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**Datasheet for the decision  
of 5 March 2013**

**Case Number:** T 0313/09 - 3.3.03  
**Application Number:** 02783838.2  
**Publication Number:** 1448654  
**IPC:** C08G 59/68, G03F 7/004,  
G03F 7/038  
**Language of the proceedings:** EN

**Title of invention:**

Radiation curable resin composition for making colored three dimensional objects

**Patent Proprietor:**

DSM IP Assets B.V.

**Opponent:**

Huntsman Advanced Materials (Switzerland) GmbH

**Headword:**

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**Relevant legal provisions:**

EPC Art. 123(2)

**Keyword:**

"Amendments - added subject-matter: yes (all requests)"

**Decisions cited:**

T 0296/96, T 0962/98, T 0686/99, T 0872/01, T 1863/06,  
T 0879/09

**Catchword:**

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Case Number: T 0313/09 - 3.3.03

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.03  
of 5 March 2013

**Appellant:** Huntsman Advanced Materials (Switzerland) GmbH  
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**Respondent:** DSM IP Assets B.V.  
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**Representative:** Hatzmann, Martin  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
12 December 2008 concerning maintenance of  
European patent No. 1448654 in amended form.

**Composition of the Board:**

**Chairman:** M. C. Gordon  
**Members:** O. Dury  
C.-P. Brandt

## Summary of Facts and Submissions

I. The appeal by the opponent lies against the interlocutory decision of the opposition division posted on 12 December 2008 according to which European patent No. EP 1 448 654, based on application No. 02 783 838.2, corresponding to the international application published as WO 03/046042 A1, could be maintained in amended form.

II. The application as filed contained 22 claims of which claims 1, 7, 9, 11, 13, 16, and 20 read as follows:

"1. A radiation curable resin composition suitable for making three dimensional objects comprising  
A) at least one epoxy compound  
B) a cationic photoinitiator,  
wherein the resin composition has a first color or no color before cure and wherein a three dimensional object made from the resin by subjecting the resin to radiation shows a second color which is different from the color of the resin composition before cure."

"7. A radiation curable composition suitable for making three dimensional objects comprising a radiation curable component, a photoinitiator and a filler,  
wherein the resin composition has a first color or no color before cure and wherein a three dimensional object made from the resin by subjecting the resin to radiation shows a second color which is different from the color of the resin."

"9. The resin composition according to claims 1, 7 or 8, wherein the resin composition contains a latent coloring component C)."

"11. The resin composition according to anyone of claims 2-5, 9-10, wherein the amount of component C is between 0.0001 and 1 wt%."

"13. The resin composition according to anyone of the preceding claims, wherein a component D) is present which contains an ethylenically [*sic*] unsaturation"

"16. The resin composition according to anyone of the preceding claims, wherein the resin composition contains a radical photoinitiator E)."

"20. A process for forming a three-dimensional article comprising:

(1) coating a layer of a composition onto a surface, wherein the composition is used as defined in anyone of claims 1-19;

(2) exposing the layer imagewise to actinic radiation to form an imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing of the layer in the exposed areas;

(3) coating a layer of the composition onto the previously exposed imaged cross-section;

(4) exposing said thin layer from step (3) imagewise to actinic radiation to form an additional imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing and coloring of the thin layer in the exposed areas and to cause adhesion to the previously exposed imaged cross-section;

(5) repeating steps (3) and (4) a sufficient number of times in order to build up the three-dimensional article."

The passages on page 5, lines 21-26 and page 20, lines 27-31 of the application as filed read, respectively, as follows:

"The resin compositions of the present invention may have cationically curable components A), and/or radically curable components D) as well as cationic photoinitiators B) and/or radical photoinitiators E). In case the compositions of the invention contain a filler F), the resin may be based on cationically curable components, radically curable components or mixtures of these components (so called hybrid systems)."

"In general, the three-dimensional article formed by exposure to actinic radiation, as discussed above, is not fully cured, by which is meant that not all of the reactive material in the composition has reacted. Therefore, there is often an additional step of postcuring the article. This can be accomplished by further irradiating with actinic radiation, heating, or both."

III. The granted patent was based on 16 claims which are however not relevant for the present decision.

IV. A notice of opposition against the patent was filed on 12 June 2007, in which the revocation of the patent in its entirety was requested on the grounds of

Art. 100(a) EPC (lack of novelty as well as lack of an inventive step) and Art. 100(b) EPC.

