

**Internal distribution code:**

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

**Datasheet for the decision  
of 11 March 2016**

**Case Number:** T 0439/12 - 3.3.03

**Application Number:** 03759472.8

**Publication Number:** 1546237

**IPC:** C08G73/00, C08G73/02,  
C08G61/00, C08G61/12,  
H01L51/00, H01L51/30, H01B1/00,  
H01B1/12

**Language of the proceedings:** EN

**Title of invention:**  
WATER DISPERSIBLE POLYTHIOPHENES MADE WITH POLYMERIC ACID  
COLLOIDS

**Patent Proprietor:**  
E. I. du Pont de Nemours and Company

**Opponent:**  
Heraeus Precious Metals GmbH & Co. KG

**Headword:**

**Relevant legal provisions:**  
EPC Art. 123(2)  
RPBA Art. 13(1), 13(3)

**Keyword:**

Amendments - added subject-matter (yes) Main request, auxiliary requests 1,1A, 2, 3, 4

Late-filed auxiliary requests - admitted (yes) Auxiliary request 4A

Remittal to the department of first instance - (yes) Auxiliary request 4A

**Decisions cited:**

**Catchword:**



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

European Patent Office  
D-80298 MUNICH  
GERMANY  
Tel. +49 (0) 89 2399-0  
Fax +49 (0) 89 2399-4465

Case Number: T 0439/12 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 11 March 2016**

**Appellant:** E. I. du Pont de Nemours and Company  
(Patent Proprietor) Chestnut Run Plaza  
974 Center Road  
P.O. Box 2915  
Wilmington, DE 19805 (US)

**Representative:** Towler, Philip Dean  
Dehns  
St Bride's House  
10 Salisbury Square  
London EC4Y 8JD (GB)

**Respondent:** Heraeus Precious Metals GmbH & Co. KG  
(Opponent) Heraeusstrasse 12-14  
63450 Hanau (DE)

**Representative:** Herzog, Fiesser & Partner Patentanwälte PartG  
mbH  
Immermannstrasse 40  
40210 Düsseldorf (DE)

**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 8 December 2011  
revoking European patent No. 1546237 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman** F. Rousseau  
**Members:** M. C. Gordon  
R. Cramer

## Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division announced on 17 November 2011 and posted on 8 December 2011 revoking European patent number EP-B1-1 546 237 (granted on European patent application number 03759472.8, derived from international application number PCT/US2003/030026, published under the number WO-A-2004/029128).

II. The application as originally filed had 10 claims whereby claims 1, 5 and 9 read as follows:

"1. A composition comprising an aqueous dispersion of a polydioxothiophene and at least one colloid-forming polymeric acid."

"5. A method of producing an aqueous dispersion of polythiophene and at least one colloid-forming polymeric acid, comprising:

- (a) providing a homogeneous aqueous mixture of water and thiophene;
- (b) providing an aqueous dispersion of the polymeric acid;
- (c) combining the thiophene mixture to the aqueous dispersion of colloid-forming polymeric acid, and
- (d) combining an oxidizer and a catalyst to the dispersion of step (c) in any order of addition."

"9. An organic electronic device comprising at least one organic layer made from a composition comprising an organic aqueous dispersion of polythiophene and at least colloid-forming polymeric acid".

The patent was granted on the basis of the same independent claims.

- III. A notice of opposition against the patent was filed by H.C. Starck Clevios GmbH in which revocation of the patent on the grounds of Art. 100(a) EPC (lack of novelty, lack of inventive step), Art. 100(b) EPC and Art. 100(c) EPC was requested.
- IV. The decision of the opposition division was based on amended claims forming a main request and eight auxiliary requests.  
*Inter alia* the main request and auxiliary requests 2 and 4 specified that the composition comprised a **stable** aqueous dispersion. Auxiliary requests 1, 3 and 5 specified that the dispersion was **colloidal**.
- V. According to the decision, the main request and auxiliary requests 2 and 4 did not meet the requirements of Art. 123(2) EPC because the feature "stable" was originally disclosed in combination with a specific polymerisation method. The requirements of Art. 84 EPC were not met because no definition of "stable", e.g. the relevant time frame was contained in the claim or otherwise derivable from the patent.

