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**Datasheet for the decision  
of 18 June 2015**

**Case Number:** T 0219/11 - 3.4.03

**Application Number:** 03797440.9

**Publication Number:** 1543564

**IPC:** H01L31/0203, H01L31/0232

**Language of the proceedings:** EN

**Title of invention:**

CAMERA DEVICE, METHOD OF MANUFACTURING A CAMERA DEVICE, WAFER  
SCALE PACKAGE

**Applicant:**

Anteryon International B.V.

**Headword:**

**Relevant legal provisions:**

EPC 1973 Art. 54(1), 56

**Keyword:**

Novelty (no) -  
main request; first, second and fourth auxiliary request  
Inventive step (no) - third and fifth auxiliary request

**Decisions cited:**

**Catchword:**



**Beschwerdekammern  
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Case Number: T 0219/11 - 3.4.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.03**  
**of 18 June 2015**

**Appellant:** Anteryon International B.V.  
(Applicant) Zwaanstraat 2A  
5651 CA Eindhoven (NL)

**Representative:** Algemeen Octrooi- en Merkenbureau B.V.  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 15 July 2010  
refusing European patent application No.  
03797440.9 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** G. Eliasson  
**Members:** R. Bekkering  
C. Heath

## Summary of Facts and Submissions

I. The appeal is against the refusal of application No. 03 797 440 for lack of novelty, Article 54(1) and (2) EPC (main request, first, second and fourth auxiliary request) over document

D1: EP 1 239 519 A,

for lack of an inventive step, Article 56 EPC (third and fifth auxiliary request) over document D1 and common knowledge of the skilled person, and

for added subject-matter, Article 123(2) EPC (first to fifth auxiliary request).

II. With the statement setting out the grounds of appeal of 25 November 2010, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the requests as refused by the examining division:

*Main request:*

Claims 1 to 17 according to the appellant's main request filed at the oral proceedings before the examining division on 17 June 2010,

*First auxiliary request:*

Claims 1 to 16 according to the appellant's first auxiliary request filed at the oral proceedings before the examining division on 17 June 2010,

*Second auxiliary request:*

Claims 1 to 15 according to the appellant's main request filed with letter dated 12 May 2010,

*Third auxiliary request:*

Claims 1 to 14 according to the appellant's first auxiliary request filed with letter dated 12 May 2010,

*Fourth auxiliary request:*

Claims 1 to 15 according to the appellant's second auxiliary request filed with letter dated 12 May 2010,

*Fifth auxiliary request:*

Claims 1 to 14 according to the appellant's third auxiliary request filed with letter dated 12 May 2010.

III. Reference is also made to the following documents cited in the application as filed:

D4: US 6 285 064 B

D5: JP 2002 139662 A

IV. A summons to oral proceedings appointed for 18 June 2015 was issued by the board, provided with an annexed communication in which a provisional opinion of the board on the matter was given.

In particular, the appellant was informed that it appeared that the subject-matter of claim 1 according to the appellant's main request lacked novelty in the sense of Article 54(1) EPC 1973 over document D1.

Claim 1 according to the first auxiliary request was considered to lack clarity, Article 84 EPC 1973. Moreover, it appeared that the subject-matter of claim 1 according to the appellant's first auxiliary request lacked novelty in the sense of Article 54(1) EPC 1973 over document D1.

The subject-matter of claim 1 according to the appellant's second auxiliary request also appeared to lack novelty in the sense of Article 54(1) EPC 1973 over document D1.

The subject-matter of claim 1 according to the appellant's third auxiliary request appeared to lack an inventive step in the sense of Article 56 EPC 1973 over documents D1 and D4.

The subject-matter of claim 1 according to the appellant's fourth auxiliary request also appeared to lack novelty in the sense of Article 54(1) EPC 1973 over document D1. Moreover, in any case it appeared to lack an inventive step in the sense of Article 56 EPC 1973 over document D1.

Finally, the subject-matter of claim 1 according to the appellant's fifth auxiliary request appeared to lack an inventive step in the sense of Article 56 EPC 1973 over documents D1 and D5.

- V. With a letter dated 2 April 2015, the board was informed that the appellant would not attend the oral proceedings.

No arguments were provided by the appellant in response to the board's observations.