The decision under appeal was based on a set of 12 claims filed at the oral proceedings before the opposition division, claim 1 of which read as follows (amendments as compared to claim 20 as filed are shown in **bold**):

"1. A process for forming a three-dimensional article comprising:

- (1) coating a layer of a radiation curable resin composition onto a surface;
- (2) exposing the layer imagewise to actinic radiation to form an imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing of the layer in the exposed areas;
- (3) coating a layer of the composition onto the previously exposed imaged cross-section:
- (4) exposing said thin layer from step (3) imagewise to actinic radiation for form [sic] an additional imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing and coloring of the thin layer in the exposed areas and to cause adhesion to the previously exposed imaged cross-section;
- (5) repeating steps (3) and (4) a sufficient number of times in order to build up the three-dimensional article; **and**
- (6) **postcuring the three-dimensional article formed in step (5) by further irradiating with actinic radiation, wherein the radiation curable resin composition comprises**
  - A) at least one epoxy compound,**
  - B) a cationic photoinitiator,**

C) a latent coloring component,  
D) a compound having at least one ethylenic unsaturation which can be polymerized with radicals,  
E) free radical initiator, and  
F) filler,  
wherein  
the resin composition has a first color before cure and wherein a three dimensional object made from the resin by subjecting the resin to radiation shows a second color which is different from the color of the resin composition before cure and  $L_c/L_u$  is less than 0.9, wherein  $L_c$  is the lightness (L) of the cured three dimensional object and  $L_u$  is L of the uncured resin composition, wherein  $L_c$  and  $L_u$  are measured with a Chroma meter on a sample having a thickness of 20 mil (0.5 mm) or more with a white Leneta-card background and wherein the amount of component C is between 0.0005 and 0.1 wt.%."

According to the decision, *inter alia*, the main request fulfilled the requirements of Art. 123(2) EPC. In that regard, the subject-matter of claim 1 was considered to be based on the combination of original claims 1, 9, 13, 16 and 20 together with the passages on page 5, lines 16-20 and 23-25, page 13, line 2, page 16, line 9ff and page 20, lines 29-31.

V. On 29 January 2009, the opponent (appellant) lodged an appeal against the above decision, the prescribed fee being paid on the same day. With the statement setting out the grounds for the appeal, received on 6 April 2009, the appellant requested that the patent be revoked because the main request on which the contested decision was based did not fulfil the requirements of

Art. 123(2) EPC, Art. 84 EPC, Art. 83 EPC, Art. 54 EPC and Art. 56 EPC. Further arguments were submitted with letter of 20 December 2012.

VI. By letter of 18 August 2009, the respondent (patent proprietor) filed comments on the statement of grounds of appeal and requested the maintenance of the patented in amended form as maintained in opposition (main request) or, alternatively, according to an auxiliary request filed therewith.

Claim 1 of the auxiliary request corresponded to claim 1 of the main request with the following amendments:

- (a) in process step (4), the actinic radiation was given as being **"in the range of 20 - 250 mJ/cm<sup>2</sup>";**
- (b) the sentence **"shows a second color which is different from the color of the resin composition before cure"** was modified to **"shows a second color which is different from the color of the resin composition before cure and which is uniform throughout the three dimensional article"** (emphasis by the Board).

VII. In a communication dated 22 October 2012 accompanying the summons to oral proceedings, the Board identified relevant issues to be addressed during the oral proceedings. It was in particular pointed out that, regarding Art. 123(2) EPC, it would have to be assessed whether or not the combination of features according to claim 1 of each of the main and auxiliary requests was directly and unambiguously derivable from the application as filed. In addition, it was indicated



that the amendment "E) free radical initiator" did not appear to be supported by the application as filed.

