UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte JOHN G. QUINN and JERRY ELKIND

Appeal 2007-1638
Application 10/152,745
Technology Center 1600

Decided: February 19, 2008

Before, DONALD E. ADAMS, DEMETRA J. MILLS, and LORA M. GREEN, *Administrative Patent Judges*.

MILLS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134. The Examiner has rejected the claims for lack of written description and for obviousness. We have jurisdiction under 35 U.S.C. § 6(b).

The following claim is representative.

23. A surface plasmon resonance sensor structure, comprising:
(a) a monolayer operable to form chemical bonds to a surface of a free-electron metal, said monolayer formed from a plurality of units, said plurality of units including units with the structure X-R-Y wherein:

(i) X, after forming chemical bonds with said metal and said R, is selected from the group consisting of -S-, -S-S-, -Se-, -Se-Se-, -S-Se-, and mixtures thereof where "-" indicates a chemical bond;

(ii) R, after forming chemical bonds with said X and said Y, includes carbon atoms $C^{(1)}$, $C^{(2)}$, ... , $C(^{n})$ where n is an integer greater than 5, and $C^{(1)}$ has chemical bonds both to said X and to said $C^{(2)}$, $C^{(n)}$ has chemical bonds both to said Y and to said $C^{(n-1)}$, and for each integer j in the range 2 to n-1 $C^{(j)}$ has chemical bonds both to said $C^{(j-1)}$ and to said $C^{(j+1)}$ wherein for each integer k in the range 1 to n-1 said chemical bond between $C^{(k)}$ and said $C^{(k+1)}$ is selected from the group consisting of a multiple bond, one of a set of conjugated bonds, and one of a set of bonds forming fused rings; and

(iii) Y, after forming chemical bonds with said R, contains a functional group.

Cited References

M. T. Cygan et al., J. Am. Chem. Soc. "*Insertion, Conductivity, and Structures of Conjugated Organic Oligomers in Self-Assembled Alkenethiol Monolayers on Au{111}*", vol. 120, pp. 2721-2732, (1998), (hereinafter "Cygan").

James E. Tour et al., J. Am. Chem. Soc. "*A Self-Assembled Monlayers and Multilayers of Onjugated Thiol, α, ω-Dithiols, and Thioacetyl-Containing Adsorbates. Understanding Attachments between Potential Molecular Wires and Gold Surfaces*", vol. 117, No. 37, pp. 9529-9534 (1995) (hereinafter "Tour").

C. J. Yu et al., J. Org. Chem. "*Soluble Ferrocene Conjugates for Incorporation into Self-Assembled Monolayers*", vol. 64, pp. 2070-2079 (1999) (hereinafter "Yu").

T. D. Dunbar et al., J. Phys. Chem. B 2000, "*Combined Scanning Tunneling Microscopy and Infrared Spectroscopic Characterization of Mixed Surface Assemblies of Linear Conjugated Guest Molecules in Host*

Alkanethiolate Monolayers on Gold" vol. 104, pp. 4880-4893 (2000) (hereinafter "Dunbar").

Fu-Ren F. Fan et al., J. Am. Chem. Soc. JACS Articles "*Charge Transport through Self-Assembled Monolayers of Compounds of Interest in Molecular Electronic*", vol. 124, pp. 5550-5560 (2002) (hereinafter "Fu").

Grounds of Rejection

1. Claims 23, 25 and 26 stand rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement.

2. Claims 23, 25 and 26 stand rejected under 35 U.S.C. § 112, second paragraph as failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

3. Claims 23-26 stand rejected under 35 U.S.C. § 102(b) as anticipated by Cygan, Tour, Yu, Dunbar, and Fan.

DISCUSSION

Background

The invention relates to (bio)chemical sensors, and more particularly to surface plasmon resonance (SPR) sensors. (Spec. 1.) A surface plasmon resonance (SPR) sensor measures changes of refractive index in a dielectric biointerface on a thin conductor using the dependence of the surface plasmon wave vector on the refractive index. Thus, with a biointerface including specific binding sites for an analyte, the analyte can be detected quantitatively in a fluid contacting the biointerface due to the change in refractive index by addition of the analyte to the biointerface. (Spec. 1.)

Claim 23 requires the following structure:

(a) a monolayer operable to form chemical bonds to a surface of a free-electron metal, said monolayer formed from a plurality of units, said plurality of units including units with the structure X-R-Y wherein:

(i) X, after forming chemical bonds with said metal and said R, is selected from the group consisting of -S-, -S-S-, -Se-, -Se-Se-, -S-Se-, and mixtures thereof where "-" indicates a chemical bond;

(ii) R, after forming chemical bonds with said X and said Y, includes carbon atoms $C^{(1)}$, $C^{(2)}$, ... , $C(^{n})$ where n is an integer greater than 5, and $C^{(1)}$ has chemical bonds both to said X and to said $C^{(2)}$, $C^{(n)}$ has chemical bonds both to said Y and to said $C^{(n-1)}$, and for each integer j in the range 2 to n-1 $C^{(j)}$ has chemical bonds both to said $C^{(j-1)}$ and to said $C^{(j+1)}$ wherein for each integer k in the range 1 to n-1 said chemical bond between $C^{(k)}$ and said $C^{(k+1)}$ is selected from the group consisting of a multiple bond, one of a set of conjugated bonds, and one of a set of bonds forming fused rings; and

(iii) Y, after forming chemical bonds with said R, contains a functional group.

In a preferred embodiment the biointerface linker film on a metal surface has the structure of a self assembled monolayer (SAM) formed from compounds with a rigid, roughly linear portion adjacent the metal surface. (Specification 5.) Suitable compounds are of the structure X-R-Y wherein X is a group such as -S- that binds to gold (or other free electron metal), Y includes functional group(s) for linking (directly or indirectly) ligand(s) which will bind target analyte(s), and R provides a rigid carbon chain backbone which close-packs upon self assembly. (Specification 5.) For the linker film depicted in Figure 1 of the Specification, X is -S-, Y is -CH2C(CH20H)3, and R is -C6H4C≡CC6H4C≡CC6H4C≡CC6HT4−. The conjugated double and triple bonds of R provide the rigidity, and the para

connections yield a roughly linear structure. (Specification 5.) Y provides a bulky, hydrophilic end to form a dense surface with active groups for linking to either ligands or an interaction layer which, in turn, includes ligands. (Specification 5.) The resulting SAM surface will be composed of tightly packed hydroxyl groups forming an ideal linker film. (Specification 5.)

1. Claims 23, 25 and 26 stand rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement.

The Examiner contends that "[t]here is no written description in the specification of the variable "R" defined as in subparagraph (ii) of newly presented claim 23 nor do the originally presented claims support the "R" definitions which appear in claim 23." (Ans. 5.) At the same time, the Examiner acknowledges that "certain structures which define the variable "R" are defined and supported in the specification." (Ans. 8.)

Appellants contend that the

> application background page 2, middle paragraph describes the notation X-R-Y with various X, R, and Y for a self-assembled monolayer (SAM) unit; and application page 5, first paragraph again describes the X, R, and Y and how they correspond to the elements of Figure 1. Further, application page 6, first full paragraph, pages 7-8, and Figures 7a-7e give more description of R.

(Br. 5.[1])

[1] Reference to the Brief throughout this document is made to the Substitute Brief filed August 25, 2006.

The purpose of the written description requirement is to "ensure that the scope of the right to exclude, as set forth in the claims[,] does not overreach the scope of the inventor's contribution to the field of art as described in the patent specification." *Reiffin v. Microsoft Corp.*, 214 F.3d 1342, 1345 (Fed. Cir. 2000). To satisfy the requirement, the Specification need not contain the identical words used in the claims. *See Purdue Pharma L.P. v. Faulding, Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000). Rather, the Specification must "convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [Applicant] was in possession [of] . . . *whatever is now claimed*." *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1564 (Fed. Cir. 1991). It is the Examiner's "initial burden [to] present[ ] evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims" (*In re Wertheim*, 541 F.2d 257, 263 (CCPA 1976)).

We do not find that the Examiner has met her burden of providing evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims. The Examiner found that "certain structures which define the variable "R" are defined and supported in the specification." (Ans. 8.) The Examiner has not indicated which structures claimed are not supported by the Specification. Therefore, we have no basis upon which to support a rejection for lack of written description. The written description rejection is reversed.

2. Claims 23, 25 and 26 stand rejected under 35 U.S.C. § 112, second paragraph as failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

The Examiner argues

> It is entirely unclear what is meant to be included by the definitions of "R" recited in claim 23. The structures meant to be encompassed by the variable "R" cannot be determined. It is unclear what moieties the individual "$C^{(n)}$" groups are a part of and how the groups are connected to each other. The claim language requires only that "R . . . includes carbon atoms C(l), C(2), . . . , C(n)" but says nothing about the presence of any other atoms or how the atoms of "R" are configured. The specification contains no definition corresponding to the variable " R" defined as *"Includes carbon atoms $C^{(1)}$, $C^{(2)}$, ..., $C^{(n)}$, where n is an integer. . . said chemical bond between $C^{(k)}$ and said $C^{(k+1)}$ is selected form the group consisting of a multiple bond one of a set of conjugated bonds and one of a set of bonds forming fused rings".* Certain structures of the variable "R" are defined in the specification. See for example, the figures, claim 24 and the last paragraph of page 7 of the specification. However, the definition of "R" as it appears in claim 23 can in no way be inferred from the description of "R" as it appears in the specification.

(Ans. 5-6.)

Again the Examiner acknowledges that "[a]lthough it might be possible to interpret the specific definitions of "R" as described in claim 24 as being encompassed by the definition of claim 23," the Examiner argues that "the much more extensive and incomplete definition of "R" in claim 23 cannot be inferred from the description of claim 24." (Ans. 8.)

"[T]he definiteness of the language employed must be analyzed—not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art." *In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971). In our view the Examiner has not articulated a specific reason why the claims are indefinite. At the same time admits that certain structures defined by the Specification are encompassed by the claims. The Examiner appears to have confused the definiteness requirement of 35 U.S.C. § 112, second paragraph, with the enablement requirement of 35 U.S.C. § 112, first paragraph, as the claim definition of "R" is broad in scope. As set forth in *In re Skoll*, 523 F.2d 1392, 1395 (CCPA 1975), the use of a broad term in a claim does not make that claim indefinite.

In view of the above, the rejection of the claims for indefiniteness is reversed.

3. Claims 23-26 stand rejected under 35 U.S.C. § 102(b) as anticipated by Cygan, Tour, Yu, Dunbar, and Fan.

The Examiner finds that

> [e]ach of the references describes a compound meeting the definition of the structure 'X-R-Y' of claim 23 of this application which is attached to a metal. The prior art compounds contain functional groups corresponding to the claim 23 terms "X" and "Y" and a group which corresponds to "R" which contains at least one of "a multiple bond", "a set of conjugated bonds" or "a set of bonds forming fused rings". These prior art compositions comprised of a "self-assembled monolayer" (SAM) attached to a gold surface anticipate the compositions of claims 23-26 which are comprised of a monolayer on a "surface". See Figure 1 of this application and

> the specification at page 6, the section entitled *Self assembled monolayer (SAM)*. The claim 23 preamble term "a surface plasmon resonance sensor structure" is a statement of the intended use of the claimed composition; however, this term does not limit the composition *per-se* which is comprised of a metal (gold) to which a "monolayer" is attached.

(Ans. 6.)

The Examiner finds that the cited references teach the claimed structures at the locations indicated below.

> *Tour et al:* Abstract wherein "alpha, omega-dithiols form assemblies in which one thiol group binds to the surface while the second thiol moiety projects upward at the exposed surface of the SAM"; compound 13 of Table 1 {one thiol forming a linkage corresponding to "X" of the claim 23 structure with the second thiol forming the "functional group" defined by "Y" in the structure of claim 23};
> *Yu et al:* Introduction: "conjugated arenethiol molecular wires that are chemisorbed onto gold surfaces" and "ferrocene-terminated oligo(phenylethynyl)arenethiols" {the "thiol" corresponding to "X" of the claim 23 structure and the "ferrocene" being the "functional group" of the claim 23 structure};
> *Dunbar et al:* the structure of Figure 3 and Table 1 {the thiol group corresponding to "X" of the structure of claim 23 and the nitro group corresponding to "Y" of the structure of claim 23};
> *Cygan et al:* Chart 1 {nitro substituent corresponding to "Y" of the structure of claim 23};
> *Fan et al:* the structure of Chart 1; structure IX {"-COO-" corresponding to "X" of the structure of claim 23 and "-SAc-" corresponding to "Y" of the structure of claim 23|}.

(Ans. 6-7.)

The standard under § 102 is one of strict identity. "Under 35 U.S.C. § 102, every limitation of a claim must identically appear in a single prior art

reference for it to anticipate the claim." *Gechter v. Davidson*, 116 F.3d 1454, 1457 (Fed. Cir. 1997). "Every element of the claimed invention must be literally present, arranged as in the claim." *Richardson v. Suzuki Motor Co., Ltd.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989). We find the cited references disclose each and every element claimed and thus, we find no error in the Examiner's prima facie case of anticipation.

With respect to each of the cited references Appellants argue that "claims 23-26 require the monolayer with X-R-Y units be part of a surface plasmon resonance sensor structure, and the references do not suggest this." (Br. 7.) Appellants argue that "Cygan focuses on electrical conductivity of regions within SAMs as parts of potential organic electronic devices." (Br. 7.)

An intended use that merely states the purpose of the claimed subject matter, without adding additional structure to it, is generally not treated as limiting the scope of the claim. See *Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp*., 320 F.3d 1339, 1345 (Fed. Cir. 2003); *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997). The claims before us recite and define the structure of a self assembled monolayer (SAM). The preamble of claim 23 recites the intended use of a self assembled monolayer in a surface plasmon resonance sensor. Claim 23 recites no other structural elements other than the structure of the self assembled monolayer and recites no additional elements of a surface plasmon resonance sensor.

Appellants admit that the cited references teach SAM's wherein X, R and Y meet the claim limitations. (Br. 8-9.) Likewise, Appellants do not argue that any of the structures of the SAMs of the cited references do not

meet the X-Y-R structure, as claimed. With respect to each of the rejections before us Appellants argue that the claims require the monolayer with X-R-Y units to be part of a surface plasmon resonance sensor structure. As discussed herein we have found that the preamble of claim 23 recites no additional structure and therefore merely recites an intended use of the monolayer recited in the claim.

We do not find Appellants have put forth sufficient evidence to rebut the Examiner's prima facie case of anticipation and the anticipation rejection is affirmed.

SUMMARY

The rejection of claims 23, 25 and 26 under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement is reversed.

The rejection of claims 23, 25 and 26 under 35 U.S.C. § 112, second paragraph as failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention is reversed.

The rejection of claims 23-26 under 35 U.S.C. § 102(b) as anticipated by Cygan, Tour, Yu, Dunbar, and Fan is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS TX 75265

lp