VI. Oral proceedings were held on 18 June 2015 in the absence of the duly summoned appellant.

VII. Claim 1 of the appellant's main request reads as follows:

*"A camera device 101 comprising an image capturing element 103, a lens element 111 for projecting an object on the image capturing element 103, a spacer means 105 for maintaining a predetermined distance between the lens 111 and the image capturing element 103, and a lens substrate 109 for carrying the lens 111, wherein said image capturing element 103 is a solid-state image sensor, and said lens element 111, spacer means 105 and lens substrate 109 are parts different from said image capturing element 103, characterized in that the spacer means 105 comprises a spacer substrate and an adhesive layer 113, wherein the adhesive layer 113 is located between the spacer substrate 105 and the image capturing element 103."*

VIII. Claim 1 of the appellant's first auxiliary request reads as follows:

*"A camera device 101 comprising an image capturing element 103, a lens element 111 for projecting an object on the image capturing element 103, a spacer means 105 for maintaining a predetermined distance between the lens 111 and the image capturing element 103, and a lens substrate 109 for carrying the lens 111, wherein said image capturing element 103 is a solid-state image sensor and said lens element 111, spacer means 105 and lens substrate 109 do not form parts of said image capturing element 103, characterized in that the spacer means 105 comprises a*

*spacer substrate and an adhesive layer 113, 115, wherein said adhesive layer 113 is located between said image capturing element 103 and said spacer substrate 105, and said adhesive layer 115 is located between said spacer substrate 105 and said lens substrate 109."*

IX. Claim 1 of the appellant's second auxiliary request reads as follows:

*"A camera device comprising an image capturing element, a lens substrate for carrying a lens element, wherein said lens element projects an object on the image capturing element, a spacer located between the lens substrate and the image capturing element, wherein the spacer comprises a first adhesive layer and a spacer substrate for maintaining a predetermined distance between the lens substrate and the image capturing element, said spacer substrate is adhered to said lens substrate by means of said first adhesive layer, said spacer substrate comprises a hole coaxially positioned relative to a main optical axis of the lens, characterized in that said spacer substrate is adhered to said image capturing element by means of a second adhesive layer."*

X. Claim 1 of the appellant's third auxiliary request corresponds to claim 1 of the second auxiliary request, with the following added feature:

*"wherein a cover plate is located between said first adhesive layer and said lens element."*

XI. Claim 1 of the appellant's fourth auxiliary request corresponds to claim 1 of the second auxiliary request, with the following added feature:

*"wherein one single lens element covers one image capturing element."*

- XII. Claim 1 of the appellant's fifth auxiliary request corresponds to claim 1 of the second auxiliary request, with the following added feature:

*"wherein a second lens substrate having a second lens element for projecting an object on the image capturing element is stacked on a second spacer substrate; wherein said second spacer substrate is stacked on said lens substrate, the main optical axis of the lens element coinciding with the main optical axis of said second lens element."*

- XIII. The appellant submitted with the statement setting out the grounds of appeal in substance the following arguments:

The construction disclosed in claim 1 of the main request, ie a camera device, was fundamentally different from the embodiment 5 of document D1, as shown in figure 26B, which only related to the image capturing element.

Therefore, claim 1 of the main request was novel and involved an inventive step over D1.

Since embodiment 5 of document D1 related to the image capturing element and not the camera device as a whole, the additional features of claim 1 of the auxiliary requests were neither known from document D1, nor rendered obvious by D1 or any of the other cited prior art. In particular, regarding the fourth auxiliary request, figure 26B of D1 clearly showed four convex



lenses, which differed from the claimed arrangement wherein one single lens element covered one image capturing element. Moreover, concerning the fifth auxiliary request, the specific construction in document D5 with two different adhesive layers was different from that recited in claim 1.

Therefore, also claim 1 of the first to fifth auxiliary request was both novel and inventive over D1 and the other cited prior art.

### **Reasons for the Decision**

1. The appeal is admissible.
2. *Absence of the duly summoned appellant*

The duly summoned appellant did not attend the oral proceedings, as announced. The proceedings were continued without him, as provided for in Rule 71(2) EPC 1973.

In accordance with Article 15(3) RPBA, the appellant was treated as relying only on its written case.

The board was in a position to decide at the conclusion of the oral proceedings, since the case was ready for decision (Article 15(5) and (6) RPBA) and the voluntary absence of the appellant was not a reason for delaying the decision (Article 15(3) RPBA).

