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Boards of Appeal

Chambres de recours

Case Number: T 0196/98 - 3.4.2

**D E C I S I O N** of 7 December 2000  
correcting errors in the Decision  
of the Technical Board of Appeal 3.4.2  
of 30 March 2000

**Appellant:** SUMITOMO CHEMICAL COMPANY LIMITED  
5-33, Kitahama 4-chome  
Chuo-ku  
Osaka-shi  
Osaka 541-0041 (JP)

**Representative:** VOSSIUS & PARTNER  
Postfach 86 07 67  
D-81634 München (DE)

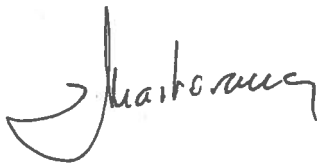
**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 29 September 1997  
refusing European patent application  
No. 90 106 735.5 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** A. G. Klein  
M. Lewenton

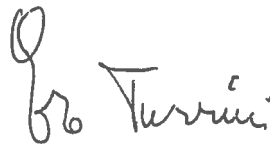
In application of Rule 89 EPC in the "Order" on page 10 of the Decision in the appeal case T 0196/98 - 3.4.2 the expression "16 and 18 as originally filed" in the indication of the pages of description for grant should be changed to "14, 16 and 17 as originally filed".

The Registrar:



P. Martorana

The Chairman:



E. Turrini

**Internal distribution code:**

- (A) [ ] Publication in OJ  
(B) [ ] To Chairmen and Members  
(C) [X] To Chairmen

**D E C I S I O N**  
**of 30 March 2000**

**Case Number:** T 0196/98 - 3.4.2

**Application Number:** 90106735.5

**Publication Number:** 0392409

**IPC:** G03F 7/09, G03F 7/008, G03C 1/52,  
G03C 1/825

**Language of the proceedings:** EN

**Title of invention:**  
Photoresist composition

**Applicant:**  
SUMITOMO CHEMICAL COMPANY LIMITED

**Opponent:**  
-

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
"Inventive step (yes)"

**Decisions cited:**  
-

**Catchword:**  
-



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M. Lewenton

## Summary of Facts and Submissions

- I. European patent application No. 90 106 735.5 (publication No. EP-A-0 392 409) was refused by decision of the Examining Division.

The ground for the refusal was that the claimed subject-matter did not involve an inventive step within the meaning of Article 56 EPC in view of the contents of the following documents:

D1: US-A-4 135 007,

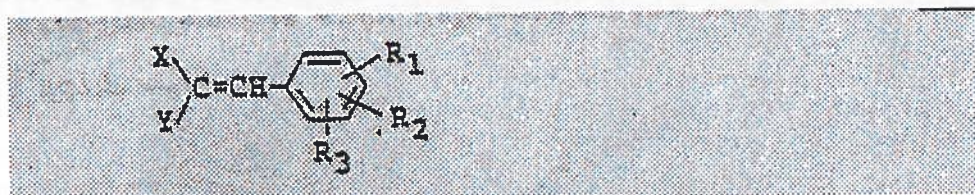
D3: EP-A-0 303 967, and

D5: US-A-3 707 375.

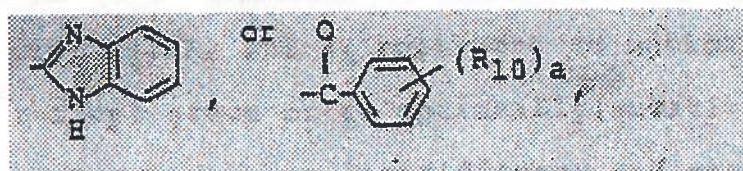
The Examining Division held in particular that the claimed photoresist composition differed from the composition disclosed in document D3 only in that it comprised an ultraviolet (UV) absorber represented by the formula set out in claim 1, instead of the dyes defined generally in D3. The skilled person who wished to prevent halation or notching phenomena, i.e. undue exposition of a photoresist region which should not have been exposed because of the reflection of light on a surface of the substrate or on side walls of steps, would be prompted to replace the dye in the photoresist composition according to document D3 by an absorber as disclosed in documents D1 or D5 and he would thus readily arrive at the claimed photoresist (see point 5 of the Reasons).

II. The appellant (applicant) lodged an appeal against the decision, requesting that it be set aside and that a patent be granted on the basis of a set of claims, of which claims 1 and 4, the only independent claims read as follows:

"1. A photoresist composition which comprises a compound of the general formula:



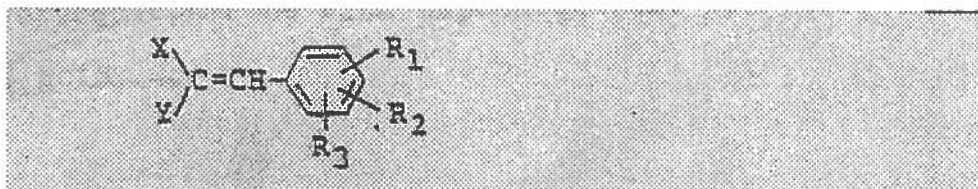
wherein  $R_1$ ,  $R_2$  and  $R_3$  are the same or different and represent a hydrogen atom, a hydroxyl group,  $-OCOR_4$ ,  $-O-R_5$ ,  $-OSi(R_6)_3$ , a halogen atom, an optionally with at least one hydroxyl group substituted alkyl group, an optionally with at least one hydroxyl group substituted alkenyl group, an optionally with at least one hydroxyl group substituted phenyl group or an optionally with at least one hydroxyl group substituted aralkyl group;  $R_4$ ,  $R_5$  and  $R_6$  represent an optionally with at least one hydroxyl group substituted lower alkyl group or an optionally with at least one hydroxyl group substituted phenyl group; X and Y are the same or different and represent  $-CN$ ,  $-COOR_7$ ,  $-CONR_8R_9$ ,



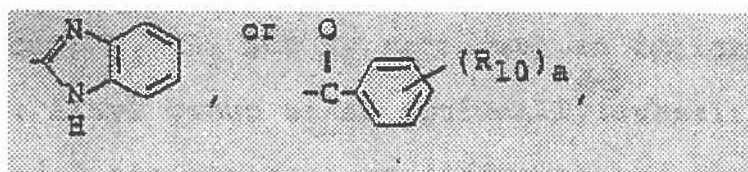
$R_7$  represents an alkyl group;  $R_8$  and  $R_9$  are the same or different and represent a hydrogen atom, an optionally with at least one hydroxyl group substituted alkyl or phenyl group;  $R_{10}$  represents a hydrogen atom, an

optionally with at least one hydroxyl group substituted alkyl group or a hydroxyl group; and a is a number of 1 to 2; an alkali-soluble resin and a quinone diazide compound."

"4. Use of a compound of the general formula:



wherein R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are the same or different and represent a hydrogen atom, a hydroxyl group, -OCOR<sub>4</sub>, -O-R<sub>5</sub>, -OSi(R<sub>6</sub>)<sub>3</sub>, a halogen atom, an optionally with at least one hydroxyl group substituted alkyl group, an optionally with at least one hydroxyl group substituted alkenyl group, an optionally with at least one hydroxyl group substituted phenyl group or an optionally with at least one hydroxyl group substituted aralkyl group; R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> represent an optionally with at least one hydroxyl group substituted lower alkyl group or an optionally with at least one hydroxyl group substituted phenyl group; X and Y are the same or different and represent -CN, -COOR<sub>7</sub>, -CONR<sub>8</sub>R<sub>9</sub>,



R<sub>7</sub> represents an alkyl group; R<sub>8</sub> and R<sub>9</sub> are the same or different and represent a hydrogen atom, an optionally with at least one hydroxyl group substituted alkyl or

phenyl group;  $R_{10}$  represents a hydrogen atom, an optionally with at least one hydroxyl group substituted alkyl group or a hydroxyl group; and  $a$  is a number of 1 to 2; in a photoresist composition."

- III. In support of his request the appellant stressed that document D1 was directed to a composition for coating materials such as leather, PVC, polyurethanes and polycarbonates, so as to render them weather-resistant by protecting them from harmful UV radiation. This application was far away from and without any connection with the art of photoresist compositions.

Document D5 also related to a clearly different application, since it only disclosed a colour silver halide photographic light-sensitive material in which a compound of the formula defined in present claim 1 was included with a view to improving its light fastness.

Neither in document D1 nor in document D5 was there any teaching or suggestion that the compounds disclosed there could meet the numerous requirements imposed on a photoresist composition.

In addition, document D3 lacked any hint at replacing the dyes disclosed there by an UV-absorber.



## Reasons for the Decision

1. The appeal meets the requirements of Articles 106 to 108, Rule 1(1) and Rule 64 EPC. It is admissible accordingly.
2. *Allowability of the amendments*

Present claim 1 corresponds to a combination of claims 1 and 2 as originally filed, with the additional limitation that the optional substituent includes at least one hydroxyl group, as was disclosed in the last sentence of the second paragraph of page 5 of the description as originally filed.

Present claims 2 and 3 correspond to claims 3 and 4 as originally filed, respectively.

The set of claims as originally filed did not comprise any use claim corresponding to present independent claim 4 but the use of the compound set out in the claim in a photoresist composition was illustrated by numerous examples throughout the original description.

Finally, the description was supplemented with a short summary of the relevant prior art and adapted to the wording of the claims as amended, in accordance with requirements of Rule 27(1)(b) and (c) EPC. A number of obvious minor clerical errors were corrected too.

For these reasons, the amendments brought to the application documents meet the requirement of Article 123(2) EPC.

3. Novelty

- 3.1 Document D1 discloses a radiation curable coating composition for providing a weather-resistant, non-yellowing, scratch-resistant, stain-resistant, abrasion-resistant and solvent-resistant protective coating on substrates such as natural leather, synthetic leather, polyvinyl chloride, polyurethanes and polycarbonates (see column 1, line 58 to column 2, line 6). The composition comprises a specific oligomer and a benzilidene acid ester ultraviolet light absorber encompassed by the general formula of present independent claims 1 and 4 (see document D1, claim 1).

