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**Datasheet for the decision
of 7 February 2019**

Case Number: T 0210/16 - 3.3.03

Application Number: 08843776.9

Publication Number: 2215158

IPC: C08K9/04, H01B3/00, H01B3/18

Language of the proceedings: EN

Title of invention:
REDUCTION OF DIELECTRIC LOSSES THROUGH USE ORGANOCCLAY IN
SEMICONDUCTOR OR INSULATOR COMPOSITIONS

Patent Proprietor:
Union Carbide Chemicals & Plastics Technology LLC

Opponent:
Borealis AG

Relevant legal provisions:
EPC Art. 123(2)

Keyword:
Amendments - allowable (all requests: no)

Decisions cited:
G 0002/10



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Case Number: T 0210/16 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 7 February 2019

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Decision under appeal:

**Interlocutory decision of the Opposition
Division of the European Patent Office posted on
1 December 2015 concerning maintenance of the
European Patent No. 2215158 in amended form.**

Composition of the Board:

Chairman D. Semino
Members: O. Dury
R. Cramer

Summary of Facts and Submissions

I. The appeal by the opponent lies against the interlocutory decision of the opposition division posted on 1 December 2015 concerning maintenance of the European Patent No. 2 215 158 in amended form according to the 4th auxiliary request filed with letter of 15 October 2015 and an adapted description.

II. The claims of the application as filed which are relevant to the present decision read as follows:

"1. A structure comprising:

A semiconducting layer comprising a first material that comprises a first polymeric resin and a conductive filler; and,

an insulating layer comprising a second material that comprises a second polymeric resin,

wherein the semiconducting layer and the insulating layer are at least partially in physical contact with each other,

wherein at least one of the first material and the second material comprise an organoclay

and wherein the first polymeric resin and the second polymeric resin may be the same or different,

and wherein the ratio of AC dielectric losses of a comparative structure, that is identical to the structure except that the comparative structure lacks

organoclay, to the structure is greater than 1.5."

"2. The structure of claim 1, wherein the organoclay is present in either the first material and/or second material in an amount up to about 1 wt% based on the total weight of polymeric resin in the material."

"3. The structure of claim 1, wherein the organoclay is present in either the first material and/or second material in an amount up to about 3 wt% based on the total weight of polymeric resin in the material."

"4. The structure of Claim 1 wherein the organoclay is a natural montmorillonite modified with a quaternary ammonium compound."

"5. The structure of Claim 1 in which the first polymeric resin comprises at least one thermoplastic."

"6. The structure of Claim 1 in which the first polymeric resin comprises at least one thermoset."

"7. The structure of Claim 5 wherein the thermoplastic comprises at least one ethylene homopolymer and/or ethylene copolymer."

"8. The structure of Claim 7 wherein the ethylene copolymer is a copolymer of ethylene within α -olefin or with a vinyl acetate comonomer."

"9. The structure of Claim 5 wherein the thermoplastic comprises at least one propylene homopolymer and/or propylene copolymer."

"10. The structure of Claim 7 wherein the propylene copolymer is a copolymer of propylene within α -olefin or with a vinyl acetate comonomer."

"11. The structure of Claim 1 wherein the conductive filler comprises at least one carbon black compound."

III. A notice of opposition against the patent was filed, requesting the revocation of the patent in its entirety.

IV. In the contested decision, the opposition division *inter alia* decided that the 4th auxiliary request filed with letter of 15 October 2015, which is the sole request dealt with by the opposition division which is relevant for the present decision, satisfied the requirements of Article 123(2) EPC.

