

## Deckblatt Übersetzung

### Daten der Übersetzung:

Court/Gericht:	Bundesgerichtshof
Date of Decision / Datum der Entscheidung:	2016-08-23
Docket Number / Aktenzeichen:	X ZR 81/14
Name of Decision / Name der Entscheidung:	Photokatalytische Titandioxidschicht

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**Arbeitskreis  
Patentgerichtswesen**  
in Deutschland e.V.



# FEDERAL COURT OF JUSTICE

## ORDER

X ZR 81/14

of

23 August 2016

in the patent nullity proceedings

Photokatalytische Titandioxidschicht/  
Photocatalytic titanium dioxide layer

Patent Act Sec. 83

If the defendant defends the patent in suit in the oral proceedings before the Patent Court in an amended version which adds further features taken from a valid subclaim to features of a previously filed auxiliary request, a new means of attack against the patentability of this technical teaching raised by the plaintiff in the oral proceedings may in any case not be rejected as belated if the qualified reference of the Patent Court gave the defendant cause to formulate the version of the patent defended in the oral proceedings already within the time limit set by the Patent Court.

Federal Court of Justice, order of 23 August 2016 - X ZR 81/14 –  
Federal Patent Court

The X. Civil Senate, following the oral hearing on 23 August 2016, attended by the presiding judge Prof- Dr. Meier-Beck, the judges Gröning, Dr. Grabinski, Hoffmann and the judge Dr. Kober-Dehm

ordered that:

The judgment of the Federal Patent Court of 25 March 2014 shall have no effect.

The costs of the legal dispute, including the costs of the intervention, are to be borne by the defendant.

Grounds of the order:

1 I. The defendant is the proprietor of the German patent 196 81 289 (patent in suit) filed on 21 March 1996, claiming Japanese priorities of 20 March 6 April, 14 June, 8 July, 9 November and 22 December 1995, which was granted with effect for the Federal Republic of Germany. Claim 1 of the patent in suit, to which claims 2 to 11 are directly or indirectly referred back, was given the following wording in the opposition proceedings:

"Use of a composite material comprising a support and a photocatalytic layer provided thereon, wherein the photocatalytic layer comprises a photocatalytic material selected from the group consisting of TiO<sub>2</sub> in the anatase form and SnO<sub>2</sub>, and further comprises SiO<sub>2</sub> or silicone, and the photocatalytic layer has a surface area which has been rendered hydrophilic by exposure to sunlight, said hydrophilic surface having a water wettability of less than 20° as expressed by the contact angle with water, as a material from which deposits and/or impurities adhering to said surface are washed off by occasional contact with rain. "

2 The plaintiff and the intervenor, who joined the litigation on its side, argued that the subject matter of the intervening patent went beyond the content of the original application and was not patentable. The defendant defended the patent in suit in a limited manner with one main request and seven auxiliary requests. The Patent Court declared the patent in suit null insofar as it went

beyond the wording of the seventh auxiliary request of the defendant.

3           The defendant appealed against this decision, initially continuing to defend the patent in suit with its main and first six auxiliary claims already asserted before the Patent Court. The plaintiff and its intervener opposed this and, in their cross-appeal, continued to pursue the request that the patent in suit be declared null in its entirety. After the patent in suit lapsed due to the passage of time, the parties unanimously declared the legal dispute resolved with conflicting requests for costs.

4           II.       After the parties have unanimously declared the legal dispute to be settled on the merits, a decision on the costs of the legal dispute is only to be made in accordance with Sec. 121(2) Patent Act in conjunction with Sec. 91a Code of Civil Procedure on an equitable basis, taking into account the submissions of the parties to date (Federal Court of Justice, order of 28 May 2009 Xa ZR 10/05, juris, marginal no. 9). The costs are to be imposed on one side insofar as it would foreseeably have been unsuccessful. Accordingly, it is equitable to order the defendant to pay the costs of the legal dispute because its appeal would probably have been unsuccessful, whereas the cross-appeal of the plaintiff and its intervenor would probably have been successful and would have led to the declaration of nullity of the patent in suit as a whole.