Auxiliary requests 1, 3 and 5 were considered to meet the requirements of Art. 123(2) EPC since the originally filed description disclosed that the compositions of the invention, in one embodiment PEDT (Polydiethoxythiophene) and colloidal perfluoroethylene sulphonic acid exist as a colloidal dispersion. The requirements of Art. 84 EPC were held to be met since the term "colloidal" had a clear meaning for the skilled person.

The claims of the first, third and fifth auxiliary

requests were however held to lack novelty. The details of the reasons for this conclusion are not relevant for the present decision.

Auxiliary requests 6-8 were held not to meet one or more of the requirements of Art. 54, 84 and 123(2) EPC. The details of these conclusions are not relevant for the present decision.

Accordingly the patent was revoked.

VI. On 16 February 2012 the patent proprietor lodged an appeal against the decision, the prescribed fee being paid on the same date.

VII. The statement of grounds of appeal was submitted on 18 April 2012.

The appellant/patent proprietor submitted sets of claims forming a main request and five auxiliary requests.

Further written submissions were made with letters of 12 December 2013 and 21 May 2015.

VIII. The respondent/opponent replied to the appeal with letter dated 20 December 2012.

Further written submissions were made with letter of 13 November 2014.

With letter of 18 September 2014 transfer of opponent status to Heraeus Precious Metals GmbH & Co. KG was requested. Following a communication of the Board dated 16 December 2014, a further submission in respect of the request for transfer was made with letter of 13 March 2015.

By communication of 9 July 2015 the Board informed the parties that the request for transfer of opponent

status could be allowed.

- IX. On 15 June 2015 the Board issued a summons to attend oral proceedings.
- X. Together with a letter of 9 October 2015 the appellant/patent proprietor submitted four further auxiliary requests, and reordered the existing requests. Thus at this point there was one main request and nine auxiliary requests.  
A complete set of requests, taking into account the reordering compared to the requests as filed with the statement of grounds of appeal was submitted.
- XI. In a communication dated 16 October 2015 the Board set out its preliminary opinion of the case.
- XII. With letter of 2 November 2015, in response to the preliminary opinion of the Board, the appellant/patent proprietor submitted two further auxiliary requests designated 1A and 6A.
- XIII. Oral proceedings were held before the Board on 11 March 2016.  
In the course of the oral proceedings, following discussion, the appellant/patent proprietor filed a further set of claims designated "Auxiliary 4A".
- XIV. The requests and claims thereof that are relevant for this decision are as follows:  
(a) Main request (submitted with letter of 9 October 2015)  
Claim 1:  
"A composition comprising a colloidal aqueous dispersion of a polydioxothiophene and at least one colloid-forming polymeric acid being a fluorinated

sulfonic acid polymer in which at least 50% of the total number of halogen and hydrogen atoms are fluorine atoms".

- (b) Auxiliary Request 1 (submitted with letter of 9 October 2015).

Claim 1:

"A composition comprising a stable aqueous dispersion of a polydioxothiophene and at least one colloid-forming polymeric acid being a fluorinated sulfonic acid polymer in which at least 50% of the total number of halogen and hydrogen atoms are fluorine atoms".

- (c) Auxiliary Request 1A (submitted with letter of 2 November 2015)

Claim 1 differed from claim 1 of Auxiliary request 1 by introduction at the end of the claim of the wording:

"and wherein the stable aqueous dispersion has a pH of up to 8".

- (d) Auxiliary Request 2 (submitted with letter of 9 October 2015)

Claim 1 was identical to claim 1 of the main request.

- (e) Auxiliary request 3 (submitted with letter of 9 October 2015) consisted of two claims which read as follows:

"1. An organic electroluminescent device comprising at least one organic layer made from a composition comprising a colloidal organic aqueous dispersion of polythiophene and at least colloid-forming polymeric acid being a fluorinated sulfonic acid



polymer in which at least 50% of the total number of halogen and hydrogen atoms are fluorine atoms.

