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Datasheet for the decision of 9 March 2010

Case Number: T 0537/08 - 3.4.02

Application Number: 01301461.8

Publication Number: 1146357

IPC: G02B 6/16

Language of the proceedings: EN

Title of invention:
Optical fiber gratings with index matched polymer coatings for cladding mode suppression

Applicant:
LUCENT TECHNOLOGIES INC.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Added subject-matter (yes - all requests)"

Decisions cited:
T 0570/05

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0537/08 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 9 March 2010

Appellant: Lucent Technologies, Inc.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 24 September 2007 refusing European patent application No. 01301461.8 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
B. Müller

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 01301461.8 published with publication No. 1146357.

In its decision the examining division held that the subject-matter of claim 1 of the main and the auxiliary requests then on file did not involve an inventive step over the prior art considered during the proceedings (Article 56 EPC 1973), claim 1 of the main request being, in addition, anticipated by the prior art within the meaning of Articles 52(1) and 54(3) EPC 1973.

II. With the statement setting out the grounds of appeal the appellant filed a new set of amended claims 1 to 13 including three independent claims, namely claims 1, 2 and 10, and requested setting aside of the decision under appeal and the grant of a patent.

Each of independent claims 1, 2 and 10 was directed to an optical fibre Bragg grating device comprising a polymer coating around the glass cladding of an optical fibre having a Bragg grating formed along its core.

The composition of the polymer coating was defined in each of independent claims 1 and 2 in terms of a blending or polymerization product of

"(a) a weight percent of a fluorine-containing urethane (meth)acrylate ranging from 10% to 35%; (b) a weight percent of a mono-functional or di-functional (meth)acrylate monomer ranging from 12% to 60%; and (c)

a weight percent of an aliphatic or aromatic urethane acrylate oligomer ranging from about 9.5% to 60%",

and in independent claim 10 as comprising

"a urethane acrylate or (meth)acrylate prepared by reacting a fluorine-containing urethane (meth)acrylate, a mono-functional or di-functional (meth)acrylate monomer, an aliphatic or aromatic urethane acrylate oligomer and a hydroxy-containing photocurable hydrocarbon".

III. In a communication annexed to summons to oral proceedings, the Board gave a preliminary assessment of the appellant's case. In particular, the Board raised several objections under Article 84 EPC 1973 and Article 123(2) EPC with regard to the new set of claims and expressed the preliminary view that the amendments would not appear to overcome the examining division's finding of lack of inventive step (Article 56 EPC 1973). The two following passages of the communication are pertinent for the present decision:

"Each of independent claims 1 and 2 specifies weight percent ranges for each of the three components of a polymerisable composition. However, no basis can be found for the combination of the specific values of the three weight percent ranges specified in these claims, i.e. for the ranges from 10 to 35%, from 12 to 60% and from about 9.5 to 60%, respectively (Article 123(2) EPC). In particular, the passages of the application as originally filed in claims 7 and 18 to 20, on page 6, lines 6 to 13 and on page 8, lines 16 to 21 and in the examples specify different alternative ranges, but none

disclose the value 12% for the second of the components and the value 9.5% for the third of the components. It is also noted that the ranges from 0 to 60% of the second and the third of the components are disclosed on page 8, lines 16 to 21 of the original application only in combination with the range from 40 to 85% of the first component, and that this disclosure relates to specific examples of the components and cannot be generalized to the family of components defined in present claims 1 and 2 (see in this respect decision T 570/05, points 1 and 2 of the reasons)."

"The application as originally filed consistently requires a correlation between the amounts of the urethane (meth)acrylate, the (meth)acrylate monomer and the acrylate oligomer specified in independent claim 10 (see original claims 7 and 18 to 20 and page 6, lines 6 to 13 and page 8, lines 16 to 21 of the description). Independent claim 10, however, does not contain any restriction to the relative amounts of the three components and therefore constitutes a generalization of the disclosure of the application as originally filed for which no basis can be found (Article 123(2) EPC)."

IV. With the letter dated 12.02.2010 in response to the summons to oral proceedings, the appellant informed the Board that they would not attend the oral proceedings and filed new sets of claims amended according to a main and first to third auxiliary requests replacing the previous set of claims.

Claim 1 amended according to the main and the first to third auxiliary requests reads as follows:

Main request:

"An optical fiber Bragg grating device (9) for operating over a temperature range within -40°C to 100°C comprising a length of glass optical fiber (10) having a core (11), a Bragg grating (12) formed along the core, and a glass cladding (14) around the core, characterised by:

a polymer coating (15) for reducing cladding mode loss around the glass cladding, the polymer having an index of refraction above that of the cladding for at least part of the temperature range and below that of the cladding for at least part of the temperature range;

wherein the polymer coating comprises the polymerization product of (a) a weight percent of a fluorine-containing urethane (meth)acrylate ranging from 40% to 85%; (b) a weight percent of a mono-functional or di-functional (meth)acrylate monomer ranging from 12% to 60%; and (c) a weight percent of an aliphatic or aromatic urethane acrylate oligomer ranging from about 9.5% to 60%, and the polymer coating comprises a weight percent of fluorine between 18.4% and 26%."