5           1.       The patent in suit relates to the use of a composite material whose surface is brought into a highly hydrophilic state to enable or facilitate self-cleaning. The description of the patent in suit states that external surfaces of buildings become increasingly soiled by inorganic substances such as soot or dust particles (paragraphs 2 to 4). Until now, it had been assumed that water-repellent protective or paint coatings, such as polytetrafluoroethylene (PTFE), were useful to prevent such soiling. According to more recent findings, however, the dirt particles, which contain large amounts of oleophilic components, can be countered more effectively by making the surfaces as hydrophilic as possible (para. 5). For example, it had been proposed to coat the buildings with a hydrophilic graft copolymer, with the coating film having a hydrophilicity of 30 to 40°. Inorganic dusts would have a contact angle with water of 20 to 50°, so there would be an affinity for the graft copolymer. Therefore, inorganic dusts are assumed to adhere to the surface of the graft copolymer coating and fouling is

not prevented. The same applies to an even greater extent to hydrophilic paints, whose contact angle with water is 50 to 70° (par. 6 ff.).

6           Against this background, the problem underlying the invention is to provide a composite material which enables or facilitates the self-cleaning of the outer surfaces of buildings, window panes or the like and thus counteracts their soiling. This is to be achieved according to the teaching of patent claim 1 in the version last defended by the defendant in the main application as follows:

- 1           Use of a composite material as a material from which deposits or impurities adhering to the surface are washed off by occasional contact with rain;
- 2           the material comprises a support; and
- 3           a photocatalytic layer deposited on the support, which contains
  - 3.1       a photocatalytic material selected from the group consisting of titanium dioxide (TiO<sub>2</sub>) in the anatase form and silicon dioxide (SiO<sub>2</sub>), and
  - 3.2       also silicon dioxide or silicon;
- 4           the photocatalytic layer has a surface which can be
  - 4.1       has been made hydrophilic by exposure to sunlight; and
  - 4.2       has a water wettability of less than 10°, expressed by the contact angle with water.

7           According to auxiliary request I, it had been intended to add feature 3.2 as follows: "wherein, when silicone is used, the organic groups bonded to the silicon atoms of the silicone molecules are at least partially replaced by hydroxy groups under the photocatalytic action of the photocatalytic material"; in the version of auxiliary requests II to VII, the alternative silicone was to be omitted completely in feature 3.2 in each case. Auxiliary claims III to VII further provided for a feature 3.3<sup>III</sup> according to which the ratio of SiO<sub>2</sub> to the sum of TiO<sub>2</sub> and SiO<sub>2</sub> is 10 to 50 mole percent. According to auxiliary request IV, features 3.1 and 3.2 were to be formulated to mean that the photocatalytic layer contains TiO<sub>2</sub> in the anatase form and SiO<sub>2</sub>; according to auxiliary requests V to VII, they

were to consist of this. Auxiliary claim VI more closely defined the composite material (feature 1) as a mirror, window glass, tile, or exterior panel of a building.

8 In the version given to the patent by the Patent Court in accordance with the first instance auxiliary request VII, the support (feature 2) has been further defined as follows:

2.1<sup>VII</sup> the support is made of glass containing alkaline network modifier ions, and

2.2<sup>VII</sup> a thin film is disposed between the support and the layer to prevent the ions from diffusing from the support into the photocatalytic layer.

9 The Patent Court considered a chemist with a university degree, who has good knowledge in the field of organic and inorganic chemistry as well as polychemistry due to his studies and who has been active for many years in the field of coating of external surfaces, in particular for improved keeping free of dirt by adsorption of dirt particles, to be the relevant skilled person without any legal error and not objected to by the parties.

10 From feature group 4, such a skilled person understands that the surface of the photocatalytic layer need not be permanently in a highly hydrophilic state, as defined in feature 4.2 by the contact angle of the surface with water of less than 10°, but that it is sufficient according to the invention if the surface of the photocatalytic layer can be brought into this state by exposure to sunlight. Accordingly, it is explained to the skilled person in the description that the surface of the photocatalytic layer is made highly hydrophilic ("super-hydrophilic") by irradiation with light of a sufficient intensity and with a wavelength whose energy is higher than the band gap energy of the photocatalytic support conductor, hence the water wettability of the surface is less than about 10° (para. 18). If the surface has been brought into such a state of "super-hydrophilicity", this continues for a certain period of time even if the substrate is stored in the dark. Over time, the "super-hydrophilicity" of the surface is gradually lost due to impurities adsorbed on the surface hydroxyl groups. However, it could be restored if the surface was again subjected to

photoexcitation by light irradiation (para. 24).

11           2.       The attacks of the defendant's appeal against patentability of the subject matter of patent claim 1 in the versions of the main request and auxiliary requests I to VI would probably be unsuccessful, because it would have had to be assessed that this was not new in the version of the main request and auxiliary requests I to IV and was obvious to the skilled person by the state of the art in the version of auxiliary requests V and VI.