3. *Main request*

3.1 *Novelty*

Document D1 discloses an image pickup module for use in a camera (cf embodiment 5 (cf paragraphs [0155] to [0199]; figures 26A, 26B, 26C, 30 to 36) with embodiment 9 (cf paragraphs [0282] to [0291]; figures 54A, 54B, 54C, 55, 56; claim 26)).

In particular, document D1 discloses, using the terminology of claim 1, a camera device (image pickup module for use in a camera) comprising an image capturing element (semiconductor chip 503 from semiconductor wafer 910), a lens element (optical element 512, optical assembly 917) for projecting an object on the image capturing element, a spacer means (522, 901) for maintaining a predetermined distance between the lens and the image capturing element (cf column 27, lines 24-26), and a lens substrate (550) for carrying the lens, wherein the spacer means comprises a spacer substrate (522, 901) and an adhesive layer (509, cf paragraphs [0185], [0186]), wherein said image capturing element (503) is a solid state image sensor (photosensor arrays 821, 822, 823, 824 with microlenses 516, see column 27, lines 36-45) and said lens element, spacer means and lens substrate are parts different from said image capturing element (503) (see figure 26B).

The appellant essentially argued in the statement setting out the grounds of appeal that the embodiment 5 of D1, in particular the device shown in figure 26B, related to the image capturing element as such and not to the complete construction of a camera device as shown in figure 1 of the application.

In figure 1 of the application, the microlenses visible as small bumps on the surface of the image capturing element 103 were schematic and had only been provided in order to make clear that element 103 was indeed an image capturing element.

From the figures 8a to 8e and corresponding description (in particular page 10, lines 9 to 15) of the application it was clear that the specific construction of silicon wafer 215 comprising solid-state image sensors, micro-spacer layer 225, cover glass layer 235 and IR glass layer 236, was to be regarded as the image capturing element 103 as shown in Figure 1.

Therefore, claim 1 of the main request was novel over D1.

The board does not agree. Firstly, claim 1 merely defines an "*image capturing element*" without any of the above features disclosed in the context of figures 8a to 8e (ie silicon wafer 215 comprising solid-state image sensors, micro-spacer layer 225, cover glass layer 235 and IR glass layer 236). Document D1 discloses, as discussed above, a semiconductor chip 503 from a semiconductor wafer 910, comprising photosensor arrays 821, 822, 823, 824 with microlenses 516 (see column 27, lines 21 to 45; figures 26A, 26B, 26C and 30 to 36). This arrangement constitutes an "*image capturing element*". Accordingly, there is no

distinction between the subject-matter of claim 1 and the device disclosed in D1.

Secondly, from the application as originally filed it is not directly and unambiguously clear that the image capturing device 103 in the embodiment of figure 1 is in fact an arrangement of a silicon wafer 215 comprising solid-state image sensors, micro-spacer layer 225, cover glass layer 235 and IR glass layer 236, as shown in figures 8a to 8e. The skilled reader would understand figure 1 to show a solid-state image sensor with microlenses on top. Such an arrangement is technically plausible and there is nothing in the original application suggesting that this should be anything different. Figures 8a to 8e show a different embodiment with a more complicated arrangement. There is nothing in the original application suggesting that this more complicated arrangement should be present in the embodiment of figure 1, neither is it plausible that a person skilled in the art would schematically depict this arrangement with microlenses in the lower cavity in the way shown in figure 1 with the microlenses on top.

It is, furthermore, noted that the appellant's argument brought forward before the examining division, that there would be a huge difference of scale between the disclosure of D1 and what is claimed in claim 1 is not persuasive either. There is no difference in scale between the two, not even under the appellant's assumption that the image capturing element 103 would actually include a silicon wafer 215 comprising solid-state image sensors, micro-spacer layer 225, cover glass layer 235 and IR glass layer 236, as shown in figures 8a to 8e.

The above was noted in the board's communication annexed to the summons to oral proceedings. The appellant did not submit any arguments in response.

Accordingly, the subject-matter of claim 1 of the main request lacks novelty over document D1 in the sense of Article 54(1) EPC 1973.

The appellant's main request is, therefore, not allowable.

#### 4. *First auxiliary request*

##### 4.1 *Clarity*

Claim 1 is unclear in the sense of Article 84 EPC 1973 in that it defines an adhesive layer (ie a single layer) and then defines this layer to be two different layers (113 and 115 in figure 1).

