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D E C I S I O N
of 21 April 2004

Case Number: T 0254/01 - 3.4.2

Application Number: 97310141.3

Publication Number: 0851246

IPC: G02B 6/16

Language of the proceedings: EN

Title of invention:

Optical fiber clad with low refractive index photocured composition

Applicant:

LUCENT TECHNOLOGIES INC.

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56, 111(1)

Keyword:

"Inventive step - claim 1 (yes)"

"Other requirements not complied with - description pages missing in the EPO file"

"Remittal for further prosecution"

Decisions cited:

-

Catchword:

-



Case Number: T 0254/01 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 21 April 2004

Appellant: LUCENT TECHNOLOGIES INC.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 25 August 2000
refusing European application No. 97310141.3
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
C. Rennie-Smith

Summary of Facts and Submissions

- I. The appellant (applicant) has lodged an appeal against the decision of the examining division to refuse European patent application No. 97 310 141.3 (publication No. 0 851 246). The application relates to an optical fibre having a cladding made of a cured material comprising a perfluoropolyether or perfluorohydrocarbon backbone end capped with (meth)acrylate groups via urethane groups.

The decision under appeal was based on the application documents as originally filed. In its decision the examining division held that the subject-matter of claim 1 as originally filed did not involve an inventive step (Articles 52(1) and 56 EPC) with regard to the disclosure of the two following documents:

D1: EP-A-0 521 360

D2: EP-A-0 737 871.

The examining division held in particular that the sole distinguishing feature of the subject-matter of claim 1 over the disclosure of document D1 was that the (meth)acrylate groups are attached to the backbone via urethane groups, and that this feature was rendered obvious within the meaning of Article 56 EPC by the disclosure of document D2 relating to the use of a fluorinated urethane (meth)acrylate as a thickener in a curable composition.

II. In its notice of appeal the appellant requested setting aside of the decision under appeal and the grant of a patent based on the application documents as originally filed. Subsequently, the appellant submitted a set of amended claims as an auxiliary request.

III. Claims 1 to 10 according to the main request correspond with claims 1 to 10 as originally filed. Claim 1, the sole independent claim, is worded as follows:

"A clad optical fiber comprising a core and a cladding made of a material having a refractive index smaller than that of the core, wherein the cladding is made of a cured material comprising a perfluoropolyether or perfluorohydrocarbon backbone end capped with (meth)acrylate groups via urethane groups."

The wording of the claims according to the auxiliary request is not relevant to the present decision.

IV. The arguments submitted by the appellant in support of its requests can be summarised as follows:

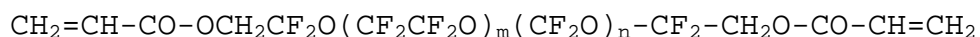
Document D1 does not disclose urethane linkages between the (meth)acrylate end-caps and the perfluoropolyether backbone, and the disclosure of document D2 is limited to the use of a specific urethane (meth)acrylate having fluorinated pendant chains and does not refer generally to the use of urethane groups to increase viscosity. In addition, document D2 only addresses the problem of reducing the value of the refractive index of urethane (meth)acrylates used as thickeners and proposes the use of urethane (meth)acrylates derived from a diisocyanate and a diol having a fluoroalkyl group. Thus, document

D2 fails to provide any motivation for introducing urethane groups between the (meth)acrylate end-caps and the perfluoropolyether backbone of the curable composition of document D1. In particular, the values of the viscosity achieved in document D2 are well below the preferred values according to document D1 and below the values achieved according to the present invention, and for this reason document D2 offers no hint towards the improvement of the viscosity of the curable composition of document D1.

Reasons for the Decision

1. The appeal complies with the requirements mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Main request - claim 1*
 - 2.1 Document D1, considered by the examining division as the starting point for the assessment of inventive step of the subject-matter of claim 1 of the present main request, is directed to a photopolymerizable composition for cladding optical fibres (page 6, lines 17 to 34), the composition comprising a fluorinated diacrylate of the type



where m/n is in the range of 0.2:1 to 5:1 (claim 10). According to the document (claim 12), the composition is coated on an optical fibre and then cured.