First auxiliary request:

"An optical fiber Bragg grating device (9) for operating over a temperature range within -40°C to 100°C comprising a length of glass optical fiber (10) having a core (11), a Bragg grating (12) formed along the core, and a glass cladding (14) around the core, characterised by:

a polymer coating (15) for reducing cladding mode loss around the glass cladding, the polymer having an index of refraction above that of the cladding up to at least 60° C

wherein the polymer coating comprises the polymerization product of (a) a weight percent of a fluorine-containing urethane (meth)acrylate ranging from 40% to 85%; (b) a weight percent of a mono-functional or di-functional (meth)acrylate monomer ranging from 12% to 60%; and (c) a weight percent of an aliphatic or aromatic urethane acrylate oligomer ranging from about 9.5% to 60%."

Second auxiliary request:

"An optical fiber Bragg grating device (9) for operating over a temperature range within -40°C to 100°C comprising a length of glass optical fiber (10) having a core (11), a Bragg grating (12) formed along the core, and a glass cladding (14) around the core, characterised by:

a polymer coating (15) for reducing cladding mode loss around the glass cladding, the polymer having an index of refraction above that of the cladding for at least part of the temperature range and below that of the cladding for at least part of the temperature range;

wherein the polymer coating comprises the polymerization product of (a) a weight percent of a fluorine-containing urethane (meth)acrylate ranging from 40% to 85%; (b) a weight percent of a mono-functional or di-functional (meth)acrylate monomer ranging from 12% to 60%; and (c) a weight percent of an aliphatic or aromatic urethane acrylate oligomer

ranging from about 9.5% to 60%, and a peak-to-peak variation of the index of refraction of the polymer coating as a function of wavelength from 1530 nm to 1555 nm varies by less than 0.15 dB within a temperature range of 27°C to 80°C."

Third auxiliary request:

"An optical fiber Bragg grating device (9) for operating over a temperature range within -40°C to 100°C comprising a length of glass optical fiber (10) having a core (11), a Bragg grating (12) formed along the core, and a glass cladding (14) around the core, characterised by:

a polymer coating (15) for reducing cladding mode loss around the glass cladding, the polymer having an index of refraction above that of the cladding for at least part of the temperature range and below that of the cladding for at least part of the temperature range;

wherein the polymer coating comprises a cured blend of a linear urethane acrylate with a perfluorinated tail, Sartomer CN 963B80, hexanediol diacrylate and Darocur 1173."

V. Oral proceedings were held on the scheduled date in the absence of the appellant.

At the end of the oral proceedings the Board gave its decision.

VI. The arguments submitted by the appellant in support of its request and pertinent for the present decision are the following:

With respect to the percent weight range of 12% to 60% recited for mono-functional or di-functional (meth)acrylate monomer, example 2 discloses 11.6 parts by weight of hexanediol diacrylate, equivalent to 1.4 wt.% [*sic*], at page 9, line 5. This compound is a di-functional acrylate monomer. Thus, the recited range of the second component is fully supported by the application as filed.

With respect to the percent weight range of 9.5% to 60% recited for an aliphatic or aromatic urethane acrylate oligomer, example 4 discloses 9.51 parts, equivalent to 9.2 wt.%, of Sartomer CN983 B88 at page 9, line 20. This compound is an aliphatic or aromatic urethane acrylate oligomer. Thus, the recited range of the third component is fully supported by the application as filed.

The feature of claim 1 of the third auxiliary request according to which the polymer coating comprises "a cured blend of a linear urethane acrylate with a perfluorinated tail, Sartomer CN 963B80, hexanediol diacrylate and Darocur 1173" is supported by the application as originally filed at page 7, lines 20 and 21, page 8, lines 24 to 26, and page 9, lines 4 to 6 and 19 to 21.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request - Article 123(2) EPC*

2.1 Claim 1 of the main request requires that the polymer coating around the glass cladding of the claimed optical fibre comprises the polymerization product of, among other components,

- a weight percent of a mono-functional or di-functional (meth)acrylate monomer ranging from 12% to 60%, and
- a weight percent of an aliphatic or aromatic urethane acrylate oligomer ranging from about 9.5% to 60%.

