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**Datasheet for the decision  
of 3 March 2008**

**Case Number:** T 1475/05 - 3.4.02

**Application Number:** 97303414.3

**Publication Number:** 0810453

**IPC:** G02B 6/12

**Language of the proceedings:** EN

**Title of invention:**

Article comprising a micro-structured optical fiber, and  
method of making such fiber

**Patentee:**

Lucent Technologies Inc.

**Opponent:**

QinetiQ Limited

**Headword:**

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**Relevant legal provisions:**

EPC Art. 123(2)

**Relevant legal provisions (EPC 1973):**

-

**Keyword:**

"Added subject-matter (yes)"

**Decisions cited:**

-

**Catchword:**

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Case Number: T 1475/05 - 3.4.02

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.02  
of 3 March 2008

(Opponent)

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**Decision under appeal:**

Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
21 September 2005 concerning maintenance of  
European patent No. 0810453 in amended form.

**Composition of the Board:**

**Chairman:** A. Klein  
**Members:** M. Rayner  
M. Vogel

## Summary of Facts and Submissions

- I. Both the opponent and the patent proprietor appealed against the interlocutory decision of the opposition division that European patent No. 810453 (application number 97303414.3) as amended according to the sixth request of the patent proprietor meets the requirements of the Convention. The patent is in the field of optical fibres. In order to guide light, optical fibres usually have a core surrounded by cladding.
- II. In the decision under appeal, the reasoning of the opposition division relied on interpreting the cladding region recited in claim 1 as granted as comprising an overclad, employing what it called use of terminology somewhat different to that used in the documents as filed. The division went on to identify a feature in claim 1 which it called b2, as follows, "an outer cladding region comprising outer microstructure elements". Claim 1 of the main and first to fifth auxiliary requests presented by the patent proprietor was considered to include four generic embodiments, two of which involved the feature b2 and were not supported by the original disclosure because an outer cladding region, in the division's view an overclad, was a solid structure. The division explained that had the cladding region of claim 1 have been interpreted as excluding the overclad as done by the opponent, making use of what the division called terminology similar to that of the original disclosure, no embodiments included in the claim would have appeared to be supported by the documents as filed. That interpretation relied, moreover, on the overclad being optically irrelevant, yet calculations of optical field go to infinity and

inner parts of an overclad would serve an optical function when used with porous glass. The division thus considered its own interpretation more correct and realistic, the claims being read by a skilled person and the patentee being entitled to the broadest possible realistic scope for the invention disclosed in the application. Following the division's interpretation, as alternative b2 was deleted according to the sixth auxiliary request and further amendments made were supported by the description, claim 1 was considered to be supported by the original disclosure. Similar considerations applied to independent claim 10. Both claims were considered restrictions of claims as granted.

III. In its appeal, the patent proprietor requests that the decision under appeal be set aside and that the patent be maintained on the basis of a main or one of seven auxiliary requests. According to the patent proprietor, the opposition division correctly stated that the overclad is one of the optional embodiments of outer cladding required by claim 1. However, the opposition division is incorrect in interpreting the disclosure as not including the option that the outer cladding region may comprise microstructure elements. In typical applications, the surrounding solid glass cladding can be arranged to be far away from the core such that it is essentially optically inactive. This does not however mean any limitation that any solid glass cladding must be optically inactive, but only teaches that the optical influence of the outer solid glass cladding can be disregarded if the same is sufficiently far away from the core. The outer cladding region of the embodiment therefore includes both areas of

periodically arranged small cladding features and the solid glass cladding. It is clear from claim 7 and the glossary in the original disclosure that the outer cladding region may have voids or microstructure elements, which means that claims 1 and 12 of the main request are supported by the original disclosure. If multiple layers of second cladding features are present, and non-periodicity is provided by having different size features between layers, the original description necessarily describes an embodiment where at least three layers of features are provided, a first layer having features of a first size, a second layer having features of a second size and a third layer having features of a third size. The total cladding including the inner and outer regions has an effective refractive index less than the core even if the outer region is solid glass. The patent proprietor also addressed issues other than added subject matter in its submissions.

