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D E C I S I O N
of 14 October 2003

Case Number: T 0991/01 - 3.4.2

Application Number: 97107800.1

Publication Number: 0807838

IPC: G02B 6/42, H01S 3/025

Language of the proceedings: EN

Title of invention:

Optical waveguide coupling arrangement and fabrication process therefor

Applicant:

NEC CORPORATION

Opponent:

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Headword:

-

Relevant legal provisions:

EPC Art. 111(1)

Keyword:

"Late argument based on a translation of a JP patent application forming the closest prior art; translation forwarded by the examining division to the applicant after the oral proceedings at which it had announced its decision to refuse the patent application; translation admitted into the proceedings: remittal to the first instance"

Decisions cited:

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Catchword:

-



Case Number: T 0991/01 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 14 October 2003

Appellant:

NEC CORPORATION
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Representative:

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted 1 February 2001
refusing European application No. 97107800.1
pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: A. G. Klein
Members: M. P. Stock
G. E. Weiss

Summary of Facts and Submissions

I. The appellant has appealed against the decision of the examining division refusing European patent application number 97 107 800.1 on the ground that its subject-matter lacked an inventive step within the meaning of Article 56 EPC in view of the following documents:

D1: Database WPI, Derwent Publications Ltd,
AN-94273815 and JP-A-6 201 930

D2: JP-A-5 100 122

The examining division stated that the subject-matter of claim 1 according to a main and an auxiliary request underlying the decision of refusal differed from what is disclosed in D1 in that the thin film is positioned in the lower clad layer whereas in D1 the thin film ("etching stop layer") is positioned either between the core and upper clad layer or in the upper clad layer. The examining division was of the opinion that it was obvious for a person skilled in the art to move the etching stop layer below the core in order to apply the concept of D1 to other known types of optical elements, eg having a planar surface.

II. The appellant requested that the decision be set aside and that a patent be granted on the basis of claims 1 to 5 submitted with "the appeal arguments". He argued as follows:

In document D1, an etching stop layer is formed at a position which is higher than a position equivalent to the upper surface of the core layer and lower than the

surface of the over-clad layer for the purpose of simultaneously achieving alignment in the vertical direction and in the horizontal direction. However, in order to achieve this, it is necessary to make the shape of the optical elements "convex" as shown in Figure 2 or 7 of D1. In cases where the optical elements are not "convex" but "square-like", it is necessary to employ the method as described in Figure 9 of D1 and to monitor the light intensity transmitted through the waveguide.

According to the invention the etching stop layer is inserted in the lower clad layer. The alignment in the horizontal direction can be carried out by the method shown in Figures A1 to A5 provided with the arguments of appeal. In accordance with this method, a marker is simultaneously prepared with the etching stop layer. No additional masking step is necessary. The marker allows to accurately mount optical elements in the horizontal direction.

III. In preparation of the oral proceedings requested by the appellant, the board made the following preliminary non-binding comments:

The last feature recited in claim 1 was related to "an alignment marker formed of thin films inserted in said optical waveguide forming layer".

Alignment in the horizontal direction (transverse direction or in-plane direction of the substrate) was discussed in the published application at column 8, lines 37 to 51. The last two sentences of this paragraph read as follows: "This method enables precise

alignment with the optical waveguide by image recognition of a marker by providing the marker at the position on the substrate and also providing a marker on the optical element. By combining this method, upon performing optical coupling of the optical waveguide, passive alignment can be realized by performing mounting without monitoring, and thus is optimal for mass-production".

The board was of the opinion that it was not directly and unambiguously derivable from this paragraph that the marker was formed by thin films inserted in the optical waveguide layer, as was shown in Figures A2 to A5 submitted with the appellant's statement of the grounds of appeal. There were no corresponding figures found in the application as originally filed.

Hence, it appeared that the subject-matter of claim 1 extended beyond the application as originally filed contrary to Article 123(2) EPC.

Ignoring the above-mentioned last feature, the subject-matter of claim 1 differed from what is disclosed in D1, in that the thin film forming an etching stop layer was inserted in the lower clad layer. The problem solved by this feature appeared to be related to the accommodation of optical elements having a planar surface (referred to as square-like optical elements by the appellant in contrast to convex elements). For assessing inventive step within the meaning of Article 56 EPC it should be evaluated whether a skilled person would have derived from D1 the general teaching to insert the etching stop layer in the waveguide layers at an appropriate position ensuring optical coupling of

the optical element with the core layer of the waveguide, and whether it would have been obvious to insert the etching stop layer in the lower clad layer.