This requirement was already present in independent claims 1 and 2 filed with the statement of grounds of appeal (point II above), and in the communication annexed to the summons (point III above, second paragraph) the Board noted with respect to this requirement that neither the lower value 12% of the claimed range "12% to 60%" nor the lower value 9.5% of the claimed range "9.5% to 60%" appear to be derivable from the disclosure of the application as originally filed (Article 123(2) EPC).

2.2 In its letter of reply the appellant contested the Board's view in this respect and referred to the disclosure in examples 2 and 4 of the application as filed as a basis for the claimed lower range values 12% and 9.5%, respectively (point VI above, second and third paragraphs).

The Board, however, does not find the submissions of the appellant convincing for the following reasons:

Example 4 of the application as filed discloses a blend of 74.4 parts by weight of OIA (i.e. a linear urethane acrylate with a perfluorinated tail previously defined on page 7, lines 18 to 24 of the description of the application), 16 parts of hexanediol diacrylate, 9.51 parts of Sartomer CN983 B88, and 3.4 parts of Darocur 1173. Since the parts by weight of the components sum up to a total of 103.31 parts, the 9.51 parts by weight of Sartomer CN983 B88 constitute (951/103.31)% by weight of the blend, i.e. about 9.2% by weight as submitted by the appellant.

Example 2 of the application discloses a blend of 53.4 parts by weight of OIA, 35 parts of Sartomer CN 963B80, 11.6 parts of hexanediol diacrylate, and 2 parts of Darocur 1173. Since the parts by weight of the components sum up to a total of 102 parts, the 11.6 parts by weight of hexanediol diacrylate constitute (1160/102)% by weight of the blend, i.e. about 11.4% by weight as it appears to have been submitted by the appellant by reference to the value "1.4 wt.%" presumably containing a clerical error.

As submitted by the appellant, the component hexanediol diacrylate disclosed in example 2 constitutes an example of the claimed di-functional acrylate monomer (page 7, lines 14 and 15 of the description), and the component Sartomer CN983 B88 disclosed in example 4 constitutes an example of the claimed urethane acrylate oligomer (page 7, lines 23 and 24 of the description).

However, even if it were assumed that the specific value (1160/102)% by weight of hexanediol diacrylate and the specific value (951/103.31)% by weight of

Sartomer CN983 B88 respectively disclosed in two different particular examples of the application could - contrary to the indications of the Board in its communication annexed to the summons, see point III above, second paragraph - be detached from the other specific features of the respective particular example, be generalized as being applicable to any other member of the respective family of components defined in claim 1 (i.e. to the di-functional acrylate monomer and the urethane acrylate oligomer, respectively), and be taken as the lower range values of the amounts of the respective family of components without infringing Article 123(2) EPC, the disclosure of examples 2 and 4 would then at the most support a lower range value of (951/103.31)% by weight for the urethane acrylate oligomer and of (1160/102)% by weight for the di-functional acrylate monomer, but not the respective lower range values 9.5% and 12% defined in claim 1 of the main request.

In addition, even assuming - as it appears to have been taken for granted by the appellant in its submissions without however giving any justification - that the values (951/103.31)% and (1160/102)% could be rounded up or down to the nearest tenth in the context of the disclosure of examples 2 and 4 to the values 9.2% and 11.4%, respectively, without infringing Article 123(2) EPC, these rounded values would still be insufficient to support the claimed lower range values of 9.5% and 12%, respectively.

Even assuming subsequently that - without there being any basis or reason that would justify such an assumption - the rounded values 9.2% and 11.4% could be

further rounded up or down to the nearest half-integer, or to the nearest integer, or even to the nearest multiple of ten without contravening Article 123(2) EPC, then the value 9.2% would have to be rounded up or down respectively to the value 9%, 9% or 10%, and the value 11.4% respectively to the value 11.5%, 11% or 10%, i.e. no consistent rounding of the two original values (951/103.31)% and (1160/102)% would result in the values 9.5% and 12% specified in the claim.

Accordingly, contrary to the appellant's submissions, no basis can be found in examples 2 and 4 for the claimed lower range values 9.5% and 12%.

2.3 In view of the above, the Board concluded during the oral proceedings that the appellant's submissions are insufficient to overcome the objection under Article 123(2) EPC previously raised with respect to the claimed lower range values 9.5% and 12% and that therefore claim 1 amended according to the main request contains subject-matter extending beyond the content of the application as filed.

3. *First and second auxiliary requests - Article 123(2) EPC*

Claim 1 amended according to each of the first and the second auxiliary requests also contains the same requirement referred to in point 2.1 above and relating to a lower range value of 12% by weight of a mono-functional or di-functional (meth)acrylate monomer and to a lower range value of 9.5% by weight of an aliphatic or aromatic urethane acrylate oligomer. Accordingly, during the oral proceedings the subject-

matter of claim 1 amended according to each of the first and the second auxiliary requests was also found to contravene the requirements of Article 123(2) EPC for the same reasons put forward in point 2.2 above with regard to claim 1 of the main request.