- IV. In its appeal, the opponent requests that the decision under appeal be set aside and the patent revoked in its entirety. In support of its position, the opponent explains that in the application as filed, the terms inner and outer cladding region refer to parts of the cladding which are optically active. Thus, it is not disclosed that the outer cladding region is constituted by the overclad, this being against the teaching of the application as filed. In advancing its objection of added subject matter, the opponent referred, inter alia, to the following sequential features of claim 1, which it designated F4 and F5, respectively:

F4 - "wherein the inner cladding region comprises a multiplicity of spaced apart inner microstructure elements (e.g., 52, 53) that are elongate in the axial direction and are disposed in a first cladding material,"

F5 - "the microstructure elements being non-periodic in the first cladding material, in that the elements are arranged irregularly or differ in some property, e. g. diameter,"

According to the opponent the reference to 53 in feature F4 is in error and the feature F5, which is present in claims occurring in all the requests of the patent proprietor, is not present in the documents as filed. Like the patent proprietor, the opponent also addressed issues other than added subject matter in its submissions.

- V. The board appointed oral proceedings and, in a communication attached to the summons, remarked that the opposition division had justified its position on interpretation of the claim on the basis of being more practical and realistic, while admitting the terminology was somewhat different to the original disclosure. The division also admitted that the other interpretation it considered but rejected resulted in terminology similar to the original disclosure. It seemed neither party wanted the board to accept this position as both challenged it, even the patent proprietor seemingly not accepting that the outer cladding region is a solid structure. The board sought from the patent proprietor an explanation as to where exactly there is a direct and unambiguous disclosure of a third layer having features of a third size,

remarking that the feature F5 needed particular attention. Only if issues of added subject matter were to be resolved in favour of the patent proprietor, would it be necessary to move on to other issues. The board expressed its intention to decide the case, if possible, at the end of the oral proceedings.

VI. In response to the summons, the representative of the patent proprietor informed the board that the patent proprietor would not be represented at the oral proceedings and was aware that the oral proceedings would continue without the patent proprietor. The board subsequently cancelled the oral proceedings.

VII. Claim 1 of the main request (claim as granted) is worded as follows:

"An article comprising a microstructured optical fiber having an axial direction and a cross-section perpendicular to the axial direction, the optical fiber comprising:

a core (51) having an effective refractive index  $N_0$ ; and  
a cladding region comprising an inner cladding region that surrounds the core region and an outer cladding region that surrounds the inner cladding region, the cladding region having an effective refractive index less than  $N_0$ ;

wherein the inner cladding region comprises a multiplicity of spaced apart inner microstructure elements (e.g., 52, 53) that are elongate in the axial direction and are disposed in a first cladding material, the microstructure elements being non-periodic in the first cladding material, in that the elements are arranged irregularly or differ in some property, e. g.

diameter, and having a refractive index differing from a refractive index of the first cladding material, and the inner microstructure elements contributing to an effective refractive index,  $N_{ic}$ , of the inner cladding region,

wherein the outer cladding region optionally comprises a multiplicity of spaced apart microstructure elements that are elongate in the axial direction, the outer cladding region having a refractive index or an effective refractive index,  $N_{oc}$ , and wherein  $N_{ic} < N_{oc}$  ."

VIII. In connection with the wording of the remaining independent claims in the requests, the board observes that particular attention is given in the present decision to the wording "wherein the inner cladding region comprises a multiplicity of spaced apart inner microstructure elements (e.g., 52, 53) that are elongate in the axial direction and are disposed in a first cladding material, the microstructure elements being non-periodic in the first cladding material, in that the elements are arranged irregularly or differ in some property, e. g. diameter,". This wording occurs not only in claim 1 of the main request but also in the respective claim 1 of auxiliary requests 1 to 5, method claim 12 of the main request and the method claim 10 of auxiliary requests 1 to 7. In claim 10 according to auxiliary requests 3 to 7, there is an extraneous remark in parentheses "see previous page" occurring after the second mention of the word "material". Recitation of the entire wording of the other independent claims occurring in the requests of the patent proprietor is not necessary for the reasons given in section 7 of the reasons below.



