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**Datasheet for the decision
of 12 April 2018**

Case Number: T 1857/12 - 3.4.02

Application Number: 02802224.2

Publication Number: 1446634

IPC: G01B9/02, G01N21/45

Language of the proceedings: EN

Title of invention:

METHOD FOR BIOMOLECULAR SENSING AND SYSTEM THEREOF

Applicant:

UNIVERSITY OF ROCHESTER

Headword:

Relevant legal provisions:

EPC 1973 Art. 84
RPBA Art. 13(1), 13(3)

Keyword:

Claims - clarity (no) - essential features omitted

Decisions cited:

T 0032/82

Catchword:



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Case Number: T 1857/12 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 12 April 2018

Appellant: UNIVERSITY OF ROCHESTER
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Representative: Potter Clarkson LLP
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 22 March 2012
refusing European patent application No.
02802224.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman R. Bekkering
Members: A. Hornung
G. Decker

Summary of Facts and Submissions

- I. The applicant appealed against the decision of the examining division refusing European patent application No. 02802224.2 on the basis of Article 123(2) EPC (main request and first to seventh auxiliary requests) and Article 56 EPC (eighth auxiliary request).
- II. The applicant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to a main request or one of the first to fifth auxiliary requests filed with the statement setting out the grounds of appeal, or on the basis of the claims according to the sixth to twelfth auxiliary requests filed with letter dated 5 March 2018.
- III. With letter dated 3 April 2018 the applicant withdrew the request for oral proceedings.
- IV. Oral proceedings were held on 12 April 2018 in the absence of the duly summoned applicant.
- V. The present decision refers to the following documents:
- D4: US 5 563 707 A.
- VI. Claims of the requests

Main request

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

"A sensor system (20) for sensing at least one target, the system comprising:

a receptor (26) for the at least one target, the receptor comprising a silicon substrate (30), a silicon dioxide coating (32) on the silicon substrate having front and back surfaces, and one or more adsorbates attached to the front surface of the silicon dioxide coating, said one or more adsorbates being capable of recognizing the at least one target;

a light source (22) positioned to direct s-polarized light (L) from the light source toward the silicon dioxide coating (32) on the receptor at a fixed angle of incidence that results in a condition of destructive interference due to the reflections from the front and back surfaces of the silicon dioxide coating, where the reflectance is less than 10^{-4} in the absence of the at least one target, wherein the s-polarized light from the light source is collimated, monochromatic or both; and

a detector (28) positioned to measure the light reflected from the front and back surfaces of the silicon dioxide coating, the detector identifying presence of at least one target based on the measured reflected light."

First auxiliary request

Independent claim 1 according to the first auxiliary request differs from claim 1 of the main request only in that the light is "having a wavelength greater than 600nm".

Second auxiliary request

Independent claim 1 according to the second auxiliary request differs from claim 1 of the main request only in that the sensor system comprises adsorbates "being selected from the group of non-polymeric small molecules, polypeptides or proteins, oligonucleotides, and combinations

thereof" and in that the s-polarized light (L) is directed on the receptor "at an angle of incidence" instead of being directed "at a fixed angle of incidence".

Third auxiliary request

Independent claim 1 according to the third auxiliary request differs from claim 1 of the main request in that the features of the light source have been amended as follows (added features are underlined; deleted features are struck through):

"a light source (22) positioned to direct s-polarized collimated light (L) with a divergence of less than one degree from the light source toward the silicon dioxide coating (32) on the receptor at ~~a fixed~~ an angle of incidence that results in a condition of destructive interference due to the reflections from the front and back surfaces of the silicon dioxide coating, where the reflectance is less than 10^{-4} in the absence of the at least one target, ~~wherein the s-polarized light from the light source is collimated, monochromatic or both~~"

Fourth auxiliary request

Independent claim 1 according to the fourth auxiliary request differs from claim 1 of the main request in that the features of the light source have been amended as follows (added features are underlined; deleted features are struck through):

"a light source (22) positioned to direct s-polarized collimated light (L) having a wavelength greater than 600nm from the light source toward the silicon dioxide coating (32) on the receptor at a fixed angle of incidence that results in a condition of destructive interference due to

the reflections from the front and back surfaces of the silicon dioxide coating, where the reflectance is less than 10^{-4} in the absence of the at least one target, ~~wherein the s-polarized light from the light source is collimated, monochromatic or both~~"

Moreover, according to the clean copy, the features of the receptor have been amended as follows (added features are underlined):

"... said one or more adsorbates being capable of recognizing the at least one target with a divergence of less than one degree"

Fifth auxiliary request

Independent claim 1 according to the fifth auxiliary request differs from claim 1 of the third auxiliary request in that the sensor system comprises adsorbates "being selected from the group of non-polymeric small molecules, polypeptides or proteins, oligonucleotides, and combinations thereof".

Sixth auxiliary request

Independent claim 1 according to the sixth auxiliary request reads as follows (features added or deleted with respect to claim 1 of the main request are underlined or struck through, respectively):

"A sensor system (20) for sensing at least one target, the system comprising:

a receptor (26) for the at least one target, the receptor comprising a silicon substrate (30), a silicon dioxide coating (32) on the silicon substrate having front and back surfaces, and one or more adsorbates covalently attached to

the front surface of the silicon dioxide coating, said one or more adsorbates being selected from the group consisting of a protein or polypeptide and an oligonucleotide, said one or more adsorbates being capable of ~~recognizing~~ binding specifically to the at least one target;

a light source (22) positioned to direct s-polarized light (L) from the light source toward the silicon dioxide coating (32) on the receptor at a fixed angle of incidence that results in a condition of destructive interference due to the reflections from the front and back surfaces of the silicon dioxide coating, where the reflectance is less than 10^{-4} in the absence of the at least one target, wherein the s-polarized light from the light source is collimated, and monochromatic ~~or both~~; and

a detector (28) positioned to measure the light reflected from the front and back surfaces of the silicon dioxide coating, the detector identifying presence of at least one target based on the measured reflected light."

Seventh to twelfth auxiliary requests

Claim 1 of the seventh to twelfth auxiliary requests comprises the same amendments as claim 1 of the sixth auxiliary request. In addition, it comprises further amendments, either by adding or deleting features. However, the wording of these further amendments plays no role for the present decision.

Reasons for the Decision

1. Procedural matters

1.1 The applicant was duly summoned to oral proceedings, and by letter dated 3 April 2018 it withdrew the request for oral proceedings. The board maintained the oral proceedings in order to resolve all outstanding issues and to bring the case to a final decision.

1.2 The oral proceedings were then held in the absence of the applicant. According to Rule 115(2) EPC, oral proceedings may continue in the absence of a duly summoned party. Furthermore, pursuant to Article 15(3) RPBA, the board is not obliged to delay any step in the proceedings, including its decision, by reason only of the absence at the oral proceedings of any party duly summoned who may then be treated as relying only on its written case. In view of these considerations and in view of the requests and the submissions of the applicant and of the preliminary assessment presented by the board in the communication annexed to the summons, the board was in a position to announce a decision at the conclusion of the oral proceedings (Articles 15(5) and (6) RPBA).

2. Main request - Clarity

2.1 According to the application as filed, the invention provides a system for "detecting molecular adsorption based on simple reflectivity" and has "a high degree of sensitivity" (see paragraph [0008] of the description). In order to achieve such high sensitivity, the receptor for the molecular target is illuminated "in a manner effective to result in a condition of near perfect interference" (see paragraph [0006] of the description). In particular, the "near perfect interference" allows for a reflectance in the

absence of the target to be less than 10^{-4} (see paragraph [0063] of the description in combination with figures 8 to 10). In other words, the invention has the objective of providing a very sensitive optical system for detecting molecular adsorption, the objective being achieved under the condition of near perfect interference corresponding to a reflectance of less than 10^{-4} .

2.2 Claim 1 comprises a receptor illuminated by a light source such that the reflectance is less than 10^{-4} , but without defining how such a low reflectance is effectively obtained. This amounts to define the claimed sensor system, in particular, its features for achieving the objective of the invention, in terms of a mere result to be achieved, instead of defining it in terms of technical structural features responsible for achieving the claimed result.

2.3 This is contrary to the established jurisprudence of the boards of appeal according to which a claim "must define clearly the object of the invention, that is to say indicate all the essential features thereof. As essential features have to be regarded all features which are necessary to obtain the desired effect or, differently expressed, which are necessary to solve the technical problem with which the application is concerned" (see T 32/82, point 15 of the Reasons).

2.4 In the present case, according to paragraphs [0060] to [0064] of the description, structural features of the coating (roughness) and the light source (divergence, spectral bandwidth, angle of incidence) are necessary to obtain the desired effect of very low reflectivity and, hence, to solve the technical problem of detecting molecular adsorption based on simple reflectivity. Therefore, these features, missing in present claim 1, are considered to be essential for guaranteeing that the reflectance is very low,

in particular less than 10^{-4} . This was not disputed by the applicant.

- 2.5 Moreover, during both first and second-instance examination proceedings, it was undisputed by the applicant that the very low level of reflectance represented a major, if not the only, contribution over the available prior art. According to the applicant's letter of 5 March 2018, sentence bridging pages 4 and 5, "[t]he Applicant regards the inventive concept to reside in that it is surprising that such profound and easily detectable differences in reflectivity exist between a surface with a target compound attached to it and the same surface which does not, provided the surface itself, i.e., in the absence of the target molecule, has *extremely low reflectivity* provided by a condition of *near perfect interference*" (emphasis added).

The very low level of reflectivity relates to the objective technical problem solved by the invention and plays a determining role in evaluating the patentability of the claimed subject-matter. This confirms that the features for achieving such a very low reflectivity are essential for clearly defining the claimed subject-matter.

- 2.6 The applicant, in its letter of reply dated 5 March 2018, did not provide any argument against this clarity objection, which was raised by the board in the communication annexed to the summons to the oral proceedings (see paragraph 6.2 of the communication).
- 2.7 Since claim 1 does not define all essential features of the claimed sensor system, it lacks clarity (Article 84 EPC 1973).
3. First to fifth auxiliary requests

Claim 1 of the first to fifth auxiliary requests is not compliant with the requirement of Article 84 EPC 1973 for reasons corresponding in part to those given for claim 1 of the main request.

Indeed, even though claim 1 of certain auxiliary requests specifies that the s-polarized light has a wavelength greater than 600 nm (first and fourth auxiliary requests) and that the light is collimated with a divergence of less than one degree (third and fifth auxiliary requests), claim 1 still misses essential features concerning the surface roughness of the coating and the spectral bandwidth of the incident light.

4. Sixth to twelfth auxiliary requests

The sixth to twelfth auxiliary requests are not admitted into the proceedings under Article 13 RPBA.

4.1 The sixth to twelfth auxiliary requests were filed in response to the communication of the board, annexed to the summons to oral proceedings. Claim 1 of all these auxiliary requests defines *inter alia* "one or more adsorbates *covalently* attached to the front surface of the silicon dioxide coating" (emphasis added), wherein the adsorbates are selected from a more limited group of materials as originally defined in dependent claims 9 and 22.

4.2 The present feature of a limited selection of adsorbates *covalently* attached to the silicon dioxide coating has been filed for the first time before the board of appeal. Hence, it has not been examined by the examining division. Moreover, the feature of covalent attachment does not correspond to a feature of a dependent claim as originally filed but is taken from the description. Such type of amendment is potentially complex since it defines subject-

matter which was not originally claimed and, therefore, may require an additional search and substantive examination to be restarted. Indeed, since D4 does not seem to disclose adsorbates covalently attached to the coating, its impact on inventive step of the subject-matter of claim 1 would have to be assessed. In particular, it would have to be assessed whether D4 is still a suitable starting point for assessing the patentability of the claimed system or not.

If any of the sixth to twelfth auxiliary requests were to be admitted into the proceedings remittal to the department of first instance for further prosecution might become necessary. The remittal would substantially increase the procedural complexity and length of the examination proceedings. This is not acceptable in view of Articles 13(1) and (3) RPBA.

- 4.3 One well-established criterion for deciding on the admissibility under Article 13(1) RPBA is whether the claims are likely to overcome the objection or objections in response to which the request has been filed. In the present case, the board acknowledges that claim 1 of the sixth to twelfth auxiliary requests has been amended in order to include *inter alia* the essential features of a collimated and monochromatic light source. However, as already objected to in point 7 of the summons to oral proceedings with respect to claim 1 of the first to fifth auxiliary requests, claim 1 of the sixth to twelfth auxiliary requests still misses the essential features concerning the surface roughness of the coating and the spectral bandwidth of the incident light. Since claim 1 of the sixth to twelfth auxiliary requests still lacks clarity, this criterion is not suitable to automatically admit any of the requests into the proceedings.

4.4 The appellant submitted in favour of the admittance of the sixth to twelfth auxiliary requests that "the new requests are filed as a *bona fide* attempt to address the issues raised in the communication from the Board" (see applicant's letter of 5 March 2018, page 1, second paragraph).

This argument is not convincing since none of the new requests includes an independent claim comprising all the essential features (see point 4.3 above).

4.5 For the above reasons, the board decides not to admit the sixth to twelfth auxiliary requests into the proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



L. Stridde

R. Bekkering

Decision electronically authenticated