4. *Third auxiliary request - Article 123(2) EPC*

4.1 In the communication annexed to the summons (point III above, third paragraph) the Board noted with regard to claim 10 then on file (point II, last paragraph) that, while the claim defined a polymer coating comprising the reaction product of "a fluorine-containing urethane (meth)acrylate, a mono-functional or di-functional (meth)acrylate monomer, an aliphatic or aromatic urethane acrylate oligomer" and a photocurable hydrocarbon without any restriction to the relative amounts of the components, the application as filed consistently required a correlation between the relative amounts of the urethane (meth)acrylate, the (meth)acrylate monomer and the acrylate oligomer as disclosed in claims 7 and 18 to 20 as filed and on page 6, lines 6 to 13 and page 8, lines 16 to 21 of the description as filed, so that the omission in claim 10 then on file of any correlation between the relative amounts of the components constituted an unallowable generalization of the disclosure of the application as filed (Article 123(2) EPC).

Claim 1 amended according to the present third auxiliary request differs from the former independent claim 10 referred to above, among other amendments, in that the polymer coating comprises a cured blend of "a linear urethane acrylate with a perfluorinated tail,

Sartomer CN 963B80, hexanediol diacrylate and Darocur 1173".

Thus, claim 1 of the third auxiliary request results from the former claim 10 amended, among others, by specifying that the fluorine-containing urethane (meth)acrylate is a linear urethane acrylate with a perfluorinated tail, the mono-functional or di-functional (meth)acrylate monomer is hexanediol diacrylate, and the aliphatic or aromatic urethane acrylate oligomer is Sartomer CN 963B80.

4.2 The amendment made according to present claim 1 of the third auxiliary request and referred to above, however, does not overcome the objection raised under Article 123(2) EPC with regard to the former claim 10 and referred to above for the following reasons.

The sole basis that can be found in the application as filed for the replacement of each of the generic compounds specified in the former claim 10 by the respective particular compounds now specified in claim 1 is to be found - as submitted by the appellant, see point VI above, last paragraph - in the passages on page 8, lines 24 to 26 and page 9, lines 4 to 6 and 19 to 21 of the description and corresponding to the disclosure of examples 1, 2 and 4, respectively. According to these examples, however, the specific components recited now in claim 1 (i.e. the linear urethane acrylate with a perfluorinated tail, Sartomer CN 963B80, hexanediol diacrylate and Darocur 1173) are blended in specific relative amounts (73.51%, 11.84%, 12.63% and 2.02% by weight in example 1, respectively, 53.4, 35, 11.6 and 2 parts by weight in example 2,

respectively, and 74.4, 9.51, 16 and 3.4 parts by weight in example 4, respectively, the last example not even involving the component Sartomer CN 963B80 specified in claim 1, but the component Sartomer CN983 B88).

In addition, the appellant has not identified any passage in the application as filed or submitted any technical evidence or argument that would allow the conclusion that the disclosure of examples 1, 2 and 4 could be generalized to blends of the particular components considered in these examples in arbitrary relative amounts.

It follows that, when comparing the former claim 10 with claim 1 amended according to the third auxiliary request, the amendments made to claim 1 do not overcome the unallowable generalization previously objected to by the Board with regard to the former claim 10 because the blend of generic compounds in arbitrary relative amounts previously objected to merely has been replaced by a blend of specific compounds also in arbitrary relative amounts and the disclosure of the application as filed supports such blend of specific compounds only in specific relative amounts.

4.3 In view of the above, the Board concluded during the oral proceedings that claim 1 amended according to the third auxiliary request does not overcome the objection previously raised under Article 123(2) EPC with respect to the former claim 10 and that therefore the claim contains subject-matter extending beyond the content of the application as filed.

5. In view of the objections under Article 123(2) EPC addressed in points 2 to 4 above, and noting that the appellant has had due opportunity to comment on them, the Board decided during the oral proceedings to dismiss the appeal.

It is incidentally noted that, after consideration of the amendments to the application documents according to the present requests of the appellant, the Board identified other deficiencies in the amended application documents possibly amounting to further objections, among others, under Article 84 EPC 1973 and Article 123(2) EPC and thus to further obstacles to the grant of a patent in accordance with the appellant's requests and that, in view of the findings in points 2 to 4 above and also in view of the absence of the appellant at the oral proceedings, the Board abstained from addressing these further issues during the proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Kiehl A. G. Klein