Claim 1 of said 4th auxiliary request read as follows (additions as compared to claim 1 of the application as filed are indicated in **bold**, deletions in ~~striketthrough~~):

"1. A structure comprising:

~~A~~ a semiconducting layer comprising ~~a~~ first material that comprises a first polymeric resin, **a lossy species** and a conductive filler; and,

an insulating layer comprising a second material that comprises a second polymeric resin,

wherein the semiconducting layer and the insulating layer are at least partially in physical contact with each other,

wherein the first polymeric resin comprises at least one thermoplastic, the at least one thermoplastic comprising: at least one ethylene homopolymer and/or ethylene copolymer, wherein the ethylene copolymer is a copolymer of ethylene with an α -olefin or with a vinyl acetate comonomer; or at least one propylene homopolymer and/or propylene copolymer, wherein the propylene copolymer is a copolymer of propylene with an α -olefin or with a vinyl acetate comonomer,

wherein the conductive filler comprises at least one carbon black compound and wherein the conductive filler is present in an amount of 10 to 55 wt.% based on the weight of the first material,

~~wherein at least one of the first material and the second material~~ comprises an organoclay **in an amount of 1 to 3 wt.% based on the total weight of polymeric resin in the material,**

wherein the organoclay is a natural montmorillonite modified with a quaternary ammonium compound

~~and~~ wherein the first polymeric resin and the second polymeric resin may be the same or different, and

wherein the ratio of AC dielectric losses of a comparative structure, that is identical to the structure except that the comparative structure lacks organoclay, to the structure is greater than 1.5, **said dielectric losses being measured at a temperature of 130°C and a frequency of 60 Hz and tension of 2kV on a thermally aged (1 week at 140°C) structure prepared from one layer of the insulating layer and another of the semiconducting layer, and then to separate the layers for dielectric analysis of the insulating layer**

only."

According to the opposition division, the application as filed provided a support for each of the amendments "lossy species", "natural montmorillonite modified with a quaternary ammonium compound", "10 to 55 wt% of at least one carbon black", "organoclay in an amount of 1 to 3 wt.% based on the total weight of polymer resin in the material" as well as for the amendments related to the measurement method of the AC dielectric losses (section 3.3 of the reasons).

- V. The opponent (appellant) appealed the above decision. With the statement setting out the grounds of appeal the appellant requested that the decision of the opposition division be set aside and that the patent be revoked.
- VI. With its rejoinder to the statement of grounds of appeal dated 15 August 2016, the patent proprietor (respondent) requested that the appeal be dismissed (i.e. that the patent be maintained in amended form according to the 4th auxiliary request filed with letter of 15 October 2015) or, in the alternative, that the patent be maintained on the basis of the 5th auxiliary request filed with letter of 15 October 2015 or of the 6th auxiliary request filed with said rejoinder to the statement of grounds of appeal.

Claim 1 of said 5th auxiliary request differed from claim 1 of the 4th auxiliary request in that the definition of the thermoplastic comprised in the first polymeric resin was modified as follows (deletions as compared to claim 1 of the 4th auxiliary request in ~~strikethrough~~):

"the at least one thermoplastic comprising: ~~at least one ethylene homopolymer and/or ethylene copolymer, wherein the ethylene copolymer is a copolymer of ethylene with an α olefin or with a vinyl acetate comonomer;~~ or at least one propylene homopolymer and/or propylene copolymer, wherein the propylene copolymer is a copolymer of propylene with an α -olefin or with a vinyl acetate comonomer,"

Claim 1 of said 6th auxiliary request differed from claim 1 of the 4th auxiliary request in that the definition of the thermoplastic comprised in the first polymeric resin was modified as follows (deletions as compared to claim 1 of the 4th auxiliary request in ~~strikethrough~~):

"the at least one thermoplastic comprising: ~~at least one ethylene homopolymer and/or ethylene copolymer, wherein the ethylene copolymer is a copolymer of ethylene with an α olefin or with a vinyl acetate comonomer;~~ or at least one propylene homopolymer and/or propylene copolymer, wherein the propylene copolymer is a copolymer of propylene with an α -olefin ~~or with a vinyl acetate comonomer,~~"

- VII. Issues to be discussed at the oral proceedings were specified by the Board in a communication.
- VIII. With letter of 4 January 2019, the respondent indicated that they would not attend the oral proceedings.
- IX. Oral proceedings were held on 7 February 2019 in the absence of the respondent, as announced.

