The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Ex parte AARON M. DATESMAN, SUSAN L.R. BAKER, MICHAEL L. WAGNER, DAVID ANGELEY, and ERIC BLACK

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Appeal No. 2006-1095
Application No. 10/280,188

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ON BRIEF

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Before JERRY SMITH, RUGGIERO, and BARRY, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1-3, 6-10, 12-15, 18-23, and 26. Claims 4, 5, 11, 16, 17, 24, and 25 have been indicated by the examiner to contain allowable subject matter. Claims 27 and 28 have been cancelled.

The disclosed invention pertains to a multiple-mode planar-waveguide sensor, fabrication materials and techniques.

Representative claim 1 is reproduced as follows:

1. A planar optical sensor, comprising:

- at least one input waveguide and at least two output waveguides in optical communication with a coupling region having a sensor surface configured to receive a multiplicity of immobilized chemical or biological receptors thereon;
- a source of light directed to the input waveguide;
- the coupling region supporting at least two electromagnetic modes of propagation such that chemical or biological binding to the receptors causes a change in the refractive index near the surface of the waveguide of the coupled region affecting the interaction of the propagation modes; and
- a detector for detecting differing aspects of the light propagating down each of the output waveguides.

The examiner relies on the following references:

Boiarski et al.	(Boiarski)	5,173,747	Dec. 22, 1992
Fardad et al.	(Fardad)	6,054,253	Apr. 25, 2000

Dietz et al.	(Dietz)	6,442,319	Aug. 27, 2002
Izumi et al.	(Izumi)	US 2003/0207567 (eff. filing date May 22, 2002)	Nov. 6, 2003

The examiner has provided the following additional references as extrinsic evidence to support a finding of inherent anticipation:

- Hartman 4,940,328 Jul. 10, 1990

  (see Hartman, col. 2, lines 6-18 and col. 4, lines 12-51)

- Worth et al., "Surface Desensitization of Polarimetric Waveguide Interferomers", IEEE Journal of Selected Topic In Quantum Electronics, Vol. 7, No. 6, November/December 2001, pages 874-877.

- Newman et al., "Silicon-on-insulator integrated optical biosensors for environmental monitoring", IEEE Colloquium on Optical Techniques for Environmental Monitoring, 15, November 1995, pages 3/1 – 3/6.

The following rejections are on appeal before us:

1. Claims 1, 12-15 and 18-23 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Boiarski [answer, pages 4 and 5].
2. Claim 1, 2, 12-15, 18-20, 22 and 23 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Dietz [answer, pages 5-7].

3. Claims 2, 3 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Boiarski [answer, pages 7-9].
4. Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Boiarski [answer, page 10].
5. Claims 7-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Boiarski and Dietz, and further in view of Izumi [answer, pages 10 and 11].

Rather than repeat the arguments of appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of anticipation and obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal

set forth in the examiner's answer. Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the briefs have not been considered and are deemed to be waived. See 37 C.F.R. § 41.37(c)(1)(vii)(2004). See also In re Watts, 354 F.3d 1362, 1368, 69 USPQ2d 1453, 1458 (Fed. Cir. 2004).

It is our view, after consideration of the record before us, that the evidence relied upon supports each of the examiner's rejections of the claims on appeal. Accordingly, we affirm.

I. We consider first the examiner's rejection of claims 1, 12-15 and 18-23 as being anticipated by Boiarski. Since Appellants' arguments with respect to this rejection have treated these claims as a single group which stand or fall together, we will consider independent claim 1 as the representative claim for this rejection. See 37 C.F.R. § 41.37(c)(1)(vii) (2004).

In rejecting claims under 35 U.S.C. §102, a single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation. Perricone v. Medicis Pharmaceutical Corp., 432 F.3d 1368, 1375-6, 77 USPQ2d 1321, 1325-6 (Fed. Cir. 2005),

citing Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1565, 24 USPQ2d 1321, 1326 (Fed. Cir. 1992). To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (internal citations omitted). To anticipate, every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim. Karsten Mfg. Corp. v. Cleveland Golf Co., 242 F.3d 1376, 1383, 58 USPQ2d 1286, 1291 (Fed. Cir. 2001); Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991).