- VIII. By letter of 5 December 2012, the respondent announced that he would not attend the oral proceedings before the Board.
- IX. Oral proceedings were held on 5 March 2013 in the absence of the respondent, as announced.
- X. The appellant's arguments relevant for the present decision may be summarised as follows:

*Main request*

- (a) Although the technical features recited in claim 1 were individually disclosed in different parts of the description of the application as filed, their specific combination was not. In particular, only claim 20 of the application as filed dealt with a process comprising steps (1) to (5) according to claim 1. In that regard, the process disclosed in the paragraph bridging pages 19 and 20 of the application as filed provided no valid support. In addition, each of the features relating to the postcuring step (6), the use of each of components C) to F) and an amount of C) between 0.0005 and 0.1 wt.% was optional. The subject-matter of claim 1 of the main request could only be obtained by making multiple selections from various passages of the application as filed. Following the conclusions of decision T 1863/06, the requirements of Art. 123(2) EPC were not fulfilled.

- (b) The examples of the application as filed were performed using a specific combination of compounds in specific amounts, which was not reflected in present claim 1. They could, thus, not serve as basis for the subject-matter now being claimed.
  
- (c) The amendment "E) free radical initiator" was not supported by the application as filed. The term "initiator" encompassed e.g. thermal initiators and had a broader meaning than the term "photoinitiator" used initially. Also for that reason, the requirements of Art. 123(2) EPC were not met.

*Auxiliary request*

- (d) The requirements of Art. 123(2) EPC were not met for the same reason as for the main request.

XI. The respondent had, in writing, essentially argued as follows:

*Main request*

- (a) The description of the application as filed was directed to two main embodiments, one of which concerned an opaque radiation-curable composition comprising a filler, as specified in original claim 7. The skilled person would seriously contemplate using for such compositions the preferred concentration range of the latent coloring component C). Furthermore the skilled person would seriously contemplate using a post-

curing step because in general the three-dimensional article was not fully cured. Following decision T 296/96, the requirements of Art. 123(2) EPC were met.

*Auxiliary request*

(b) No substantiation with regard to the auxiliary request was provided.

XII. The appellant (opponent) requested that the decision under appeal be set aside and that European patent No. 1 448 654 be revoked.

The respondent (patent proprietor) requested in writing that the appeal be dismissed. Alternatively it was requested that the patent be maintained on the basis of the auxiliary request filed with letter dated 18 August 2009.

XIII. The Board announced its decision at the end of the oral proceedings.

## Reasons for the Decision

1. The appeal is admissible.

### *Main request*

2. Amendments
  - 2.1 Claim 1 corresponds to the combination of original claims 20, 1, 9, 11, 13 and 16 with the following amendments:
    - (a) addition of a postcuring step by further irradiating with actinic radiation according to feature (6);
    - (b) specifying that compound D) "can be polymerized with radicals";
    - (c) modifying the term "radical photoinitiator E)" according to original claim 16 to "E) free radical initiator";
    - (d) addition of filler F);
    - (e) addition of the feature "Lc/Lu is less than 0.9 ... background";
    - (f) modifying the range of component C) from "between 0.0001 wt.% and 1 wt.%" to "between 0.0005 wt.% and 0.1 wt.%".
  - 2.2 The process according to claim 1 comprises six steps as defined in paragraphs (1) to (6) specified therein, wherein a composition comprising components A) to F) is used.
    - 2.2.1 The process defined in original claim 20 comprises only steps (1) to (5) according to present claim 1 and step

(6) is not mentioned in the claims of the application as filed.

Similarly, filler F) is not mentioned in the compositions defined in the claims of the application as filed.

Hence, it has to be assessed whether or not a process having the specific combination of those features, step (6) and filler F), together with the remaining features of claim 1 is directly and unambiguously derivable from the application as filed as a whole.

2.2.2 Process step (6), which corresponds to a postcuring by irradiating with actinic radiation, is disclosed in the application as filed as an optional embodiment (page 20, lines 27-31). Contrary to the argument of the respondent, that passage does not explicitly disclose that a postcuring is a "preferred embodiment" of the process claimed but merely acknowledges that postcuring is often necessary in order to fully cure the three-dimensional article.

Besides, according to said passage, should a postcuring step be applied, it could be accomplished either with actinic radiation, heating or both. It is further derivable from the passage on page 20, line 35 to page 21, line 3 as well as from the Table on page 24 of the application as filed that those alternatives are not equivalent since the nature of the postcuring (actinic radiation or heating) has an impact on the colour change and may be decisive as to whether or not the criteria "Lc/Lu is less than 0.9" according to

claim 1 is met (see examples 8-9 in the Table on page 24 of the application as filed).