## Reasons for the Decision

1. The appeal is admissible.

Added subject matter (Articles 100(c), 123(2) EPC)

2. The disclosure of the patent in dispute

- 2.1 The documents as filed introduce the background of the invention with reference to optical fibre communication systems achieving light guiding by means of total internal reflection, based on the presence of a solid core of relatively high refractive index that is surrounded by a solid cladding that has relatively low refractive index.

- 2.2 In a nutshell, what has happened in the present case is that subject matter assigned to the term "cladding region" in the documents as filed has been reassigned in a therein undisclosed context to the term "inner cladding region" in independent claims in all of the requests of the patent proprietor. As a result, subject matter has been added.

- 2.3 The term "cladding region" is first mentioned (see page 2, line 18 et seq.) in a glossary of definitions in the context of the effective refractive index of the cladding region being the value of refractive index that gives in a simulation of the fibre the same optical properties as the actual fibre. The term is next mentioned in the passage headed "summary of the invention" (see the paragraph bridging pages 3 and 4)

in the context of an effective refractive index less than that of the core.

- 2.4 The terms "inner cladding region" and "outer cladding region" are introduced in association with a preferred microstructure fibre (see page 4, line 25 et seq.). The terms are then used in the description of the preferred embodiments in relation to Figure 5 and then Figure 4. The terms also occur in originally filed dependent claim 7 (reciting that the cladding region comprises an inner and an outer cladding region...).
- 2.5 The inner cladding region is taught to have void cladding features of larger diameter than the void cladding features of the outer cladding region (page 4, lines 26 to 29). Moreover, in the example, the cladding features in the inner cladding region are taught to be arranged in basically hexagonal form (page 7, lines 3 and 4) with centre to centre spacing  $0.925\mu\text{m}$ .
- 2.6 Thus, the core region, consisting of glass, will have an effective refractive index substantially equal to the refractive index of the glass. The inner cladding region has a larger ratio of void to glass than the outer cladding region. Consequently, the inner cladding region has a lower effective refractive index than the outer cladding region, and both cladding regions have lower effective refractive index than the core region.
- 2.7 The patent application also recites that typically, the microstructured cladding region will, for mechanical reasons, be surrounded by solid glass cladding that is far enough away from the core region such that it is

essentially optically inactive (see page 7, lines 27 to 29).

3. The claims of the patent in dispute

The claims require that "...the inner cladding region comprises a multiplicity of spaced apart inner microstructure elements (e.g., 52, 53) that are elongate in the axial direction and are disposed in a first cladding material, the microstructure elements being non-periodic in the first cladding material, in that the elements are arranged irregularly or differ in some property, e. g. diameter...", i.e. the feature F5 referred to by the opponent is required. As can be seen from the analysis above (point 2.5 different void diameters), the difference in property occurs because of the difference between the inner and outer cladding regions, the inner cladding region alone has voids arranged in hexagonal form (i.e. regularly) with the same diameter. Thus the microstructure elements in the inner cladding region are not arranged irregularly, nor do they differ in property. This is why the contrary requirement of the claim requires a non-disclosed embodiment and means that subject matter has been added. The board is not therefore satisfied as to compliance with Article 100(c) (Article 123(2) EPC).

4. The decision under appeal

4.1 The opposition division admitted that if an interpretation of the claims is taken excluding the overclad, i.e. the surrounding solid glass cladding referred to in point 2.7 above, from what is understood by the cladding region, this cannot lead to a claim

acceptable pursuant to Article 123(2) EPC. In other words, following this "interpretation", the position of the opposition division and the board are the same.

- 4.2 Nevertheless, despite remarking on the similarity of terminology with the documents as filed, the division rejected this interpretation as not being logical or practical, since the overclad is optically relevant in the calculation of optical fields going to infinity and the inner parts of the overclad would have an optical function when used with a porous glass embodiment. Moreover the overclad would be necessary for protective and strengthening purposes. The board does not accept the analysis of the division because it amounts to making the not logical or practical statement, which is not correct, based on giving reasons which are in themselves correct but do not support the statement. Thus, the comments made about an overclad are in themselves correct, but they do not mean that the overclad in, say the Figure 5 embodiment where the inner and outer terminology is actually used in the document, has an optical function because the description states unequivocally that the solid glass cladding is far enough away from the core region that it is essentially inactive. That the overclad is not even necessary is apparent from the Figure 4 embodiment, also using the inner and outer cladding region terminology, it being there recited that the optional outer cladding can be conventional. Moreover, there is no disclosure of inner and outer cladding regions in relation to a porous glass embodiment. Calculation to infinity is not incompatible with the overclad being "essentially inactive", nor does the latter's use for strengthening purposes change this. The board cannot

therefore agree that the solid glass cladding is an outer cladding region within the meaning of the claim. Therefore the board finds the documents as filed do not lead in a logical way to the conclusion that not including the overlaid in what is understood by the cladding region is not logical or practical.

