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**Datasheet for the decision  
of 24 March 2016**

**Case Number:** T 2351/09 - 3.3.10

**Application Number:** 05774137.3

**Publication Number:** 1789842

**IPC:** G02F1/15, C09K9/02, G03C1/815

**Language of the proceedings:** EN

**Title of invention:**  
STABILIZED ELECTROCHROMIC MEDIA

**Applicant:**  
BASF SE

**Headword:**  
Electrochromic device / BASF SE

**Relevant legal provisions:**  
EPC Art. 84, 123(2), 56

**Keyword:**  
Main request: inventive step (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

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Case Number: T 2351/09 - 3.3.10

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.10**  
**of 24 March 2016**

**Appellant:** BASF SE Carl-Bosch-Strasse 38 67056 Ludwigshafen  
(Applicant) am Rhein (DE)

**Representative:** Reitstötter Kinzebach  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 10 July 2009  
refusing European patent application No.  
05774137.3 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** P. Gryczka  
**Members:** C. Komenda  
C. Schmidt

## Summary of Facts and Submissions

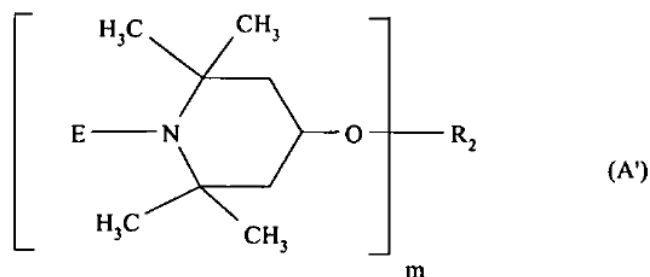
- I. The appeal lies from the decision of the Examining Division refusing European patent application No. 05 774 137.3 published with the publication No. EP1789842.
- II. In its reasoning the Examining Division found that the subject-matter of the claims according to the then pending main request was not clear and contained amendments that extended beyond the scope of the application as filed. The subject matter of the claims of the then pending main request and of the first auxiliary auxiliary request did not involve an inventive step. In its reasoning the Examining Division referred to documents
- (2) US-A-4 314 933,  
(3) US-A-2003/030883, corresponding to US-A-6 614 578  
and  
(5) US-A-5 239 406.

In particular, the Examining Division found that document (5) represented the closest state of the art. It was regarded as being closer to the claimed invention than document (3), since document (3) did not disclose the use of a hindered amine light stabiliser. The only difference to the disclosure of document (5) was that the closest prior art did not disclose the specific formula of the pentamethyl piperidine compounds used as hindered amine light stabilisers. Neither the application as filed, nor the experimental evidence filed with letter dated 11 April 2008 did contain comparative examples representing the closest state of the art document (5). Therefore, the alleged improvement was not acknowledged and the objective technical problem

was merely to provide an alternative. The specific piperidine derivatives according to the application in suit were already known from document (2).

III. During the oral proceedings held before the Boards on 24 March 2016 the Appellant (Applicant) filed a new main request and with its letter dated 8 January 2016 it filed a first and a second auxiliary request. The wording of claim 1 of the main request is as follows:

- "1. an electrochromic device comprising a medium which comprises*
- a) one or more solvents suitable as a medium in an electrochromic device, wherein at least one of the one or more solvents is selected from the group consisting of sulfones, amides, sulfoxides, ketones, aldehydes, cyclic esters, cyclic carbonates, and glycidyl ether carbonates,*
  - b) an effective amount of one or more additive compounds selected from the group consisting of ultraviolet light absorbers, wherein at least one of the one or more ultraviolet light absorbers is selected from the group consisting of hydroxyphenylbenzotriazoles and benzophenones, and*
  - c) an effective amount of one or more additive compounds selected from the group consisting of N-H and N-alkyl hindered amine light stabilisers, wherein at least one of the one or more N-H or N-alkyl hindered amine light stabilisers is a compound of formula A'*



wherein

*E* is hydrogen, C<sub>1</sub>-C<sub>18</sub> alkyl,

*m* is 1 or 2,

when *m* is 1,

*R*<sub>2</sub> is hydrogen, a monovalent acyl radical of a C<sub>2</sub>-C<sub>18</sub> aliphatic carboxylic acid, or

when *m* is 2,

*R*<sub>2</sub> is C<sub>1</sub>-C<sub>12</sub> alkylene, a divalent acyl radical of an aliphatic dicarboxylic acid having 2-18 carbon atoms."

IV. The Appellant brought forward its argumentation with regard to the basis of the amendments made. Further, it argued that document (3) was closer to the claimed invention than document (5) and, therefore, represented the closest state of the art. Starting from document (3) the problem was to improve the stability of the electrochromic device against yellowing due to UV-radiation. None of the other cited documents gave an incentive to further incorporate specific pentamethyl piperidine derivatives in order to solve the technical problem. Therefore, the claimed subject-matter involved an inventive step.

V. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request, filed at the oral proceedings before the Board or - alternatively - on the basis of

the first or second auxiliary request, both filed with letter dated 8 January 2016.

- VI. At the end of the oral proceedings held before the Board the decision was given.

### **Reasons for the Decision**

1. The appeal is admissible.

#### *Main request*

2. *Article 123 (2) EPC*

2.1 Claim 1 of the main request (see paragraph III *supra*) is based on the wording of original claim 1, wherein all or parts of the features of original claims 2, 3, 9 and 12 have been incorporated.

2.2 Therefore, the Board is of the opinion the the requirements of Article 123(2) EPC are met.

3. *Clarity (Article 84 EPC)*

The objections under Article 84 EPC have been removed, since the wording of the dependent claims has been adapted to the wording of claim 1 in order to clarify that all dependent claims relate to the "electrochromic device" of claim 1 instead of being directed to a "composition".

4. *Novelty (Article 54 EPC)*

In its decision the Examining Division did not have any objections to lack of novelty. Since claim 1 of the

present main request is even more restricted than claim 1 of the then pending main request, the Board sees no reason to investigate further.

5. *Inventive step (Article 56 EPC)*

5.1 In assessing inventive step the Examining Division started from document (5) as closest state of the art, whereas the Appellant favoured document (3) as being closer to the claimed subject-matter.

5.1.1 Document (3) teaches an electrochromic medium and an electrochromic device comprising a solvent, an anodic material, a cathodic material and a benzotriazole as a UV stabilizer corresponding to component (b) of the application in suit (see paragraphs [0007],[0034],[0036] and [0037]; claims 1,2 6, 10, 11 and 15).

5.1.2 Document (5) relates to a vehicle rear mirror assembly comprising at least two transparent glass layers (front and rear element) and a space between these layers filled with an electrochromic medium. Various other layers are applied to this assembly, which may contain UV absorbers and hindered amine light stabilisers to prevent the electrochromic medium from UV degradation. However, the UV absorbers cited in Table 5 of document (5) refer to the polymers listed in that Table, which are used as additional layers on the outer surface of the rear mirror assembly and are not incorporated into the electrochromic medium . Consequently, document (5) does not disclose a combination of solvent, UV-absorber and hindered amine light stabiliser in the electrochromic medium (see Fig. 1, column 11, line 63 to column 13 bottom; Table 5 bridging columns 16 and 17; column 5, lines 22 to 25 and 28 to 30; column 17, lines 34 to 60 and claim 82).



- 5.1.3 Since Document (5), therefore, appears to be more remote from the application in suit the Board concurs with the Appellant in that document (3) represents the closest state of the art for the assessment of inventive step.
- 5.2 According to the Appellant the problem to be solved starting from document (3) was to provide an electrochromic device showing an improved stability against yellowing due to UV degradation.
- 5.3 As a solution to this problem the application in suit proposes the electrochromic device according to claim 1, which is characterized in that additionally as component c) a hindered amine light stabiliser (HALS) of Formula A' is used.
- 5.4 In order to demonstrate that the proffered solution was successful the Appellant referred to the experiments as filed with letter dated 11 April 2008:

These experiments compare the compositions used as electrochromic medium in the application in suit with compositions that do not contain any HALS corresponding to document (3). The compositions were irradiated under determined standard conditions and the resulting colour change was determined via Gardner colour measurements. The obtained results clearly demonstrate that for the compositions according to the application in suit lower Gardner numbers were observed, corresponding to a lower degree of yellowing.

Together with the examples in the application as filed the success is also credible over the whole range claimed, since the examples in the application use also different solvents and UV absorbers. Therefore, the

Board is satisfied that the technical problem as stated in paragraph 5.2 *supra* was successfully solved.

- 5.5 Document (2), which was cited in the decision under appeal discloses various HALS stabilizers falling within the definition of component c) of claim 1. However, this document relates to the stabilization of two-layer uni-lacquer polymer coatings. Since this document is silent on the problem of yellowing the skilled person would have had no incentive from this document to add the HALS stabilizers of Formula A' to the electrochromic medium known from document (3).

None of the other cited documents teaches the use of HALS stabilisers of Formula A'. Therefore, these documents could not give an incentive either.

- 5.6 For these reasons the Board is of the opinion that the subject-matter of the independent claim 1 of the main request, and by the saame token that of the dependent claims 2 to 12, involves an inventive step in the sense of Article 56 EPC.
6. Since the subject-matter of the main request was regarded as fulfilling the requirements of the EPC, a decision on the first and second auxiliary requests is not necessary.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division with the order to grant a patent on the basis of claims 1 to 12 of the main request, filed at the oral proceedings before the Board, and a description to be adapted.

The Registrar:

The Chairman:



M. Schalow

P. Gryczka

Decision electronically authenticated