12           a)       In the introduction to D2 (WO 95/11751), the skilled person could read as "Background of the Invention" that heterogeneous photocatalysis was a promising chemical process for oxidation and thus removal of undesirable organic compounds from fluids, including water and air. UV-irradiated catalysts such as titanium dioxide, a semiconductor with a band gap of 3.0 eV (rutile) and 3.2 eV (anatase), absorbed UV light, which generated electrons and holes that migrated to the surface of the catalyst. While the electrons adsorbed oxygen on the surface, the holes oxidized compounds or adsorbed water molecules (D2, p. 1, line 24 ff.). D2 set out to provide a photocatalytic composition that enabled a photocatalyst and a binder to adhere the photocatalyst particles to a variety of surfaces (D2, p. 4, lines 30 ff.). Thus, as the Patent Court correctly pointed out, D2 was of great interest to a skilled person who, in accordance with the task of the patent in suit, wanted to develop a composite material for preventing contamination of external surfaces by self-cleaning.

13           b)       Example 14 describes the production of four photoactive surfaces containing titanium dioxide. Regarding the production of the second photoactive surface, it is stated in detail that soda-lime glass had been coated with a solution containing 99% by weight of water, 0.5% by weight of colloidal silica (Alfa Johnson Matthey) and 0.5% by weight of titanium dioxide (Degussa P-25), the water having evaporated under ambient conditions (D2, p. 39, line 24 ff.; p. 40, line 13 ff.). According to the findings of the Patent Court, which were not challenged by the appeal, the titanium dioxide "Degussa P-25" is a commercial titanium dioxide product which, according to the information in D6, in addition to titanium dioxide in amorphous form, consists predominantly of titanium dioxide in crystalline form with an 80% proportion of anatase and a 20% proportion of rutile. Thus, a composite material was disclosed to the skilled person as a

material comprising a support and a photocatalytic layer applied thereto within the meaning of features 2 to 3.2.

- 14           c)       Also disclosed is the use of a composite material produced in this way as a material from which deposits or impurities adhering to the surface are washed off by occasional contact with rain and thus with water (feature 1). Admittedly, according to the description of D2, scratch hardness tests were carried out with samples of the four coated glasses of Example 14 with slightly different results (D2, p. 41, line 7 ff.) and the section relating to the example is accordingly entitled "Example 14 Measuring Abrasion Resistance by the Scratch Hardness Test" (D2, p. 39, line 24 ff.). However, this did not yet give the skilled person any reason to regard the four embodiments of Example 14 as advantageous exclusively from the point of view of abrasion resistance or scratch resistance. Rather, Example 14 is in the overall context of D2, which, as explained, is concerned with providing a photocatalytic composition for self-cleaning surfaces. The complaint of the appeal that the Patent Court combined the embodiment of example 9, for which the special self-cleaning ability of a composition exposed to the weather, in particular sunlight and rain, is expressly mentioned (D2, p. 36, line 17 ff.), with the second embodiment of example 14 in an impermissible manner would therefore probably not have been successful. Since the composite material of the second embodiment of example 14 is glass, the variant of feature 1VI is also disclosed (see also, for example, D2, p. 3, line 19; p. 5, line 11 f.).
- 15           d)       Indications which could have given rise to doubts about the correctness of the Patent Court's finding that the "super hydrophilicity" according to feature group 4 inevitably occurs when the composite material is used outdoors in the presence of sunlight have not been pointed out by the appeal and would probably not have been discernible for the Senate (Sec. 117 Patent Act in conjunction with Sec. 529(1) No. 1 Code of Civil Procedure).
- 16           (1)       In this context, it could have been irrelevant whether composite materials in which the photocatalytic layer contains silicone as a binder, as in examples 1 and 9 of D2 in the form of polymethylsilsesquioxane, unlike the composite material according to the invention with silicon dioxide as a binder, do not have the property of being rendered hydrophilic by exposure to sunlight

(in the sense of feature group 4), can be made hydrophilic by exposure to sunlight (in the sense of feature group 4), as the defendant claims with reference to experiments in which examples 1 and 9 of D2 are said to have been reworked (E8). This is because if several substances are claimed alternatively as components of a composition of matter, as in feature 3.2 of the patent in suit as binder of the photocatalytic layer silicon dioxide or silicone, the subject matter of the patent already lacks the required novelty in the entire range if one of these substances was known as a component of such a composition (Federal Court of Justice, judgment of 5 May 2015 X ZR 60/13, GRUR 2015, 1091 marginal no. 31 Thickener Polymer I). Accordingly, it is sufficient for the disclosure of feature group 4 that in the second embodiment of example 14 of D2 silicon dioxide (SiO<sub>2</sub>) is disclosed as a binder contained in the photocatalytic layer (D2, p. 40, line 16; cf. also generally p. 10, line 17) and that the Patent Court found that the hydrophilicity according to the invention is necessarily achieved if the surface of such a photocatalytic layer is exposed to irradiation with sunlight for a sufficiently long time. According to the wording of auxiliary claims II to VII, the alternative silicone should be omitted in feature 3.2 anyway.