Amendment a) of claim 1, thus, corresponds to an optional embodiment of the process disclosed in the application as filed, further restricted to a selection between non equivalent alternatives.

2.2.3 Regarding the components comprised in the radiation curable resin composition to be used in the process according to claim 20 of the application as filed, many possibilities were originally disclosed. According to page 5, lines 21-28, components A) and/or D) could be used as curable components and components B) and/or E) could be used as initiators. In that regard, it was further indicated on page 18, lines 22-24 that hybrid systems containing both radically and cationically polymerisable components (i.e. A) and D) together) and also radical and cationic photoinitiators (i.e. B) and E)) were preferred.

The presence of a latent coloring component C) in those compositions was, however, only disclosed as an optional feature in the application as filed (see claim 1; claim 7; page 2, lines 12-23; page 3, lines 6-12).

Similarly, the use of a filler F) in those compositions was consistently disclosed in the application as filed as an optional feature (page 5, lines 21-28; page 16, lines 9-10; page 17, line 6; examples 1-7).

Hence, a composition comprising the combination of components A) to F) according to claim 1 may only be

obtained after combining a preferred embodiment (hybrid composition comprising components A), B), D) and E)) and two optional features (latent coloring component C) and filler F)) of the application as filed.

2.2.4 Following the conclusions of paragraphs 2.2.2 and 2.2.3, a process according to claim 1 may only be obtained by making multiple choices in various passages of the description of the application as filed (postcuring step (6); use of actinic radiation in step (6)); hybrid composition comprising A), B), D) and E); latent coloring component C); filler F)).

2.2.5 As to whether or not the generation of such a particular combination of features contravenes Art. 123(2) EPC, it is established case law of the Boards of Appeal of the EPO that the content of the application as filed may not be considered to be a reservoir from which individual features pertaining to separate sections can be combined in order artificially to create a particular combination. In general, the requirements of Art. 123(2) EPC may only be met if it can be established that there is a pointer to that particular combination of features, so that this combined selection of features emerges clearly and unambiguously from the content of the application as filed (e.g. T 686/99: section 4.3.3 of the reasons; T 872/01: section 2.2.3 of the reasons).

(a) As explained previously, neither the claims nor the description of the application as filed contain a pointer to the specific combination of features according to claim 1.

- (b) Among the examples of the application as filed, only examples 8-10 deal with compositions comprising components A) to F) according to claim 1. Examples 1-7 do not employ a filler F). However, the compositions of examples 8-10, which do employ a filler, were not used in a process comprising steps (1) to (6) according to present claim 1. The measurement of the lightness parameters  $L_c$  and  $L_u$  in said examples is, according to page 21, lines 26-27 of the application as filed, determined on a film having a thickness of 6 mils (0.15 mm). It is, however, not disclosed in the application as filed whether or not those measurements correspond to the requirement that  $L_c/L_u$  is less than 0.9 according to claim 1, whereby  $L_c$  and  $L_u$  are to be measured "on a sample having a thickness of 20 mil (0.5 mm) or more". Hence, it can not be concluded whether the compositions prepared in examples 8-10 are illustrative of those defined in present claim 1.
- (c) Examples 8-10 of the application as filed were further performed using a combination of two different epoxy compounds A) (Uvacure 1500 and Epon 825) one of which being a specific cycloaliphatic diepoxide, a specific cationic photoinitiator B), latent coloring component C) (Copikem 20 Magenta), compound D) (Sartomer SR-399), a specific free radical photoinitiator E) (Irgacure 184), a specific filler F) (Siltex 44), each of those compounds being present in specific amounts. Those compositions further comprise an additional curable component (UVR6000: see page 18, lines 25-



28 of the application as filed) and a specific alcohol G) (Triton X-100), both compounds corresponding to preferred embodiments according to the application as filed but which are not recited in the composition defined in present claim 1. Examples 8-10 of the application as filed only differ from each other in that they were performed using different amounts of latent coloring component C) (see Table on page 24 of the application as filed).

According to page 3, lines 6-12 of the application as filed, it is preferred that the latent coloring component C) is a substantially colorless dye precursor capable of forming a chromophore in the presence of reactive components in the resin that are formed during irradiation of the resin. It is also indicated that it is believed that especially the photoacid that is formed during irradiation of the cationic photoinitiator B) is one of the active components that reacts with the latent coloring component C) to generate a chromophore that gives color to the resin composition or to the three dimensional part. Hence, the nature of C) has an impact on the measurement of lightness.