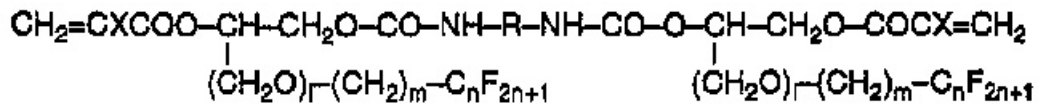
The Board concurs with the findings of the examining division that the coating and curing process according to the disclosure of document D1 results in an optical fibre having a cladding made of a cured material comprising a perfluoropolyether backbone end-capped with (meth)acrylate groups, and that the clad optical fibre defined according to the alternative of claim 1 relating to the perfluoropolyether backbone differs from the clad optical fibre obtained according to document D1 only in that the end-capping (meth)acrylate groups are attached to the respective backbone via urethane groups.

2.2 According to the appellant's submissions and the description of the application (page 2, lines 29 to 31, page 8, lines 35 to 41, page 9, lines 1 to 3 and page 12, lines 13 to 24 together with examples 1 to 9 of the publication of the application) and as was held by the examining division in its decision, the technical effect achieved by the presence of urethane groups linking the end-capping (meth)acrylate groups to the respective backbone is the improvement of the viscosity of the curable composition without detriment to the physical characteristics of the resulting cured cladding material such as the refractive index and the mechanical properties of the cured material.

2.3 In its decision the examining division also held that the problem solved by the claimed subject-matter is addressed in the passage on page 3, lines 37 to 45 of document D2 and that the person skilled in the art would apply the corresponding teaching relating to the use of urethane (meth)acrylates to the disclosure of

document D1 so as to arrive at the claimed subject-matter.

Document D2 is also directed to curable compositions for cladding optical fibres (page 2, line 42 to page 3, line 2). According to the passage on page 3, lines 37 to 45 referred to by the examining division, it is necessary that the curable composition is uniformly and thinly applied on the fibre and the document proposes compositions containing a thickener constituted by a fluorinated urethane di(meth)acrylate represented by the formula



wherein X represents a hydrogen atom or a methyl group, R represents an alkyl, an aryl or a cyclic alkyl group, l is 0 or 1, m is 1 or 2 and n is an integer from 3 to 12 (page 3, lines 40 to 45 together with page 2, line 42 to page 3, line 2). The resulting cladding is made of a cured material comprising a backbone including urethane groups and end capped with (meth)acrylate groups.

However, document D2 proposes values of the viscosity of the curable compositions in the range 100 to 10000 cP, preferably in the range 500 to 5000 cP (page 3, lines 37-40), i.e. values that do not exceed the corresponding range 1000 to 15000 cP proposed in document D1 (page 5, lines 46 to 53), and the actual values of the viscosity reported in document D2 are between 950 and 1310 cP (Examples 1 to 9 in Table IV), all these values being significantly lower than the

actual value 3850 cP of the viscosity achieved in document D1 (page 7, lines 36 to 41). In addition, the composition of document D1 is already based on a fluorinated (meth)acrylate and there is no actual teaching in document D2, and in particular in the passage on page 3, lines 37 to 45 cited by the examining division, regarding any specific effect of the urethane groups on the viscosity of the curable composition. On the contrary, in the passage on page 5, lines 6 to 14 of document D2 reference is made to the use of additional (meth)acrylates as suitable reactive diluents for adjusting the viscosity of the composition; the document specifies that the reactive diluents "may be those which have no urethane group" (page 5, lines 8 and 9) and none of the examples of (meth)acrylate diluents listed on page 5, line 15 to page 7, line 10 contains urethane groups.