- 4.3 The decision of the division in the opposite way was based on considering that the skilled person attempts to make sense of the wording. Moreover, the patent proprietor is entitled to the broadest possible realistic scope for the invention disclosed and the interpretation used permits an amendment leading to a claim acceptable under Article 123(2) EPC. The board is not convinced by this approach, because the skilled person has no difficulty in understanding from the documents as filed what the inner and outer cladding regions are and has therefrom no reason at all to think the inner region includes both itself and the outer region. In other words, the skilled person would realise that the claim includes a non-disclosed embodiment. The board does not concur with the claims as granted being interpreted inconsistently with the disclosure, or as the division put it, use of terminology somewhat different to that used in the documents as filed, either for reaching the broadest possible realistic scope or for becoming acceptable under Article 123(2) EPC.

5. The position of the patent proprietor

- 5.1 The patent proprietor agrees with the opposition division that the overlaid is one of the embodiments originally disclosed as outer cladding but considers

the division wrong to interpret the original documents as not disclosing the option that the outer cladding region may comprise microstructure elements.

- 5.2 While the board does not consider the overclad to be the outer cladding, it does agree with the opposition division that there is no disclosure that the overclad comprises microstructure elements. In disagreeing with the opposition division, the patent proprietor, on the other hand, has simply mixed up the disclosure of the overclad with that of the outer cladding region, which latter, of course, can comprises microstructure elements, in the embodiment the smaller diameter voids as disclosed. The disagreement with the opposition division does no more than reinforce the view of the board that the overclad should not be considered to be the outer cladding region in the sense of the claim.
- 5.3 The patent proprietor declined to attend oral proceedings, nor, moreover, was any response offered to the question of the board as to exactly where there is a direct and unambiguous disclosure of a third layer having features of a third size as referred to in submissions. Reference was made to Figure 5, where there is a remark in the description that "our simulation indicates that at least four layers of second capillary features should be provided". This remark is not adequate support to make the submission of the patent proprietor credible as it does not disclose the feature concerned. The board observes that there is also a passage in lines 32 to 34 on page 7, as follows: "As described, the non-periodicity is due to the presence of both first and second cladding features. However, the second cladding features could also be

non-periodically disposed." It is not very clear exactly what is meant by this passage, but the first cladding features, i.e. those in the inner cladding region, are not affected, so the board sees no reason to modify its view.

5.4 There is thus nothing in the position of the patent proprietor which causes the board to doubt its own position.

6. The position of the opponent

6.1 The opponent has submitted that there is no disclosure in the documents as filed that the microstructure elements are non-periodic in the inner cladding region. Moreover, the reference to numeral 53 as being in the inner cladding region is incorrect. As can be seen from the analysis above, the board agrees with the first submission and the second submission is also correct as can be seen by inspection of Figure 5, where items 53 are shown in the outer cladding.

7. Since, as set out in section IX of the Facts and Submissions above, all of the requests submitted by the patent proprietor contain claims which have been amended in such a way as to contain subject matter extending beyond the content of the application as filed, the requirements of Article 123(2) EPC are not met by any request. The extraneous wording "see previous page" is not relevant in this context, as it amounts to a note for the printer referring to the wording " in that the elements are arranged irregularly or differ in some property, e. g. diameter", present in the claims as amended. Consequently, without needing

further discussion of the remaining wording of the claims or relating to other issues raised in the appeal proceedings, the board concluded that the appeal of the patent proprietor fails and that of the opponent succeeds.

**Order**

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

The patent is revoked

The Registrar

The Chairman

M. Kiehl

A. G. Klein