##### 4.2 *Novelty*

Figure 26B of D1 shows an adhesive layer (509) between the spacer (522) and the optical element (512). According to the description of this figure, "*for fixing the spacer 522 to the semiconductor chip 50, there may be applied an adhering step in producing a SOI (silicon on insulator) substrate*" (column 29, lines 4 to 7). On the other hand, according to the description of figures 30 to 36, explaining the corresponding production method, the spacer assembly 901 is adhered to the semiconductor wafer 910 by thermosetting resin 931 (cf column 31, lines 46 to 49; see also lines 31 to 35) (the reference here to pattern/sealant 509 in figure 26C may be somewhat confusing, as the same reference numeral 509 is used in figure 26B

for the adhesive layer between the spacer and the optical element). The adhesion of the optical element to the spacer is done by means of an epoxy resin (509 in figure 26B) (cf column 32, line 36 to 58).

Accordingly, the subject-matter of claim 1 of the first auxiliary request, apart from its unclear wording, also lacks novelty over document D1, Article 54(1) EPC 1973.

4.3 The appellant's first auxiliary request is, therefore, not allowable either.

5. *Second auxiliary request*

A camera device according to the pre-characterising portion of claim 1 is known from document D1, for in substance the same reasons given above for the first auxiliary request. It is noted that in D1 the spacer (522) comprises a hole coaxially positioned relative to a main optical axis of the lens (see figure 26B).

Moreover, as discussed, in D1 the spacer (522, 901) is adhered to the image capturing element (503, 910) by means of a second adhesive layer (cf column 31, lines 31 to 35 and 46 to 49).

Accordingly, also the subject-matter of claim 1 of the second auxiliary request lacks novelty over document D1, Article 54(1) EPC 1973.

The appellant's second auxiliary request is, thus, also not allowable.

6. *Third auxiliary request*

Claim 1 according to the third auxiliary request further defines a cover plate between the first adhesive layer and the lens element.

According to the description, however, it is already known to cover the cavity over the microlenses with a cover plate (cf page 2, lines 18 to 24). Reference is made in the description in this respect to document D4.

Accordingly, it would be obvious to a person skilled in the art to provide such a cover plate where deemed appropriate. In particular, it would be obvious to provide such a cover plate in the arrangement of D1 between the first adhesive layer (509) and the lens element (512), as is readily apparent from figure 26B of D1.

The subject-matter of claim 1 of the third auxiliary request, therefore, lacks an inventive step in the sense of Article 56 EPC 1973.

The appellant's third auxiliary request is, therefore, not allowable either.

7. *Fourth auxiliary request*

Claim 1 according to the fourth auxiliary request further defines with respect to claim 1 of the second auxiliary request that one single lens element covers one image capturing element.

This additional feature is also known from document D1 where the lens element 601 covers the underlying pixel array disposed under the microlenses 516 on semiconductor chip 503 (cf figure 26B).

It is noted that the photosensor (pixel) array is considered to constitute an "*image capturing element*" with the meaning of claim 1.

Accordingly, also the subject-matter of claim 1 of the fourth auxiliary request lacks novelty over document D1, Article 54(1) EPC 1973.

The appellant's fourth auxiliary request is, thus, also not allowable.

8. *Fifth auxiliary request*

Claim 1 according to the fifth auxiliary request further defines with respect to claim 1 of the second auxiliary request that a second lens substrate having a second lens element for projecting an object on the image capturing element is stacked on a second spacer substrate, wherein said second spacer substrate is stacked on said lens substrate, the main optical axis of the lens element coinciding with the main optical axis of said second lens element.

The additional feature of stacking a second spacer and lens element is already known from document D5, cited in the application as filed (cf page 1, lines 12 to 22).

Indeed, as indicated in D5 the image quality is improved by using two or more lenses.

Therefore, for a person skilled in the art wishing to increase the image quality in D1 it would be obvious to add a further lens with coinciding optical axes. It would also be obvious to use essentially the same arrangement used for the first lens, and thus to use a



second spacer substrate stacked on the first lens substrate, the second lens element being stacked on the second spacer.

Accordingly, the subject-matter of claim 1 of the fifth auxiliary request lacks an inventive step in the sense of Article 56 EPC 1973.

The appellant's fifth auxiliary request is, therefore, not allowable either.

## Order

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

The appeal is dismissed.

The Registrar:

The Chairman:



S. Sánchez Chiquero

G. Eliasson

Decision electronically authenticated