings before the Board the appellant submitted for the first time his second to sixth auxiliary requests (see paragraph IV *supra*). All these requests were objected to by the Respondent as being late filed and the Respondent requested that

they not be admitted into the proceedings before the Board.

The purpose of the appeal procedure in inter partes proceedings is mainly to give a party being adversely affected the possibility of challenging the decision of the first instance. However, if the Appellant wants late filed requests to be considered, admission of these requests into the proceedings is a matter of discretion of the Board of Appeal. For exercising due discretion in respect of the admission of fresh requests by the Appellant that were not before the Opposition Division, it is established case law of the Boards of Appeal that crucial criteria to be taken into account are whether or not the amended claims of those fresh requests are clearly allowable and whether or not those amended claims give rise to fresh issues which the other party can reasonably be expected to deal with properly without unjustified procedural delay (see decisions T 153/85, OJ EPO, 1988, 1, points 2.1 and 2.2 of the reasons; T 401/95, point 5.2 of the reasons, not published in OJ EPO).

9.1 *Second auxiliary request*

9.1.1 According to Rule 80 EPC, the claims of a granted patent may be amended, provided that the amendments are occasioned by a ground for opposition specified in Article 100 EPC.

9.1.2 In the present case, claim 1 of the second auxiliary request was based on the wording of claim 1 of the first auxiliary request, wherein the passage "which has a water wettability of less than 10° in terms of the

contact angle with water", which was already present in the granted version of claim 1, was repeated again before the passage "by occasional contact with rain". According to the Appellant it does, however, not change the subject-matter of claim 1 of the first auxiliary request.

The amendment to claim 1 of the second auxiliary request thus merely modifies the wording of claim 1 of the first auxiliary request without amending the subject-matter thereof, such that said amendment cannot be occasioned by, any ground for opposition as required by Rule 80 EPC. This is confirmed by the argument of the Appellant explaining that this amendment had been introduced to clarify the wording of the claim, clarity not being a ground for opposition.

9.1.3 As a result, the second auxiliary request is not clearly admissible and cannot therefore at this late stage of the appeal proceedings be admitted into the proceedings.

9.2 *Third to sixth auxiliary request*

9.2.1 Claim 1 of the third and fourth auxiliary requests were based on the wording of claim 1 of the first auxiliary request, wherein *inter alia* the passage "and for precluding contaminants from adhering to the surface as rainwater laden with contaminants flows down along the surface" was appended to the end of claim 1. Basis for this amendment is to be found on page 12, lines 33 to page 13, line 1 of the application as filed.

Claim 1 of the fifth auxiliary request was based on the wording of claim 1 of the first auxiliary request, wherein the passage "wherein the deposits and/or contaminants include inorganic dusts" was appended to the end of the claim. Basis for this amendment is to be found on page 12, line 22 of the application as filed.

Claim 1 of the sixth auxiliary request was based on the wording of claim 1 of the first auxiliary request, wherein the passage "wherein the deposits and/or contaminants are both city grime and inorganic dusts" was appended to the end of the claim. Basis for this amendment is to be found on page 12, line 14 and lines 20 to 22 of the application as filed.

9.2.2 The objection which may have prompted the third to sixth auxiliary requests, namely lack of inventive step over documents (3) and (1), was known to the Appellant from the beginning of the appeal proceedings. The Respondent objected from the beginning that it was obvious to use a composite having a photocatalytic layer of titanium dioxide in the anatase form for improving the self-cleaning property of composites exposed to outdoor conditions. Therefore these requests were not induced by objections, facts or evidence freshly raised during appeal proceedings and no reasons have been given for the filing of these auxiliary requests only one month before the oral proceedings before the Board.

Furthermore, the amendments made to claim 1 of the third to sixth auxiliary requests take up features which were merely mentioned in the description of the patent in suit and had never before formed the basis

for any claim. Moreover, these features are not emphasised in the patent in suit as contributing to solving the problem underlying the invention in any way. Therefore the Respondent could not reasonably be expected to prepare itself for dealing with the fresh issues arising from said amendments, having no possibility to search for new documents or submit other evidence for challenging the patentability of the newly filed claims.

9.2.3 Thus, the Board concurs with the Respondent's objections that the third to sixth auxiliary requests give rise to fresh issues not yet addressed which the Respondent could not be expected to respond to at the oral proceedings, thus possibly violating its right to be heard, whereas to give him time to respond would have led to undue procedural delay, i.e. an adjournment of the oral proceedings already arranged before the Board.

9.2.4 For these reasons, the Board exercises its discretion not to admit the third to sixth auxiliary requests into the proceedings according to Article 13(3) of the RPBA.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

C. Rodríguez Rodríguez

P. Gryczka