Appellants argue that Boiarski does not teach a coupling region supporting at least two electromagnetic modes of propagation wherein a change in the refractive index affects the interaction of the propagation modes, as required by the language of claim 1 [brief, pages 2-3].

The examiner responds that Boiarski discloses that the thickness and width of the waveguide are sufficient to support multimode light (col. 8, lines 44-45); hence, multiple modes propagate within the optical waveguide and the coupling region in one embodiment of Boiarski's invention [answer, page 13]. The examiner notes that Boiarski discloses when antigens in a sample bind to the antibodies in the coupling region, the refractive index changes, changing the relative intensity of light measured by the detectors (see col. 5, lines 33-42) [id.]. The examiner acknowledges that Boiarski does not explicitly state that the change in the refractive index affects the interaction of the propagation modes [id.]. However, the examiner asserts that a change in the refractive index of a waveguide (including the surrounding cladding/coating materials) inherently produces a change in the mode interaction when multiple modes are propagating through the region where the refractive index changes [id.].

In the reply brief, appellants further argue that Boiarski is silent on multiple propagational modes in general and chemical or biological binding which causes a change in the refractive index affecting the interaction of the propagational modes [reply brief, page 2].

We begin by noting that the Court of Appeals for the Federal Circuit has determined that anticipation of a patent claim requires a finding that the

claim at issue "reads on" a prior art reference. Atlas Powder Co. v. IRECO, Inc., 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed Cir. 1999) ("In other words, if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art.") (internal citations omitted). In the instant case, we agree with the examiner that the language of representative claim 1 reads upon the Boiarski reference in the manner argued by the examiner. After carefully reviewing all of the evidence before us, we find that the examiner, as finder of fact, has set forth a proper prima facie case of anticipation that is fully supported by the evidence of record, as discussed infra.

Instead of rebutting the examiner's position by clearly pointing out the distinctions of the claimed invention over the prior art, we note that appellants merely assert that "it would be clear to one of ordinary skill in the art what is meant by a propagation mode" and point to the instant specification (at fig. 4 and page 10) where two propagation modes are disclosed that differ only as to phase such that the "two modes allow for complete destructive and constructive interference between the two modes" [instant specification, page 10; see also brief, page 3, ¶1]. We note that Boiarski explicitly discloses constructive interference and destructive interference as the result of relative phase differences [col. 5, lines 60-66].

We further note that appellants fail to point out in the briefs exactly how the claimed limitations of: (1) "at least two electromagnetic modes of propagation," and, (2) "chemical or biological binding to the receptors causes a change in the refractive index" distinguish over Boiarski's explicit disclosure of: (1) multimode light [col. 8, line 45], and (2) binding reactions of antigens to antibodies that change the index [col. 5, lines 34-36]. We find that the language of the claim reads upon these sections of Boiarski. We further find that Boiarski's disclosure of index changes that further change (i.e., affect) the amount of light coupling between the waveguides meets the language of claim 1 that requires "affecting the interaction of the propagation modes." See Boiarski at col. 5, lines 33-42:

> When a sample containing antigens is added to the cavity 43 above the second waveguide 41 coated with antibodies 44 a binding reaction of antigens to antibodies occurs which changes the index of the coating 44 relative to the first superstrate 42. This changes the amount of coupling of light which affects the relative intensity of light P_1, P_2 emerging from each waveguide as measured by detectors and reflected in the value of the ratio R. A change in the value of R can be correlated with the concentration of antigens in the sample [emphasis added].

With respect to the issue of inherent anticipation, we note that "[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App.