- 17           (2)     The fact that D2 does not teach that the photocatalytic layer is rendered hydrophilic when exposed to sunlight for a sufficiently long time does not change the disclosure of the feature. In this respect, it is also irrelevant that in the D2 an increased photoactivity of the photocatalytic layer is associated with the hydrophobic properties of a binder, the latter serving to increase the contact angle with water up to 180° (D2, p. 17, line 18 ff.; p. 18, line 3 ff.). The inventors of the patent in suit may be credited with having discovered that the self-cleaning effect of a photocatalytic layer containing TiO<sub>2</sub> and SiO<sub>2</sub> and applied to an outer surface is due to its property of being rendered highly hydrophilic by exposure to sunlight, even if the binder is hydrophobic per se, as illustrated in reference example 11 of the patent in suit, when the contact angle of a photocatalytic layer is 70° without exposure and less than 3° after 5 days of exposure (paras. 135 et seq, 140 ff.). However, the discovery of this correlation of effects does not establish a technical action teaching based on an inventive step, since the use of the composite material according to the invention was at least obvious on the basis of D2 and the photocatalytic layer containing TiO<sub>2</sub> and SiO<sub>2</sub>, according to the findings of the Patent Court, inevitably reaches the

highly hydrophilic state defined in feature 4. 2 (see Federal Court of Justice, judgment of 9 June 2011 X ZR 68/08, GRUR 2011, 999 marginal no. 44 Memantine; judgment of 24 July 2012 X ZR 126/09, GRUR 2012, 1130 marginal no. 29 Leflunomid).

- 18           (3)     Insofar as the appeal has claimed that, according to the invention, silicon dioxide and silicone are selected in such a way that the use with the photocatalyst achieves the water wettability referred to in feature 4.2, whereas the D2 explicitly aims at increasing the contact angle, it could not have succeeded with this either. Neither the patent specification in dispute nor the submissions of the defendant provide a concrete basis for the assumption that the invention and the D2 differ in the requirements for a suitable silicon dioxide.
- 19           e)     As pointed out by the Patent Court, in the second embodiment of Example 14 of D2, the ratio of the weight fractions of SiO<sub>2</sub> and TiO<sub>2</sub> is the same (0.5 weight percent each), which corresponds to a quantity share of SiO<sub>2</sub> in the sum of SiO<sub>2</sub> and TiO<sub>2</sub> of about 57 mole percent. However, it is generally stated in D2 regarding the preparation of the photocatalyst-binder composition that it may contain between about 10 and 90 weight percent photocatalyst particles and between 10 and 90 weight percent binder. Thus, a ratio of SiO<sub>2</sub> to the sum of TiO<sub>2</sub> and SiO<sub>2</sub> of 12.8 to 92 mole percent overlapping with feature 3.3<sup>III</sup> is also disclosed.
- 20           f)     Finally, the Patent Court did not err in law in assuming that the skilled person was inspired by D2 to develop the variants of feature 3.1 claimed in auxiliary claims IV to VI. In the second embodiment of Example 12, as explained, a commercial titanium dioxide product (Degussa P-25) is used for the production of the photocatalytic layer which, in addition to titanium dioxide in amorphous form, consists predominantly of titanium dioxide in crystalline form with 80% anatase and 20% rutile. However, the skilled person will not regard this ratio as a mandatory requirement for the production of the photocatalytic layer, if only because D2 generally instructs him that titanium dioxide is photoactive both in its anatase and in its rutile state and thus equally suitable as a photocatalyst according to the invention (D2, p. 16, line 22 ff.; cf. also D2, p. 2, line 3 ff.). Thus, both crystalline forms of titanium dioxide can be considered for the production of the photocatalytic layer without further ado, whereby their

proportion is left to the discretion of the user. The fact that the photocatalytic layer contains TiO<sub>2</sub> in the anatase form or that the photocatalyst consists of it is thus also at least suggested.

21           2.       The cross-appeal of the plaintiff and its intervener, on the other hand, would probably have been successful, since it would have had to be assessed that the subject matter of auxiliary claim VII had been suggested to the skilled person by the state of the art.