X. The appellants' arguments, insofar as relevant to the decision, may be summarised as follows:

4th auxiliary request - Article 123(2) EPC

- (a) The combination of features now being defined in operative claim 1 was not supported by the application as filed. In that respect, some of the dependent claims of the original set of claims only depended on claim 1 and not on each other;
- (b) The application as filed further did not provide a valid support for the amendment "lossy species" at the level of generality according to operative claim 1. In particular, paragraph 18 was only directed to cable designs and it was derivable from paragraphs 18, 39, 40 and 51 of the application as filed that the lossy species were originally disclosed as originating from a specific type of elastomeric material, both of which was not reflected in operative claim 1;
- (c) Regarding the feature "ratio of AC dielectric loss" mentioned in operative claim 1, it was not directly and unambiguously derivable from the application as filed that the ratio of greater than 1.5 specified in the original set of claims was to be obtained when determining the dielectric losses at 130°C. Also, that feature was only disclosed in the application as filed for a specific sandwich structure, which was not reflected in operative claim 1;
- (d) For those reasons, the requirements of Article 123(2) EPC were not met.

5th and 6th auxiliary requests - Article 123(2) EPC

- (e) Since claim 1 of each of the 5th and 6th auxiliary requests comprised the same combination of features as claim 1 of the 4th auxiliary request, the same arguments were valid as for the 4th auxiliary request.

XI. The respondent's arguments, insofar as relevant to the decision, may be summarised as follows:

4th auxiliary request - Article 123(2) EPC

- (a) The amendment related to "lossy species" was based on paragraph 18 of the application as filed. It was in particular derivable from the application as filed as a whole that the invention was not limited to cables;
- (b) The amendments related to the definition of the first polymeric resin were supported by original claims 5 and 7-10;
- (c) The amendments related to the conductive filler were supported by original claim 11 and paragraph 25 of the application as filed, whereby it was derivable from the application as filed as a whole that the invention was not limited to devices but also included the claimed structure;
- (d) The amendments related to the amount and type of the organoclay were derivable from original claims 2-4 and paragraph 26 of the application as filed;

- (e) The amendments related to the definition of the AC dielectric loss were supported by paragraphs 30, 31, 34, 36 and the table on pages 7-8 of the application as filed. Besides, since a temperature of 130°C was the temperature at which the migration of lossy species was the most apparent, it would have been selected by the skilled person;
- (f) For those reasons, the requirements of Article 123(2) EPC were met.

5th and 6th auxiliary requests - Article 123(2) EPC

- (g) Claim 1 of each of the 5th and 6th auxiliary requests corresponded to a limitation of claim 1 of the 4th auxiliary request in terms of the thermoplastic. That amendment was based on original claims 5 and 9. Otherwise, the same arguments in respect of Article 123(2) EPC were valid as for claim 1 of the 4th auxiliary request.

XII. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed (i.e. that the patent be maintained in amended form according to the 4th auxiliary request filed with letter of 15 October 2015) or, in the alternative, that the patent be maintained on the basis of the 5th auxiliary request filed with letter of 15 October 2015 or on the basis of the 6th auxiliary request filed with the rejoinder to the statement of grounds of appeal dated 15 August 2016.

Reasons for the Decision

4th auxiliary request

1. Amendments: Article 123(2) EPC
 - 1.1 For the assessment of Article 123(2) EPC, the question to be answered is whether or not the subject-matter of an amended claim extends beyond the content of the application as filed, i.e. whether after the amendment the skilled person is presented with new technical information (see G 2/10, OJ EPO 2012, 376, point 4.5.1 of the Reasons and Case Law of the Boards of Appeal of the EPO, 8th edition, 2016, II.E.1 and 1.2.1). In the case of multiple amendments being made, as is the case here, the question has to be posed whether the specific combination of features now being defined in operative claim 1 emerges from the application as filed, whereby the description is not to be viewed as a reservoir from which features pertaining to separate embodiments can be freely combined in order to artificially create a certain embodiment (Case Law, *supra*, II.E.1.4.1).
 - 1.2 The subject-matter of operative claim 1 corresponds to claim 1 as originally filed with the following amendments:
 - (a) addition of the requirement that the first material comprises "lossy species";
 - (b) more specific definition of the first polymeric resin;

- (c) addition of the requirement that the conductive filler should be carbon black in a certain amount;
- (d) addition of the requirement that the first material comprises a specific organoclay in a certain amount;
- (e) addition of the conditions of determination the ratio of AC dielectric losses ("said dielectric losses being measured ... of the insulating layer only").