Consequently, there is no specific technical teaching in document D2, going beyond the use of fluorinated (meth)acrylates, that would suggest an additional mechanism for improving the viscosity of the fluorinated (meth)acrylate based compositions of document D1, and it is therefore doubtful whether the disclosure of document D2 would have been regarded by the man skilled in the art as offering any potential solution to the problem of improving the viscosity of the compositions disclosed in document D1.

In addition, even if it were conceded that the person skilled in the art would, first, have construed the disclosure of document D2 as teaching a beneficial influence of the urethane groups on the viscosity of the compositions and, second, would have assumed that

this teaching, which is confined in document D2 to compositions based on oligomers having all the fluorinated groups as side or pendant chains attached to the main chain of the oligomer, would be directly applicable to the curable compositions of document D1 based on oligomers having fluorinated groups forming part of the main chain of the oligomer, in the Board's view the skilled person would nonetheless not have arrived in an obvious way at the claimed subject-matter. The reason for this is that the curable compositions of document D2 are based on urethane di(meth)acrylates having the fluorinated groups arranged between the (meth)acrylate and the urethane groups (page 2, lines 42 to 54), this structure resulting from the sequence of reactions followed in document D2 in the preparation of the urethane (meth)acrylates and involving first the reaction of a diol having a fluoroalkyl group with a diisocyanate and then the reaction of the resultant product with (meth)acrylic acid (page 3, lines 46 to 59 and Examples 1 to 5). Accordingly, the direct application of the teaching of document D2 to the compositions disclosed in document D1 would then lead to curable compositions based on oligomers having (meth)acrylate groups linked to urethane groups via fluorinated groups of the main chain of the oligomer, and the curing of the compositions would then result in perfluoropolyether backbones including urethane groups and end-capped with (meth)acrylate groups, the end-capping (meth)acrylate groups being linked to the respective urethane groups via perfluoropolyether groups of the backbone. Therefore, the teaching of document D2 would not result in a perfluoropolyether backbone end-capped with (meth)acrylate groups via urethane groups as claimed

because, although claim 1 would not exclude further groups between the end-capping (meth)acrylate groups and the urethane groups linking the (meth)acrylate groups to the backbone, the formulation of claim 1 makes clear - as supported by the corresponding passages of the description, see page 5, line 24 to page 6, line 12, and page 9, lines 11 to 50 of the publication of the application - that the urethane groups link the end-capping (meth)acrylate groups to the perfluoropolyether backbone and therefore excludes perfluoropolyether groups of the backbone between the linking urethane groups and the respective end-capping (meth)acrylate groups.

- 2.4 The Board concludes that the skilled person would not have derived the subject-matter of claim 1 of the main request from the disclosure of documents D1 and D2 in an obvious way and without hindsight knowledge of the claimed invention.

In addition, in the Board's view none of the remaining documents on file anticipates or renders obvious the claimed subject-matter (Articles 52(1), 54(1, 2) and 56 EPC).

3. *Main request - Further prosecution*

The application documents according to the main request do not appear to comply fully with the requirements of the EPC. In particular, the provisions of Rules 29(1), 29(7) and 27(1) (b) EPC do not appear to be complied with, the features of dependent claims 8 to 10 as dependent on claim 6 would not appear to be clear (Article 84 EPC), and some passages of the description,

and in particular the statements of invention starting at line 16 of page 5, lines 35, 42 and 50 of page 8, line 11 of page 9, and lines 13 and 25 of page 12 of the application as published do not appear to be consistent with the claimed invention (Article 84 EPC). In addition, pages 1 to 23 of the description as originally filed are missing in the EPO file before the Board. In the circumstances of the present case, the Board considers that it is incumbent upon the first instance to address these issues.

In view of the above, the decision under appeal is to be set aside and the case remitted pursuant to Article 111(1) EPC to the department of first instance for further prosecution of the application on the basis of the main request.

4. *Auxiliary request*

Since the main request of the appellant requires further examination by the department of first instance, there is no need to consider at this stage of the procedure the set of amended claims according to the auxiliary request.

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:

P. Martorana

A. G. Klein