2. The device according claim 1 wherein the device is a light-emitting diode, light-emitting diode display, or diode laser."

(f) Auxiliary request 4, submitted with letter of 9 October 2015 consisted of two claims. Claim 1 read as follows:

"1. An organic electroluminescent device comprising at least one organic layer made from a composition comprising an organic aqueous dispersion of polythiophene and at least colloid forming polymeric acid being a fluorinated sulfonic acid polymer in which at least 50% of the total number of halogen and hydrogen atoms are fluorine atoms."

Claim 2 was identical to claim 2 of auxiliary request 3.

(g) Auxiliary request 4A, submitted in the oral proceedings before the Board differed from auxiliary request 4 in that in claim 1 the wording "at least one organic layer made" was replaced by "a buffer layer cast".

Hence claim 1 of auxiliary request 4a read as follows:

"An organic electroluminescent device comprising a buffer layer cast from a composition comprising an organic aqueous dispersion of polythiophene and at least colloid-forming polymeric acid being a fluorinated sulfonic acid polymer in which at least 50% of the total number of halogen and hydrogen atoms are fluorine atoms".

XV. The arguments of the appellant/patent proprietor, insofar as relevant for the present decision, can be summarised as follows:

(a) Main request

Claim 1 corresponded to claim 1 of auxiliary request 5 considered by the the opposition division and which was held to meet the requirements of Art. 123(2) and 83 EPC.

The original description disclosed that the dispersions were colloidal. This feature was central to the disclosed invention. The disclosure of "colloidal" was general and not linked to any specific dispersions or method for their preparation. The respondent/opponent had not shown that no other method than that disclosed in the patent would be applicable to obtain the claimed dispersions.

The minimum percentage of fluorine atoms in the sulphonic acid was disclosed in another part of the description from "colloidal". From the whole application it was apparent that these fluorinated sulphonic acids - "Nafion" - were preferred and applicable to the invention across the whole scope. From the description it was derivable that the purpose of employing the colloidal acid was to obtain colloidal dispersions.

It was not known whether other structures of colloidal polymers than those resulting from the exemplified process were possible. Any considerations in that direction were speculative.

(b) Auxiliary requests 1 and 2

The term "stable" was disclosed in the application, independently of any polymerisation method, as a descriptor for the properties of the dispersion *per se*. Hence the requirements of Art. 123(2) EPC were

met.

(c) Auxiliary Request 1A

The introduction of the pH was intended as a precautionary measure in respect of objections in respect of Art. 123(2) EPC in order to define the conditions under which the stability was to be achieved.

(d) Auxiliary Request 3

Claim 1 corresponded to claim 9 of the granted patent with the limitation in respect of the proportion of fluorine atoms in the fluorinated sulphonic acid and the restriction that the dispersion was colloidal. The decision under appeal had held the corresponding claim of the then fifth auxiliary request to meet the requirements of Art. 123(2) and 84 EPC. That conclusion should be followed.

(e) Auxiliary request 4

The term "colloidal" had been deleted.

The application discussed organic electronic devices in general including various light-emitting devices, i.e. those which convert electrical energy into light (electroluminescent) and disclosed that these devices could contain a layer comprising the aqueous dispersion. Although there were disclosures of specifically buffer layers in the context of light emitting devices the description was broader than this and encompassed light emitting devices where layers other than buffer layers are made from the compositions.

(f) Auxiliary request 4A

The layer was now defined as a "buffer" thus

addressing objections with respect to auxiliary request 4.

XVI. The arguments of the respondent/opponent can be summarised as follows

(a) Main request

The feature "colloidal" was not an independent characteristic but was disclosed only in combination with other features, in particular the method by which the polythiophene was prepared in the presence of the colloid forming acid. No other method of preparing the composition was disclosed in the application.

Consequently the isolation of "colloidal" from the method gave rise to contravention of Art. 123(2) EPC.