1.3 Basis for the combination of features

1.3.1 Although the respondent has indicated where a suitable basis for each of the separate amendments was indicated in the application as filed (see the references to the passages of the application as filed indicated in section XI a-e above), as had been done by the opposition division (reasons of the decision: sections 3.3.1 to 3.3.5), no argument was provided, in particular in reply to the Board's communication in which that issue was identified (section 5.5), to show that the specific combination of features according to operative claim 1 is directly and unambiguously derivable from the application as filed. In the present case, it was in particular not shown that the application as filed provides a pointer to the combination of the following features, at the present level of generality:

- "lossy species" in the semiconducting layer;
- First polymeric resin being a thermoplastic as now defined in operative claim 1;

- Conductive filler being carbon black and being present in an amount of 10-55 wt.% based on the first material;
- Organoclay being a natural montmorillonite modified with a quaternary ammonium compound and being present in the first polymeric resin in an amount of 1-3 wt.% based on the total weight of polymeric resin in the material;
- Ratio of AC dielectric losses as defined in operative claim 1 being greater than 1.5, whereby the dielectric losses are measured at 130°C.

In that respect, it has to be taken into account that the application as filed comprised various alternative embodiments for each of those amendments. For instance,

- The lossy species could be present either in the semiconducting layer or in the insulating layer (paragraphs 18, 43, 51 and 54);
- The first polymeric resin could be either a thermoplastic or a thermoset (claims 5 and 6);
- The thermoplastic was not limited to the ones mentioned in operative claim 1 but could also be an ethylene copolymer in general or a polypropylene copolymer in general (claims 7 and 9);
- The most common conductive filler could be either carbon black or graphite and the amount of filler could vary depending on the type of filler and other components (paragraph 25);

- The organoclay could be comprised either in the first material, i.e. in the semiconducting layer, or in the second material, i.e. the insulating layer (claims 1 and 3; paragraphs 18 and 27). Also, it was not limited to the sole natural montmorillonite modified with a quaternary ammonium compound as now specified in operative claim 1 (paragraph 26) and the amount of organoclay was also disclosed in different ranges ("up to about 1 wt.%": claim 2; "up to about 3 wt.%": claim 3 and paragraph 26; "from about 1 wt.% to about 3 wt.%": paragraph 26).

In view of the above, the specific combination of features now defined in operative claim 1 may only be arrived at after arbitrarily combining various passages of the application as filed. However, it was not shown that said combination of features effectively emerges out of the application as filed.

1.3.2 Since original claims 2 to 6 and 11 were only dependent on claim 1 and original claims 7 to 10 were only dependent on either claim 5 or claim 7, these claims do not provide a direct and unambiguous basis for any of their combinations, contrary to the respondent's view.

1.3.3 Also, since the examples of the application as filed were only related to specific semiconducting layers (EVA/PP) and insulating layers (HFDB-4202 and HFDE-4201), whereby the AC dielectric losses as defined in operative claim 1 was not explicitly indicated, they cannot provide a direct and unambiguous basis for the specific combination of features according to operative claim 1 at its level of generality.

1.3.4 In view of the above, the application as filed does not provide a direct and unambiguous support for the combination of features now being defined in operative claim 1.

1.4 Basis for some of the individual features

1.4.1 Regarding the amendment "lossy species", the respondent argued that it was based on paragraph 18 of the application as filed.