& Inter. 1990) [emphasis in original]. "[A]fter the PTO establishes a prima facie case of anticipation based on inherency, the burden shifts to appellant to 'prove that the subject matter shown to be in the prior art does not possess the characteristic relied on.' " In re King, 801 F.2d 1324, 1327, 231 USPQ 136, 138 (Fed. Cir. 1986) quoting In re Swinehart, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971). See also MPEP §§ 2112 (IV.), (V.).

In the instant case, we note that the examiner has provided both a rationale in the answer and also extrinsic evidence to support the examiner's finding of inherent anticipation with respect to the Boiarski reference. We note that appellants have responded by merely stating that the extrinsic evidence provided by the examiner (to support the finding of inherent anticipation) "is tantamount to combining references, which is inappropriate in conjunction with anticipation" [reply brief, page 2]. Therefore, we find that appellants have not met their burden of proving that the subject matter shown to be in the prior art does not possess the characteristic relied on by the examiner. Accordingly, we will sustain the examiner's rejection of representative claim 1 as being anticipated by Boiarski for essentially the same reasons argued by the examiner in the answer. We further note that appellants have not presented any substantive arguments directed

separately to the patentability of dependent claims 12-15 and 18-23. See In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987). See also 37 C.F.R. § 41.37(c)(1)(vii)(2004). Therefore, we will also sustain the examiner's rejection of these claims as being anticipated by Boiarski for the same reasons set forth in the rejection.

II. We consider next the examiner's rejection of claims 1, 2, 12-15, 18-20, 22 and 23 as being anticipated by Dietz. Since Appellants' arguments with respect to this rejection have treated these claims as a single group which stand or fall together, we will consider independent claim 1 as the representative claim for this rejection. See 37 C.F.R. § 41.37(c)(1)(vii) (2004).

Appellants argue that Dietz does not teach multiple electromagnetic modes of propagation, at least with respect to interactions at the coupling region, affecting the interaction of the propagational modes, as required by the language of claim 1 [brief, page 5].

The examiner notes that Dietz discloses that the surface or layer that is altered with a specific molecule, antigen and/or antibody has an index of refraction that is proportional to the concentration of chemical or biological agents attached to the molecules, antigen and/or antibodies on the surface

or layer [answer, page 19, cont'd page 20; see also Dietz at col. 8, line 45 through col. 9, line 7]. The examiner notes that Dietz further discloses that a probe beam interacting with the surface or layer undergoes an amplitude and phase change proportional to the concentration of the chemical or biological agents attached to the surface or layer [answer, page 20; see also Dietz at col. 8, line 66 through col. 9, line 7]. The examiner asserts that the phase change results from a change in refractive index due to the binding of chemical or biological agents to the surface or layer [answer, page 20]. The examiner asserts that a change in refractive index produces a change in the mode propagation constants, which produces a change in the optical path length of the light and a total phase shift proportional to the average change in the propagation constant per unit length [answer, page 20, ¶2]. The examiner further asserts that for two or more modes propagating in the region of refractive index change, wherein the two or more modes interfere, the overall phase shift in an interference pattern is equal to the relative phase shift between the two or more modes, which results from the change of propagation constants for each mode due to the change in refractive index [id.]. The examiner concludes that the multiple propagation modes are affected by the change in refractive index that is proportional to the concentration of the chemical or biological agents that bind to the coupling

region [answer, page 20, ¶3]. The examiner further notes that since the light resulting from the interaction of the propagation modes that results from the change in refractive index is detected, the affect on the interaction of the propagation modes is used for detection purposes [id.].

Regarding appellants' arguments that the examiner is relying upon inherency in formulating the rejection, we restate our comments supra that appellants have not met their burden of proving that the subject matter shown to be in the prior art does not possess the characteristic relied on by the examiner. See In re King, 801 F.2d at 1327, 231 USPQ at 138.