(b) Auxiliary Requests 1 and 2

The feature "stable" was disclosed only in combination with a specific process. Isolation of this feature gave rise to contravention of Art. 123(2) EPC analogously to the isolation of "colloid". "Stable" was furthermore not clear because the patent did not provide any unambiguous definition of the requisite conditions.

(c) Auxiliary request 1A

No additional arguments were advanced in respect of this request.

(d) Auxiliary request 3

There was no disclosure in the application of the combination of features that the defined colloidal dispersion was employed in a layer - in general -

of an electroluminescent device.

(e) Auxiliary request 4

With respect to Art. 123(2) EPC, the application as filed disclosed that the composition was used as a buffer layer in an electroluminescent device. There was no disclosure of the composition being used for a layer in general.

It was stated that no objections pursuant to Art. 54, 83, 84 EPC were raised.

(f) Auxiliary request 4A

The opponent indicated that no (further) submissions would be made with respect to this request.

XVII. The appellant requested that the decision under appeal be set aside and the case be remitted to the department of first instance for consideration of Article 56 EPC on the basis of:

- the main request or auxiliary request 1 submitted with the letter of 9 October 2015, or
- auxiliary request 1A submitted with the letter of 2 November 2015, or
- auxiliary requests 2, 3 or 4 submitted with the letter of 9 October 2015, or
- auxiliary request 4A submitted during oral proceedings, or
- auxiliary requests 5 or 6 submitted with the letter of 9 October 2015, or
- auxiliary request 6A submitted with the letter of 2 November 2015, or
- auxiliary requests 7, 8 or 9 submitted with the letter of 9 October 2015.

XVIII. The respondent requested that the appeal be dismissed, or, if any of the appellant's request were found to meet the requirements of Articles 123, 83, 84 and 54 EPC, that the case be remitted to the department of first instance for consideration of Article 56 EPC.

### **Reasons for the Decision**

1. The appeal is admissible.

2. Main request

2.1 Art. 123(2) EPC

Claim 1 as originally filed did not specify that the aqueous dispersion of a polydioxythiophene was colloidal, but specified that the dispersion comprised at least one colloid-forming polymeric acid (see section II, above).

The features of the claim relating to the acid being a fluorinated sulphonic acid having a specified content of fluorine atoms are disclosed at page 6 lines 11-15 of the application as filed.

The question to be answered is thus whether there is a general disclosure in the application as filed for the feature "colloidal aqueous dispersion of a polydioxythiophene".

Contrary to the argument of the appellant, the Board is not able to identify a general disclosure in the application as originally filed that the dispersions of a polydioxythiophene are necessarily colloidal. A general description for said feature was not identified by the appellant nor was any passage indicated which established that the feature "colloidal aqueous dispersion of a polydioxythiophene" could be seen to be disclosed independently from the method for the preparation thereof. The question is not whether the respondent had not shown that no other method than that

disclosed in the patent would be applicable to obtain colloidal aqueous dispersions of a polydioxothiophene, as argued by the appellant, but rather whether the appellant, who in that respect carries the burden of proof, had convincingly shown that a general disclosure in the application as filed, i.e. without any limitation concerning the polymerisation method described therein was provided for colloidal aqueous dispersions of the polydioxothiophenes.

The independence of the term "colloidal" from the methods used to prepare the dispersions has however not been demonstrated.

Under these circumstances, where - it is repeated - it has not been established that the characteristic "colloidal" is independent of the specific process steps disclosed in the application, the presence of the feature "colloidal" in claim 1 in the absence of definition of said specific process steps is not allowable.

Consequently claim 1 does not meet the requirements of Art. 123(2) EPC.

Under these circumstances it is not necessary to discuss in detail which method steps for the preparation would be sufficient to ensure that the resulting dispersion could be considered as colloidal.

### 3. Auxiliary request 1

Claim 1 of auxiliary request 1 requires that the dispersion is a "stable aqueous dispersion".