However, it is derivable from the first two sentences of said paragraph 18 that the lossy species mentioned therein are those contained in an elastomeric material present in the semiconducting layer. A similar conclusion may further be derived from the expression "semiconductive shield compositions which also contain lossy elastomeric components" according to paragraph 51 of the application as filed. It may further be derived from paragraphs 39 and 40 of the application as filed that, according to the original application, the source of the "lossy species" is the propylene-ethylene elastomer and not the ethylene vinyl acetate copolymer also contained in the semiconducting layer. Considering that operative claim 1 does not reflect any limitation in terms of an elastomeric material contained in the semiconducting layer (in particular in imposing the presence of a propylene-ethylene elastomer), it is agreed with the appellant that the application as filed does not provide a direct and unambiguous support for the amendment "lossy species" at the level of generality of operative claim 1.

1.4.2 Regarding the amendment "said dielectric losses being measured ... of the insulating layer only" (end of operative claim 1), the respondent argued that it was

derivable from paragraph 30 of the application as filed, in particular from the table contained therein (pages 7-8).

However, said passages of the application as filed describe a more specific determination method than the one now mentioned in operative claim 1. In particular the features of the first sentence of paragraph 30 ("sandwich" structure) and those of steps 1 to 4 of the table of paragraph 30 are not reflected in operative claim 1. Considering that it was not shown that those features do not affect the determination of the dielectric loss, in particular in reply to the Board's communication in which that issue was identified (section 5.4), the requirements of Article 123(2) EPC are not satisfied also for that reason.

- 1.4.3 Regarding the requirement directed to a ratio of AC dielectric losses of greater than 1.5 when measuring the dielectric loss at 130°C, it is noted that that parameter was not determined in the examples of the patent in suit (only the values of dielectric constants and dissipation factors for various compositions and at various temperatures such as 90°C, 110°C and 130°C are indicated e.g. in Tables 2 to 6). Besides, different temperatures are indicated in step 7 of the table bridging pages 7 and 8 of the application as filed. Also, the AC dielectric losses ratio as defined in operative claim 1 was not explicitly determined, at any temperature, in the examples of the application as filed. In that respect, it was not clarified by the respondent which examples of the application as filed would have to be compared in order to illustrate the ratio of AC dielectric losses mentioned in operative claim 1 (see point 5.5, end of the bullet point on page 7 of the Board's communication). Regarding the

temperature of determination of 130°C, since the table on page 8 of the application as filed (point 7) discloses five suitable temperatures ranging from room temperature to 130°C and the examples of application as filed contain measurement of dissipation factor at seven different temperatures ranging from room temperature to 130°C (tables 2A-B and 4), it cannot be concluded that the application as filed discloses any preference for the temperature of 130°C, contrary to the respondent's view. Under such circumstances, it cannot be concluded that it is directly and unambiguously derivable from the application as filed that the ratio of AC dielectric losses of greater than 1.5 specified in the original claim 1 is to be obtained when determining the dielectric losses at 130°C.

- 1.4.4 In view of the above, the application as filed does not provide a direct and unambiguous support for amendments (a) and (e) identified in section 1.2 above.

- 1.5 For these reasons, claim 1 of the 4th auxiliary request does not satisfy the requirements of Article 123(2) EPC.

5th and 6th auxiliary requests

- 2. Article 123(2) EPC

- 2.1 Claim 1 of each of the 5th and 6th auxiliary requests corresponds to a limitation of claim 1 of the 4th auxiliary request in terms of the thermoplastic contained in the first polymeric resin. However, the subject-matter so defined contains the same unallowable combination of features as identified in section 1.3 above and the same unallowable amendments as indicated in section 1.4 above (apart from the one indicated in

section 1.4.1 for the 6th auxiliary request). Under such circumstances, the same conclusion in respect of Article 123(2) EPC as for the 4th auxiliary request is bound to be drawn for each of the 5th and 6th auxiliary requests.

3. None of the respondent's requests being allowable pursuant to Article 123(2) EPC, there is no need to decide on any other issue and the patent is to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. European patent 2 215 158 is revoked.

The Registrar:

The Chairman:



G. Nachtigall

D. Semino

Decision electronically authenticated