In addition, we note that appellants have recognized in the brief that Dietz explicitly discloses (at col. 7, lines 25 and 26) that "'waveguides 44 and 48 support one or more guided modes each'" [brief, page 5, emphasis added]. We note that appellants further acknowledge: "Applicant takes this passage simply to state that these are multi-mode waveguides" [brief, page 5, ¶1, emphasis added]. In particular, we note that appellants further argue: "this is not to say that they [i.e., Dietz's multi-mode waveguides] are used for any purpose in particular" [brief, page 5, emphasis added]. Significantly, we note that appellants assert that Dietz's disclosure of "Light/Sensor Area Interaction" (col. 8, lines 45-65) does not disclose the "use of propagational modes for detection purposes" [brief, page 5, ¶1, emphasis added].

In response, we note that the Court of Appeals for the Federal Circuit has determined that the absence of a disclosure relating to function does not defeat a finding of anticipation if all the claimed structural limitations are found in the reference. In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). In Schreiber, the court held that a funnel-shaped oil dispenser spout anticipated a claimed conical-shaped popcorn dispensing top, even though the function of popcorn dispensing was not taught by the reference, because the reference met all the structural limitations of the claim. In re Schreiber, 128 F.3d at 1479, 44 USPQ2d at 1433.

In the instant case, we find that the Dietz reference does teach all the structural elements arranged as claimed, as pointed out by the examiner in the rejection [answer, see rejection of claim 1, pages 5 and 6]. We note again that appellants have acknowledged in the brief that Dietz teaches multi-mode waveguides [brief, page 5, ¶1]. Therefore, we agree with the examiner that Dietz's disclosed structure is inherently capable of performing the instant intended purpose or function of using propagational modes for detection purposes.

Accordingly, because the absence of a disclosure relating to an intended use or function does not defeat a finding of anticipation, we will

sustain the examiner's rejection of claim 1 as being anticipated by Dietz for essentially the same reasons argued by the examiner. We note that appellants have not presented any substantive arguments directed separately to the patentability of dependent claims 12-15 and 18-20, 22 and 23. Therefore, we will also sustain the examiner's rejection of these claims as being anticipated by Dietz for the same reasons set forth in the rejection.

III. We consider next the examiner's rejection of claims 2, 3 and 26 as being unpatentable over the teachings of Boiarski [answer, pages 7-9]. We note that appellants have not presented any substantive arguments directed separately to the patentability of these dependent claims. See In re Nielson, 816 F.2d at 1572, 2 USPQ2d at 1528. See also 37 C.F.R. § 41.37(c)(1)(vii)(2004). Therefore, we will sustain the examiner's rejection of these claims as being unpatentable over the teachings of Boiarski for the same reasons set forth in the rejection.

IV. We consider next the examiner's rejection of claim 6 as being unpatentable over the teachings of Boiarski in view of Fardad [answer, page 10]. We note that appellants have not presented any substantive arguments directed separately to the patentability of dependent claim 6. Therefore, we

will also sustain the examiner's rejection of claim 6 as being unpatentable over the teachings of Boiarski in view of Fardad for the same reasons set forth in the rejection.

V. Lastly, we consider the examiner's rejection of claims 7-10 as being unpatentable over the teachings of Boiarski in view of Fardad, and further in view of Izumi [answer, pages 10 and 11]. We note that appellants have not presented any substantive arguments directed separately to the patentability of these dependent claims. Therefore, we will also sustain the examiner's rejection of these claims as being unpatentable over the teachings of Boiarski in view of Fardad, and further in view of Izumi, for the same reasons set forth in the rejection.

In summary, we have sustained the examiner's rejections of all claims on appeal. Therefore, the decision of the examiner rejecting claims 1-3, 6-10, 12-15, 18-23, and 26 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)(1)(iv).

AFFIRMED.

Jerry Smith Administrative Patent Judge	)
Joseph F. Ruggiero Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES
Lance Leonard Barry Administrative Patent Judge	)

JS/sjc/kis

GIFFORD, KRASS, GROH,
SPRINKLE & CITOWSKI, P.C.
P. O. BOX 7021
TROY, MI 48007-7021