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Datasheet for the decision of 9 February 2018

Case Number: T 2250/11 - 3.4.02

Application Number: 02721330.5

Publication Number: 1381825

IPC: G01B11/06

Language of the proceedings: EN

Title of invention:
METHOD AND APPARATUS FOR DECREASING THERMAL LOADING AND ROUGHNESS SENSITIVITY IN A PHOTOACOUSTIC FILM THICKNESS MEASUREMENT SYSTEM

Applicant:
RUDOLPH TECHNOLOGIES, INC.

Headword:

Relevant legal provisions:
EPC 1973 Art. 54
EPC R. 103(1)(a)

Keyword:
Novelty - main request (no)
Reimbursement of appeal fee - substantial procedural violation (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2250/11 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 9 February 2018

Appellant: (Applicant)	RUDOLPH TECHNOLOGIES, INC. One Rudolph Road Flanders, NJ 07836 (US)
Representative:	Higgin, Paul Swindell & Pearson Limited 48 Friar Gate Derby DE1 1GY (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 30 May 2011 refusing European patent application No. 02721330.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	A. Hornung
	T. Karamanli

Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application No. 02721330.5 on the basis of Article 97(2) EPC because the requirements of Article 56 EPC were not fulfilled.

II. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the claims according to the main request filed with letter dated 7 April 2011 and underlying the appealed decision.

III. By communication dated 11 September 2017, the board summoned the appellant to attend oral proceedings on 9 February 2018. In a communication accompanying the summons, the board provided its provisional opinion on the merits of the appeal.

IV. The appellant informed the board with letter dated 31 January 2018 that he would not be attending the oral proceedings. The appellant made no further submissions in reply to the board's communication.

V. Oral proceedings were held on 9 February 2018 in the absence of the duly summoned appellant.

VI. The present decision refers to the following document:
D1: US 6,175,416 B.

VII. Independent claim 1 according to the main request reads as follows:

"An apparatus for semiconductor photoacoustic thickness measurement (75) comprising:

a light source (100);

a system for creating a modulated pump beam (125A) and a delayed probe beam (125B) from a laser beam emitted from the light source (100) and for focusing the beams (125A, 125B) onto a sample (220) to be measured;

a dither modulator (205) located in paths of both the modulated pump beam (125A) and the delayed probe beam (125B) to a sample (220) being measured; and

a detector (250) located in a path of a reflected probe beam (225) from the sample (220),

wherein the dither modulator (205) causes the modulated pump beam (125A) and the delayed probe beam (125B) to sweep a measurement spot in an area of the sample (220) to obtain an average thickness measurement of the area."

Reasons for the Decision

1. Novelty

1.1 The subject-matter of claim 1 lacks novelty with respect to the disclosure of D1 (Article 54(1) and (2) EPC 1973).

D1 discloses, with reference to figure 2, an apparatus for semiconductor photoacoustic thickness measurement comprising:

a light source (12);

a system (16, 34, 36, 38, 40, 44, 48) for creating a modulated pump beam (21a) and a delayed probe beam (21b)

from a laser beam emitted from the light source (12) and for focusing the beams (21a, 21b) onto a sample (51) to be measured *[see e.g. column 11, lines 28 to 67];*

a dither modulator located in paths of both the modulated pump beam (21a) and the delayed probe beam (21b) to a sample (51) being measured *[see column 18, lines 42 to 46: in order to detect variations in film thickness over small lateral displacements, both pump beam and probe beam of D1 must be scanned over the sample surface; this implies the existence of scanning means in D1 which are located in the path of both the pump beam and the probe beam; this scanning means of D1 falls under the general wording of "dither modulator"; indeed, claim 1 does not specify any clear structural features of the dither modulator which would allow to differentiate it from the scanning means disclosed in D1];*

a detector (60) located in a path of a reflected probe beam (21b') from the sample (51);

wherein the dither modulator causes the modulated pump beam (21a) and the delayed probe beam (21b) to sweep a measurement spot in an area of the sample (51) to obtain an average thickness measurement of the area.