#### 3.1 Art. 123(2) EPC

There are several occurrences of the term "stable" in the application as filed:

- Page 4 line 28 - page 5 line 1: "It has been discovered that aqueous dispersions of electrically conductive polythiophene and, specifically,

poly(dioxythiophenes) can be prepared when thiophene monomers including dioxythiophene monomers, are polymerized chemically in the presence of colloid-forming polymeric acids. Further, it has been discovered that use of a polymeric acid that is not water soluble in preparation of an aqueous dispersion of the polythiophenes of poly(dioxythiophenes) yields a composition with superior electrical properties. One advantage of these aqueous dispersions is that the electrically conductive minute particles are stable in the aqueous medium without forming a separate phase over a long period of time before use."

- Page 9 line 21: "The oxidative polymerisation results in a stable aqueous dispersion"
- Page 10 line 32: "After synthesis....contacted with at least one ion exchange resin under conditions suitable to produce a stable, aqueous dispersion".

However in all these occurrences the term "stable" is disclosed in the context of the polymerisation of the thiophene in the presence of the colloid-forming polymer.

There is however no disclosure in the application as originally filed of "stable" independently of any such process.

As a result the requirement in claim 1 of the auxiliary request 1 that the composition, in the generality as defined, comprises a "stable aqueous dispersion" finds no basis in the application as originally filed.



- 3.2 Auxiliary request 1 therefore does not meet the requirements of Art. 123(2) EPC.
  
- 4. Auxiliary request 1A  
Claim 1 differs from claim 1 of auxiliary request 1 by specifying the pH as being up to 8.
  
- 4.1 Art. 123(2) EPC  
Claim 1 retains the term "stable" however additionally specifies the pH.  
As that claim does not specify a polymerisation of thiophene in the presence of the colloid-forming polymer the same reasoning applies as for auxiliary request 1.
  
- 4.2 Under these circumstances it is not necessary to address the question of whether the range "pH up to 8" finds a basis in the application as originally filed.
  
- 4.3 Auxiliary request 1A does not meet the requirements of Art. 123(2) EPC.
  
- 5. Auxiliary request 2  
Claim 1 is identical to claim 1 of the main request.  
For the reasons indicated in section 2 above claim 1 of auxiliary request 2 does not meet the requirements of Art. 123(2) EPC.
  
- 6. Auxiliary request 3  
Claim 1 defines an organic electroluminescent device having at least one layer made from a composition comprising a colloidal organic aqueous dispersion as defined in claim 1 of the main request.
  
- 6.1 Art. 123(2) EPC  
As noted in respect of the main request there is no

basis in the application as filed for the feature "colloidal aqueous dispersion" in the absence of any definition of the process disclosed in the application as filed for obtaining the dispersions.

Furthermore insofar as the application relates to electroluminescent devices in general, the only disclosure is on page 2, lines 32-34 which specifies that the layers formed from said composition are buffer layers.

There is however no disclosure in the application that - in general - a layer of an electroluminescent device may be made from the defined composition.

On the contrary in the introduction to the application as filed on page 1, line 26 electroluminescent devices are discussed and it is stated that the buffer layer of such devices is typically a conducting polymer, reference being made *inter alia* to poly (3,4-ethylenedioxythiophene).

Thus even in the most general disclosure it is not possible to derive a teaching that a layer - in general - of an electroluminescent device may be prepared from a composition as defined. Rather the disclosure is restricted to buffer layers.

Original claim 9 discloses an organic electronic device having a layer prepared from the composition (however without the feature that the dispersion itself is colloidal). Claim 10 as originally filed defines a range of specific types of device, a number of which do fall within the scope of the general term "electroluminescent".

Page 18, lines 19-29 of the application as filed, which was invoked by the appellant/patent proprietor, discusses organic electronic devices having one or more

layers comprising the aqueous dispersion of polythiophene. Among the devices disclosed are "devices that convert electrical energy into radiation", specific examples given being light-emitting diode, light-emitting diode display or diode laser. Whilst the term "devices that convert electrical energy into radiation" encompasses electroluminescent devices, and the specific examples of devices given are themselves encompassed by the term "electroluminescent devices", there is no explicit statement of the subject-matter as defined in the claim, i.e. electroluminescent devices in general.