22           The cross-appeal's claim that the Patent Court had failed to examine the subject matter of citation D8/D8a in a procedurally erroneous manner would probably have succeeded. The requirements of Sec. 83(4) Patent Act for a rejection as a belated means of attack would not have been met; the new argument would therefore have had to be taken into account under Sec. 177 Patent Act in conjunction with Sec. 529(1) No. 2 Code of Civil Procedure.

23           a)       Like auxiliary request VI, auxiliary request VII with the version of the claims of the patent in suit which the Patent Court considered to be legally valid was filed by the defendant for the first time in the oral proceedings before the Patent Court. It is true that the failure to reject this auxiliary request, which the cross-appeal complains of as being erroneous in law, cannot be made up for in the appeal proceedings (Federal Court of Justice, judgment of 9 June 2015 X ZR 51/13, GRUR 2015, 976 marginal no. 62 Injection valve). However, the defense of the patent in suit with auxiliary request VII was itself late, so that the plaintiff, which responded to auxiliary request VII directly by relying on D8, could not be charged with the late submission of a means of attack against the subject matter of this auxiliary request.

24           b)       The auxiliary request VII is not filed in due time because the features 2.1VII and 2.2VII added to the features of the auxiliary request V are taken from the applicable patent claim 8.

25           (1)       The defense of the patent in suit with only one valid subclaim while omitting a claim superior to it is also a defense of the patent in an amended version. If the defendant has not previously asserted, at least in the alternative, that the features added in the subclaim are of importance for the assessment of

the inventive step with regard to the technical teaching of this subclaim (i.e. the subject matter of the subclaim has "independent inventive content" using the usual, somewhat abbreviated formulation), the independent defense of the subject matter of the subclaim is a new defense (Federal Court of Justice, judgment of 15 December 2015 X ZR 111/13, GRUR 2016, 365 Telekommunikationsverbindung).

26           (2)     It is irrelevant that the plaintiff explicitly addressed the patentability of the subject matter of patent claim 8 in the nullity action and in this respect exclusively relied on the citation D1, of which the Patent Court stated in its qualified reference that it was not to be taken into account as state of the art due to the preliminary assessment of the priorities, and that the Patent Court further noted there that the subject matter of the subclaims also appeared not to be new with respect to D2 "except for the thin film", by which recognizably patent claim 8 was meant. This is because the defendant did not take up this explicit differentiation in the provisional novelty assessment of the Patent Court and did not argue anything up to the oral hearing that the subject matter of patent claim 8 was not obvious even if the subject matter of patent claim 1 in the various defended versions did not require an inventive step.

27           c)     Presumably, the Senate would have come to the conclusion that the subject^matter of auxiliary claim VII was suggested to the skilled person by citations D2 and D8 (WO 95/15815 = D8a [European patent application 684 075]).

28           The skilled person who, starting from D2, sought to improve the photocatalytic effect of the layer consisting of titanium dioxide and silicon dioxide in order to increase its self-cleaning power, could see from D8/D8a that an intermediate or bonding layer between the support and the photocatalytic layer could be conducive to this goal. Like D2, D8/D8a also relates to a photocatalytic layer of titanium dioxide on surfaces of walls, tiles, glass, etc., in order to make them stain-resistant (D8a, p. 3, lines 3 ff., 9 ff.). Examples 35 and 37 of D8/D8a show that a soda glass plate with a layer of titanium dioxide has an improved photocatalytic effect if it has been provided with an intermediate or bonding layer of pure silicon dioxide before coating with titanium dioxide. Accordingly, it suggested itself to the skilled person to provide such a thin intermediate layer

also for the composite suggested by the D2 when the support is glass. It is true that the improvement of the catalytic effect in D8/D8a is attributed to the fact that the intermediate layer prevents the titanium dioxide particles from being embedded in the soda glass softened by sintering temperatures of 400 to 500° (D8a, p. 50, line 1 ff.). However, this is not important because the effects mentioned in feature 2.2VII necessarily occur when an intermediate layer, as disclosed in D8/D8a, is placed between the glass and the photocatalytic layer. Therefore, the suggestion resulting from D8/D8a is sufficient for the skilled person, when glass is used as a support, to arrange an intermediate layer (for example of pure silicon dioxide) between it and the photocatalytic layer of titanium dioxide and silicon dioxide in order to prevent "migration" of titanium dioxide particles and thus improve the photocatalytic effect.

Meier-Beck

Gröning

Grabinski

Hoffmann

Kober-Dehm

Previous instance:

Federal Patent Court, judgment of 25 March 2014 – 3 Ni 31/12 –