This last feature of claim 1 is anticipated by D1, column 18, lines 42 to 46, for the following reasons:

- The small area optical generator (i.e. the pump beam and the probe beam) and the detector of D1 form a "measurement spot".
- Scanning the small area optical generator and the detector corresponds to the feature of claim 1 of

causing the pump beam and the probe beam to sweep a measurement spot in an area of the sample.

- As explained, for instance, in D1, column 11, line 43, to column 12, line 24, film thicknesses are obtained on the basis of detector signals. It is implicit that these film thicknesses allow the computation of an average thickness measurement of an area.
- The functional feature of claim 1 "to obtain an average thickness measurement of the area" limits the scope of claim 1 only in that the sweeping of the beams must be such that an average thickness of an area can be obtained therefrom.
- Since the scanning means of D1 is suitable for obtaining an average thickness of an area, this functional feature is anticipated by D1.

1.2 Appellant's arguments in support of novelty

1.2.1 The appellant, with reference to D1, column 32, lines 1 to 13; column 14, line 47 to column 15, line 6; figure 7, argued that the subject-matter of claim 1 was novel because D1 disclosed an embodiment where the pump beam was held substantially stationary and only the probe beam was scanned.

The board acknowledges that an embodiment with a stationary pump beam and a scanned probe beam is disclosed in the passages recited by the appellant. However, the novelty objection is based on another embodiment described inter alia in column 18, lines 42 to 46. By the way, the board notes that the sentence in column 32, lines 4 and 5, does not exclude that both beams are scanned. The subsequent sentence in column 32, lines 5 to 11, merely describes one of the possible embodiments.

1.2.2 According to the appellant, the two terms "dithering" and "scanning" were not equivalent. By referring to the description of the patent application, page 6, lines 8 and 9, the appellant concluded that "dithering" and "scanning" were "two different and distinct motions". The appellant further argued that "dithering" in the present invention was a technique to move a pump laser beam in a way which avoided overheating the illuminated surface. Since the "scanning" in D1 did nothing "to prevent the thermal loading", it was not "dithering" as contemplated by the present invention.

The board is not convinced by these arguments. Both "dithering" and "scanning" designate the moving of a spot. The board cannot recognize any intrinsic difference in the meaning of both terms. Present claim 1 does also not define any specific features of a dither modulator which would differentiate it from a scanner. The description of the patent application, i.e. "the dither motion has a much higher frequency than that of the scanning motion", page 6, lines 8 and 9, cannot limit the scope of claim 1. Firstly, because limiting features must generally be defined in the claim itself and, secondly, the feature taken from the description has only a relative meaning with respect to a reference scanning motion, which is not defined in claim 1. Similarly, the board cannot see why "dithering" necessarily avoids overheating or which feature of claim 1 implies the avoidance of overheating.

1.2.3 The appellant noted that the passage in D1, column 18, lines 42 to 46, taught "to detect roughness or to detect variations in film thickness over small lateral displacements". The appellant concluded that "this is contrasted to the present claims which describe "to obtain an average thickness measurement of the area" (claim 1)...".

As explained in point 1.1 above, the functional feature of claim 1 "to obtain an average thickness measurement of the area" limits the scope of claim 1 only in that it requires that the sweeping of the pump beam and the probe beam *enables* the obtention of an average thickness measurement of the area. This enablement, however, is also the case with the scanning means of D1.

2. In view of the above, the appellant's main request is not allowable and, therefore, the board sees no reason to set aside the contested decision. Consequently, the appeal must be dismissed.

3. Reimbursement of the appeal fee

The appellant has provided no reasons for its request for reimbursement of the appeal fee under Rule 103 EPC.

In the present case, the only legal basis for reimbursement of the appeal fee would be the provisions of Rule 103(1) (a) EPC. However, the board concludes that no substantial procedural violation has occurred in the first-instance proceedings. Therefore, and because the appeal is not allowable, the appellant's request for reimbursement of the appeal fee must be refused.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

2. The request for reimbursement of the appeal fee is refused.

The Registrar: The Chairman:

M. Kiehl R. Bekkering

Decision electronically authenticated