On the contrary, in the context of the most general and the more specific disclosures provided by the application as filed, the claimed subject-matter that the electroluminescent devices comprise an organic layer made from the composition represents an intermediate generalisation.

In this connection it is observed that there is no indication in the passage relating to devices which convert electrical energy to radiation that this statement is to be interpreted as necessarily limited to electroluminescent devices, thereby excluding other forms of device which generate radiation e.g. radio transmitters.

6.2 Consequently, there is no basis in the application as filed for the feature of claim 1 of auxiliary request 3 of an electroluminescent device having a layer - in general - formed from the defined colloidal composition, as well as no basis for the feature that the composition is a colloidal aqueous dispersion.

6.3 Auxiliary request 3 does not satisfy the requirements of Art. 123(2) EPC.

7. Auxiliary request 4

Claim 1 of auxiliary request 4 differs from that of auxiliary request 3 in that the feature "colloidal" has been deleted from the definition of the "organic aqueous dispersion".

7.1 Art. 123(2) EPC

The same objection arises as with respect to auxiliary request 3 because, as explained above the disclosure of the application as filed is restricted to electroluminescent devices in which - specifically - the buffer layers are prepared from the organic aqueous dispersion, not however "layer" in the generality as defined in the operative claim.

7.2 Auxiliary request 4 therefore does not meet the requirements of Art. 123(2) EPC.

8. Auxiliary request 4A

Claim 1 differs from claim 1 of auxiliary request 4 in that the layer is defined as "a buffer layer cast" from a composition comprising the aqueous organic dispersion.

8.1 Admissibility

The request was filed during the oral proceedings, following discussion of the preceding requests, in particular auxiliary requests 3 and 4.

The respondent/opponent did not present any comments as to the admissibility of this request.

The matter in question, i.e. the (intermediate) generalisation of "layer" compared to the application as originally filed (see discussion of the preceding auxiliary requests above) had not been raised either by the Board or by the respondent during the written phase of the proceedings. Consequently there had been no

reason for the appellant/patent proprietor to propose such an amendment prior to the discussion during the course of the oral proceedings.

The amendment is not complex, derives directly from the discussions relating to the previous requests and, as noted directly addresses in a direct and simple manner an issue which was the subject of discussion.

Consequently the Board, in exercise of the discretion allowed under Art. 13(1) RPBA and with reference to the provisions of Art. 13(3) RPBA admits auxiliary request 4a to the proceedings.

#### 8.2 Art. 123(2) EPC

As indicated above, the objection with respect to Art. 123(2) EPC has been overcome by specifying that the layer is a buffer layer.

A basis for the wording of the claim is to be found in the application as originally filed in:

- claim 1 (aqueous dispersion of polydioxothiophene and at least one colloid forming polymeric acid)
- page 6 lines 11-13 (polymeric acid is a fluorinated sulphonic acid polymer in which at least 50% of the total number of hydrogen and halogen atoms are fluorine atoms)
- page 2 lines 33 and 34 and page 13 lines 31-34 (electroluminescent devices comprising buffer layers of the composition that are cast).

The definition of the devices of claim 2 finds a basis in originally filed claim 10.

Consequently auxiliary request 4A satisfies the requirements of Art. 123(2) EPC.

8.3 Art. 123(3), 83, 84, 54 EPC

The respondent/opponent stated at the oral proceedings that no objections under these provisions of the EPC were raised in respect of auxiliary request 4. Following submission of auxiliary request 4A the respondent/opponent stated that no comments would be made.

Under these circumstances the Board is aware of no reasons to take a different position, and hence comes to the conclusion that the requirements of Art. 123(3), 83, 84 and 54 EPC are satisfied by the claims of auxiliary request 4A.

9. The decision under appeal did not address the matter of inventive step for any of the requests then considered. The parties in their submissions also did not discuss this matter, but requested that, if appropriate, the matter be remitted to the first instance to have this requirement of the EPC dealt with. The Board also considers that under these circumstances remittal is the appropriate course of action.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution.

The Registrar:

The Chairman:



B. ter Heijden

F. Rousseau

Decision electronically authenticated