Furthermore, the compositions used in examples 8-10 comprise various components which participate in the polymerisation reaction but which are not recited in present claim 1.

Since the determination of lightness in examples 8-10 of the application as filed is the result of the specific interaction(s) between the

components used in those examples, the results obtained, even if they were to satisfy the requirement of lightness as defined in claim 1, which was not shown (see preceding section b)), may not be generalised to the more generic compositions presently defined in claim 1.

Consequently, the subject-matter of claim 1 represents an intermediate generalisation of examples 8-10 of the application as filed. According to established case law of the Boards of Appeal of the EPO, such an intermediate generalisation is only permissible under Art. 123(2) EPC if the skilled person would recognize without any doubt from the application as filed that characteristics taken from said examples 8-10 were not closely related to the other characteristics of the specific embodiments and were applicable directly and unambiguously to the more general context (T 962/98; T 879/09). Since, as explained above, that condition is not fulfilled in the present case, the subject-matter defined in claim 1 does not amount to an allowable generalisation of examples 8-10.

- 2.2.6 Original claim 7, which was cited by the respondent as support for the claimed amendments, deals with a composition comprising "a radiation curable component", a "photoinitiator" and a filler. Therefore, said claim 7 defines compositions in more generic terms than those defined in present claim 1. It fails in particular to disclose the specific combination of components A) and D) according to claim 1 as "radiation curable component" and the combination of components B)

and E) as "photoinitiator". It also fails to specify component C). The same holds true regarding the "second embodiment" indicated on page 2, lines 18-23 of the application as filed. The argument of the respondent could therefore not be followed.

2.2.7 The respondent invoked the findings of decision T 296/96, according to which when assessing whether a feature has been disclosed in a document, the relevant question was whether a skilled person would seriously contemplate combining the different features cited in that document (section 3.1 of the reasons of T 296/96). In the present case, the application as filed contains no pointer to the specific combination of features required to arrive at the subject-matter of claim 1. In particular, neither the postcuring step (6), nor the use of actinic radiation in step (6), nor the use of filler F) were disclosed e.g. as preferred embodiments in the application as filed. Under such circumstances, the skilled person would have had no good reason to concentrate on the combination of features according to present claim 1. That conclusion is, thus, in line with the findings of decision T 296/96.

2.3 For these reasons, the combination of features recited in claim 1 is not directly and unambiguously derivable from the application as filed.

2.4 Regarding amendment c), the application as filed does not disclose the term "free radical initiator". The only basis regarding component E) is either directed to "radical photoinitiators" which form "free radicals when the appropriate irradiation takes place" (page 14,

line 26 to page 15, line 10) or to "radical photoinitiator" (original claim 16).

2.4.1 According to common general knowledge in the field of chemistry, (free) radical initiators are substances which can be fragmented into free radicals in order to promote radical reactions e.g. radical polymerisation. Initiators are classified in different groups depending on the type of process used to induce said fragmentation, photoinitiators corresponding for instance to substances that may be fragmented when exposed to light or electromagnetic radiation, as explained in paragraphs [0064] to [0066] of the patent in suit. Another main group of initiators is constituted by thermal initiators, which are activated by heat. Hence, the term "(free) radical photoinitiator" according to the application as filed has a more restricted meaning than the generic term "free radical initiator" recited in present claim 1. Amendment c) made in claim 1 is, thus, not supported by the application as filed and extends beyond the content of the application as filed.

2.4.2 The respondent did not reply to that objection, which had been identified in the communication of the Board (section 6.1 ii)).

2.5 The requirements of Art. 123(2) EPC are therefore not met and the main request is not allowable.

*Auxiliary request*

3. Amendments

3.1 Claim 1 corresponds to claim 1 of the main request with two additional limitations. The subject-matter thus defined comprises the same combination of features as claim 1 of the main request.

3.2 Therefore, for the same reasons as for the main request, the requirements of Art. 123(2) EPC are not met and the auxiliary request is not allowable.

4. None of the requests of the respondent/patent proprietor fulfilling the requirements of the EPC, the patent is to be revoked.

**Order**

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

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

The Registrar:

The Chairman:

E. Görgmaier

M. C. Gordon