The ultraviolet light absorber of document D1 is not provided in a photoresist composition including an alkali-soluble resin and a quinone diazide compound as set out in present claim 1, nor is it used in a photoresist composition as set out in independent claim 4.

- 3.2 Document D3 discloses a photoresist composition which like the composition of present claim 1 comprises an alkali-soluble resin and a quinone diazide compound (see claim 1). The photoresist composition may comprise a dye to decrease back-scattering of light from the support and, thus, increase image resolution (see column 7, lines 25 to 39).

This known photoresist composition does not comprise the compound set out in present independent claims 1 and 4.

3.3 Document D5 discloses a colour photographic light sensitive material having an improved light fastness. The material comprises an ultraviolet absorber of a formula encompassed by the general formula of the compound set out in present independent claims 1 and 4 (see column 2, lines 3 to 24).

This ultraviolet absorber is not used in a photoresist composition.

3.4 The remaining citations on the file do not come closer to the claimed subject-matter, which is novel within the meaning of Article 54 EPC, accordingly.

4. *Inventive step*

4.1 The present patent application is generally dedicated to the art of photolithography, and it addresses the detrimental effects of the phenomenon generally referred to as notching or halation, which consists in an unwanted exposition of photoresist regions because of reflections on high reflectance surfaces of the substrate on which the photoresist is formed (see page 1 of the description, lines 1 to 20).

Document D3 already proposes to provide a dye in a photoresist composition, for the explicit purpose of reducing back-scattering of light from the surface of the substrate (see point 3.1 supra). It can therefore be considered as disclosing the closest prior art.

4.2 There is no evidence on the file that the compound claimed in the present application better copes with the halation phenomenon than the dye of the closest prior art. The technical problem underlying the claimed subject-matter can therefore only be seen in proposing a different means of obviating halation.

The mere formulation of this technical problem does not as such provide any positive contribution to inventive step, because it is the normal endeavour of the skilled person to propose alternatives to existing solutions, amongst which the user may make his choice in accordance with the circumstances.

- 4.3 In his search for an alternative light absorber to be added to the photoresist composition of document D3, the skilled person would certainly contemplate the use of adequate ultraviolet absorbers, because it is well known that in the production of integrated circuits the exposure of photoresist is conventionally performed under ultraviolet radiation.

The present application points at a number of specific properties which a potential UV-absorber additive must exhibit, beyond its pure light absorbing characteristics. Its presence should not in particular deteriorate the sensitivity of the photoresist composition, nor should it precipitate during prebaking of the coated wafer, as is necessary to evaporate of the solvent after deposition of the photoresist composition (see page 2, line 13 to the end of page 3 of the description). The appellant convincingly submitted that the above particular requirements are not comparable with those imposed upon ultraviolet absorbers as used to promote weather-resistance of radiation curable coating compositions, or to improve light fastness of colour photographic materials.

Accordingly, amongst the great number of available ultraviolet absorbers, the skilled person would not in the Board's opinion have had any obvious reason to contemplate using, as an alternative to the known dyes in a photoresist composition, ultraviolet absorbers specifically recommended in documents D1 and D5 for such different applications only, if not with the

benefit of hindsight. As a matter of fact, a documentary search performed without the knowledge of the invention, i.e. of general formula of the claimed compound, would probably not have brought these documents to light.

4.4 For these reasons, the subject-matter of independent claims 1 and 4 in the Board's opinion involves an inventive step within the meaning of Article 56 EPC in view of the documents on file.

5. The present patent application also meets the remaining conditions of the EPC.

The Examining Division in its decision and in connection with the discussion of inventive step submitted that the claimed compounds and compositions embraced an unlimited number of possibilities which activity had not yet been explored or demonstrated and that such a generalisation could not be considered as reasonable in view of the eighteen examples given in the description (see point 6 of the Reasons).

Considering however the substantial number of specific examples given in the description (18), the fact that the prior art citations provide still further examples of compounds encompassed by the general formula of independent claims 1 and 4 which at least exhibit the required ultraviolet absorbing properties, and the absence of any objective evidence calling in question the capacity of the claimed compound to constitute an effective alternative to the known dye throughout the whole range of the formula in independent claims 1 and 4, the Board sees no reason to raise any objection against the present patent application under Articles 83 or 84 EPC.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to grant a patent on the basis of the following application documents:

**Claims:** 1 to 6 as filed with the appellant's letter dated 15 February 2000;

**Description:** pages 1, 2, 6 to 8, 16 and 18 as originally filed;  
pages 4, 5, 10 to 13 and 15 as filed with the appellant's letter dated 15 February 2000;  
pages 3 and 9 as attached to the minutes of the telephone conversation of 14 March 2000 ;

**Drawings:** Sheets 1/4 to 4/4 of the drawings as originally filed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini