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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YUTAKA TSUJIUCHI[1]

Appeal 2015-002488
Application 12/293,574
Technology Center 1600

Before JOHN G. NEW, RICHARD J. SMITH, and KRISTI L. R. SAWERT, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a laminate of molecular thin films that have been rejected as obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

Background

"The present invention relates to an organic thin film for realizing, in an artificial thin film system, functional expression of a membrane protein." (Spec. 1, ll. 8–9.)

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[1] According to Appellant, the real party in interest is National University Corporation Akita University. (Appeal Br. 3.)

Claims on Appeal

Claims 1, 4, 5, 9, 19, and 20 are on appeal.[2] (Claims Appendix, Appeal Br. 20.) Independent claim 1 is illustrative and reads as follows:

1. A laminate of molecular thin films of retinoic acid and a lipid other than a fatty acid;

wherein the laminate of molecular thin films comprises a) at least three retinoic acid layers and b) at least two lipid layers that are not fatty acid layers; and

the at least three retinoic acid layers are formed on a substrate and the at least two lipid layers are formed on the at least three retinoic acid layers; and

wherein the surface of the laminate comprises a plurality of uniform, curved protruding surfaces of approximately 200 nm in width.

Examiner's Rejection

Claims 1, 4, 5, 9, 19, and 20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Meuse,[3] de Melo,[4] Tieke,[5] and Slade.[6] (Ans. 3.)

Claims 1, 4, 5, 9, 19, and 20 were not separately argued, and we therefore limit our consideration to claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

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[2] The rejection refers to claims 1, 4–7, 9, 19, and 20, but claims 6 and 7 were cancelled pursuant to an Amendment after Final dated Jan. 27, 2014, entered by the Examiner pursuant to an Advisory Action dated Feb. 6, 2014.

[3] Meuse et al., *Assessing the Molecular Structure of Alkanethiol Monolayers in Hybrid Bilayer Membranes with Vibrational Spectroscopies*, 14 Langmuir 7, 1604–11 (1998) ("Meuse").

[4] de Melo et al., *Langmuir-Blodgett Films of Retinal Derivatives*, 14 Langmuir 2, 490–96 (1998) ("de Melo").

[5] Tieke, *Langmuir-Blodgett Membranes for Separation and Sensing*, 3 Adv. Mater. 11, 532–41 (1991) ("Tieke").

[6] Slade et al., *Single molecule imaging of supported planar lipid bilayer–reconstituted human insulin receptors by in situ scanning probe microscopy*, Journal of Structural Biology 137, 283–91 (2002) ("Slade").

FINDINGS OF FACT

We adopt as our own the Examiner's findings and analysis concerning the scope and content of the prior art. The following findings are included for emphasis and reference convenience.

FF 1. Meuse teaches a membrane mimetic model comprising a laminate of molecular thin films, including an alkanethiol layer on a solid support and a lipid layer (DMPC)[7] on the alkanethiol layer. (Ans 3; Meuse Abstract; Fig. 1; 1606, col. 1.)

FF 2. Meuse teaches that "[e]xamples of planar-supported bilayer membranes include . . . transfer of lipid monolayers to glass surfaces made hydrophobic with a lipid layer." (*Id.* 1604, col. 1.)

FF 3. de Melo teaches the use of multiple retinoic acid monolayers to form Langmuir-Blodgett (LB) films on solid substrates. (de Melo Abstract, 492.)

FF 4. The Specification teaches that "in accordance with the type of fatty acid used, different characteristics arise in the structure of the film formed." (Spec. 9, ll. 19–21.)

ISSUE

Whether a preponderance of the evidence of record supports the Examiner's conclusion of obviousness under 35 U.S.C. § 103(a).

ANALYSIS

The Examiner concludes that it would have been obvious to one of skill in the art at the time of the invention to modify the laminate of Meuse by replacing the alkanethiols with the retinoic acid layers of de Melo, using

[7] DMPC is the abbreviation for dimyristoylphosphatidylcholine. (Meuse 1605, col. 2.)

the LB method suggested by Tieke, to achieve the predictable result of obtaining a laminate of molecular thin films suitable to be used as a membrane mimetic model. (Ans. 4–5.) The Examiner also concludes that "a plurality of uniform, curved protruding surfaces of approximately 200 nm . . . is inherent to laminates comprising retinoic acid." (*Id.* 5.) The Examiner further concludes that "[a]bsent evidence of unexpected results, it would have been obvious to one of skill in the art to use routine experimentation and vary the number of the retinoic and lipid layers, with the purpose of optimizing the membrane mimetic model."[8] (*Id.* 6.)

We find that the Examiner has satisfied the burden of showing "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Accordingly, the Examiner has established a prima facie case of obviousness and, as discussed below, Appellant has not overcome or rebutted that prima facie case.

Replacement of Alkanethiol with Retinoic Acid

Appellant contends that "a skilled artisan would not have been led to replace the alkanethiols of Meuse [] with retinoic acid, with any reasonable expectation of success." (Appeal Br. 12.) In support of that contention, Appellant argues that, while "[a]lkanethiols are like fatty acids . . . for purposes of creating synthetic lipid layers on metal substrates, they are far better than fatty acids." (*Id.*) Appellant further argues that replacing alkanethiol with retinoic acid "would have resulted in abandoning the thiol

[8] The Examiner also points to Slade for teaching "at least two DMPC layers." (Ans. 5.)

. . . responsible for the strong interaction with the gold substrate, with a carboxylic acid (which is the head group of retinoic acid), which would not have the same strength of interaction." (*Id.* 13.) Appellant also argues that Meuse "uses alkanethiols to anchor the building of lipid layers underwater – a process that would be impossible without the alkanethiols," whereas de Melo and Tieke "rely on the tendency of polar lipids to similarly organize at the air-water interface." (*Id.* 14.)

We are unpersuaded by Appellant's arguments. Even if alkanethiol layers were "better" than retinoic acid layers as argued by Appellant, that argument does not outweigh the evidence in favor of obviousness. *See In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) ("[J]ust because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes."). We are also unpersuaded by Appellant's argument that an air-water interface may be used in connection with retinoic acid layers, and find no reason or evidence suggesting that such process would be beyond the level of one of ordinary skill in the art. *See KSR*, 550 U.S. at 421 ("A person of ordinary skill is also a person of ordinary creativity, not an automaton."); *In re Sovish*, 769 F.2d 738, 743 (Fed. Cir. 1985) (skill is presumed on the part of one of ordinary skill in the art).

In summary, we agree with the Examiner that the use of retinoic acid layers in place of alkanethiol layers constitutes the mere substitution of one type of membrane layer for another known in the field, yielding predictable results. (Ans. 4–5.) *See KSR*, 550 U.S. at 416.

Unexpected Results

Claim 1 recites "wherein the surface of the laminate comprises a

plurality of uniform, curved protruding surfaces of approximately 200 nm in width." (Appeal Br. 20.) Appellant argues that

> Appellant has discovered that when an artificial lipid laminate is created with three layers of [retinoic acid] and two layers of DMPC, uniform, curved, protruding surfaces of approximately 200 nm are created on the surface of the lipid laminate. There is nothing whatever in any of the art cited by the examiner that suggests that this structure would result. Moreover, because this structure is believed to represent something that may naturally occur in biological membranes, the discovery is a significant advance in the field.

(*Id.* 16.)

Appellant points to pages 40–42 of the Specification as further evidence of unexpected results, arguing that "[t]he fact that these *structures* result is unexpected." (*Id.* 17–18.) In the Reply Brief, Appellant states that

> Appellant has discovered that when a laminate of molecular thin films is formed as recited in the claims, the result is a plurality of uniform, curved protruding surfaces in the resulting membrane. This result – the plurality of uniform, curved protruding surfaces – is unexpected. Appellant has not argued that these structures perform unexpectedly better as membrane mimetics than prior art structures.

(Reply Br. 3.)

Appellant also points to "the differences between alkanethiols and fatty acids" as reflected in the Tsujiuchi Declaration.[9] (*Id.* 2.)

We are unpersuaded by Appellant's arguments. As a fundamental matter, Appellant misconstrues the import of a discovery, even of an

[9] Declaration under 37 CFR § 1.132 by Yutaka Tsujiuchi, dated Jan. 24, 2014 ("Tsujiuchi Declaration" or "Decl.").

unknown or "unexpected" property, in the context of patentability. "[I]t is elementary that the mere recitation of a newly discovered function or property, inherently possessed by things in the prior art, does not cause a claim drawn to those things to distinguish over the prior art." *In re Swinehart*, 439 F.2d 210, 212–13 (CCPA 1971); *Atlas Powder Co. v. Ireco, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999) ("[T]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer.").

Here, as the Examiner points out, the claimed surface structure is an inherent property of laminates comprising retinoic acid layers (Ans. 5), as evidenced by Appellant's statement that different characteristics arise in the structure of the film depending on the type of fatty acid used (FF 4; *see also* Decl. ¶ 15.). Moreover, the last "wherein" clause of claim 1 merely states the result of the limitations in the claim (i.e., "at least three retinoic acid layers [] formed on a substrate and [] at least two lipid layers [] formed on the at least three retinoic acid layers"), and thus adds nothing to the patentability or substance of the claim. *See Texas Instruments Inc. v. U.S. Int'l Trade Comm'n*, 988 F.2d 1165, 1172 (Fed. Cir. 1993).

The Tsujiuchi Declaration confirms that the structure of the laminate molecular thin films is a function of the "underlying organic films (alkanethiols, stearic acid, and retinoic acid)." (Decl. ¶ 15.) It is therefore unpersuasive of nonobviousness. Moreover, while we acknowledge Appellant's position that the Examiner "has failed to give sufficient weight to the unexpected results" (Appeal Br. 18), we find no evidence to support that position, or any error in the Examiner's rejection, for the reasons set

forth above.

CONCLUSION

A preponderance of evidence of record supports the Examiner's conclusion that claim 1 is obvious under 35 U.S.C. § 103(a). Claims 4, 5, 9, 19, and 20 were not argued separately and fall with claim 1.

SUMMARY

We affirm the rejection of all claims on appeal.

TIME PERIOD FOR RESPONSE

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