IV. In the oral proceedings which took place on 14 October 2003 the appellant requested that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 3 submitted at the oral proceedings and claims 4 and 5 filed with letter dated 7 June 2001. The independent claims 1 and 4 read as follows:

"1. An optical coupling circuit for optically coupling an optical waveguide to an optical element (7) comprising:
an embedded optical waveguide (2, 4, 5) formed on a substrate (1) and comprising a first lower clad layer (2), a core layer (5) and an upper clad layer (4);
optical element mounting portion(s) (2, 6b) consisting of a part of the first lower clad layer (2) characterized in that
a second lower clad layer (3) is sandwiched between the first lower clad layer (2) and the core layer (5) with a height determined to fit an active layer (8) of the optical element (7) and;
the optical element mounting portion consists of a part of the first lower clad layer (2), separated from the waveguide, and at least one thin film (6b) inserted in the top surface of the first lower clad layer (2);
said optical element mounting portion has an etching stopper mask formed of thin films inserted in said optical waveguide forming layer."

"4. A fabrication process of an optical coupling circuit for optically coupling an optical element comprising the steps of:
forming an optical waveguide forming layer having a first lower clad layer (2), a second lower clad layer (3), a core layer (5) and an upper clad layer (4) on a substrate (1) with inserting at least one thin etching stopper film (6b) in the part of said first lower clad layer (2) at an optical element mounting portion;
removing at least a part of said optical waveguide forming layer at said optical element mounting portion to constitute an optical waveguide and said optical element mounting portion and to expose the surface of said thin etching stopper film (6b); and
exposing the part of the surface of the substrate (1), where said thin film (6b) is not inserted."

In the oral proceedings the appellant made reference to a translation of document D1 which had been sent to him by telefax by the examining division on 17 November 2000. The appellant presented a copy of the telefax. The file as transmitted to the board by the examining division does not contain a copy of this telefax.

Based on the above translation of D1 the appellant argued that D1 disclosed an optical coupling circuit in which vertical and horizontal alignment was simultaneously achieved by using the same masking step for determining the location of the active layer of the waveguide and the mounting portion of the optical element. He emphasised that the optical element was automatically aligned in the horizontal direction. Therefore the skilled person was prevented by the

teaching of D1 from inserting the etching stop layer in the lower clad layer since this would have required giving up the concept of automatic alignment in the horizontal direction.

Reasons for the Decision

1. *Admissibility of the appeal*

The appeal complies with the provisions of Articles 106 to 108 and Rules 1(1) and 64(b) EPC and is therefore admissible.

2. *Amendments*

The objections raised by the board under Article 123(2) EPC (see point III above) have been overcome by the appellant in that the feature "alignment marker" has been cancelled in claim 1.

3. *Prior art according to document D1*

In the appealed decision the examining division reasoned that the subject-matter of the present application lacked an inventive step since it was obvious for the skilled person from the disclosure of document D1. Therefore the interpretation of the technical content of D1 is crucial to the assessment of inventive step.

D1 is a published Japanese patent application and there is no indication that the examining division based its assessment of D1 on inventive step on anything else

than the document in Japanese and on the corresponding WPI/Derwent abstract in English, both of which were cited in the appealed decision. There was no other document relating to D1 present in the file and hence available to the board.

4. *Admissibility into the procedure of the translation of document D1*

The board was surprised at the oral proceedings when the appellant for the first time made reference to an English translation of the Japanese patent application according to D1. This translation was generated by a computer according a service provided by the Japanese Patent Office, as can be seen from the first page under "Notices". The translation was sent to the appellant by the examining division, as evidenced by a copy of the telefax he received from the EPO on 17 November 2000. Although the translation was sent by the examining division four days after the oral proceedings at the end of which it had orally announced that the patent application was refused, and was not entered into the examination file, the appellant could legitimately assume that the translation was on file and had been duly considered by the board. This translation shall therefore be admitted into the proceedings despite its late filing.

5. *Further prosecution*

In view of the limited time available and the difficulties in analysing a computer-generated translation the board was not at the oral proceedings in a position to draw a considered conclusion from the

content of D1, in particular, as to the question of whether D1 emphasised the benefit of achieving an automatic alignment in the horizontal direction of the waveguide and the optical element to such an extent that it led the skilled person away from the idea of inserting the etching stop layer in the lower clad layer.

Moreover, the translation of D1 was sent to the appellant only after the oral proceedings held before the examining division and is mentioned neither in the minutes nor the appealed decision itself. There is no indication in the file that the translation had been considered by the examining division when it took its decision at the end of the oral proceedings. Therefore the appellant should have the opportunity to have his arguments considered by two instances. Hence the board uses its discretion under Article 111(1) EPC to remit the case to the examining division for resolving these issues.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance for further prosecution.

The Registrar:

The Chairman:

P. Martorana

A. Klein