

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Roche Diabetes Care, Inc.,
Petitioner,

v.

Trividia Health, Inc.,
Patent Owner.

Case IPR2025-00553

**PETITION FOR *INTER PARTES* REVIEW
OF CLAIMS 1-13, 15-16, 18-30, AND 32-37 OF
U.S. PATENT NO. 8,128,981
UNDER 35 U.S.C. §312 AND 37 C.F.R. §42.104**

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Roche Diabetes Care, Inc. (“Petitioner”) respectfully requests *inter partes* review (“IPR”) of claims 1–13, 15–16, 18–30, and 32–37 of U.S. Patent No. 8,128,981 (the “’981 patent”)(EX1001) pursuant to 35 U.S.C. §§311–19 and 37 C.F.R. §42.1 *et seq.*

I. INTRODUCTION

The ’981 patent claims a method of manufacturing a conventional glucose test strip for monitoring diabetes. The technology recited in the claims was old hat to a person of ordinary skill in the art. The allegedly inventive steps amount to simply using two conventional focused laser beams and moving them to scribe electrodes on a conductive strip. But this was both well-known in the field and obvious in the context of the claims, as detailed in the grounds below, which are based on new, noncumulative prior art not cited in prosecution.

II. MANDATORY NOTICES

A. Real Party-in-Interest

The real party-in-interest for this Petition is Roche Diabetes Care, Inc.

B. Related Matters

Patent Owner (“PO”) has asserted the ’981 patent against Petitioner in *Roche Diabetes Care, Inc. v. Trividia Health, Inc.*, Case No. 1:24-cv-00668-GBW (D. Del)(EX1004)(“*DDEL* litigation”).

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III. CERTIFICATION OF GROUNDS FOR STANDING

Petitioner certifies pursuant to Rule 42.104(a) that the '981 patent is available for IPR and Petitioner is not barred or estopped from requesting IPR challenging the claims on the grounds identified in this Petition.

IV. STIPULATION

If the Board institutes IPR, Petitioner stipulates not to pursue, in the above-identified district court proceeding, the same grounds presented here or any grounds that could have reasonably been raised with respect to the claims challenged in this IPR. *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (P.T.A.B. Dec. 1, 2020).

V. OVERVIEW OF THE CHALLENGE AND RELIEF REQUESTED

Petitioner challenges claims 1–13, 15–16, 18–30, and 32–37 of the '981 patent, filed April 10, 2007. EX1001-'981, Cover.

A. Prior Art

The '981 patent, filed April 10, 2007, claims priority to two provisional applications including earliest USAN 60/790,773, filed April 11, 2006.¹ EX1001-'981, Cover. Petitioner relies upon the following prior art:²

1. USPN 2004/0200721 ("Bhullar")(EX1007), published October 14, 2004, is prior art under §102(b).
2. USPN 2009/0159197 ("Edelbrock")(EX1032), claiming benefit of USAN 60/754,141 ("Edelbrock Provisional")(EX1033), filed December 27, 2005. Edelbrock is prior art under §102(e). *See* Section V.A.1.
3. Boogaard, "*Precision laser micromachining*," SPIE Vol. 611 (1986) ("Boogaard")(EX1035), publicly accessible shortly after August 20, 1986, is prior art under §102(b). *See* EX1058-Munford-Decl.

¹ Petitioner reserves the right to challenge PO's priority claim in the *DDEL* litigation.

² Pre-AIA law applies to the '981 patent.

4. Angell et al., “*Processing Parameters for Laser Micromachining*,” SPIE Vol. 2993 (1997) (“Angell”)(EX1034), publicly accessible shortly after April 28, 1997, is prior art under §102(b). See EX1058-Munford-Decl.

EX1002-Decl., ¶¶26–35.

1. Edelbrock is Prior Art

Edelbrock is prior art as of the Edelbrock Provisional filing date of December 27, 2005. *Amgen v. Sanofi*, 872 F.3d 1367, 1380 (Fed. Cir. 2017); *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375 (Fed. Cir. 2015). First, the Edelbrock Provisional discloses relied-upon subject matter in Edelbrock.

Edelbrock (EX1032)	Edelbrock Provisional (EX1033)
[0001]	[0001]
[0008]	[0008]
[0009]	[0009]
[0028]	[0028]
[0029]	[0029]
[0030]	[0030]
[0031]	[0031]
[0032]	[0032]
[0035]	[0035]
[0036]	[0036]

Edelbrock (EX1032)	Edelbrock Provisional (EX1033)
[0037]	[0037]
[0038]	[0038]
[0039]	[0039]
[0040]	[0040]
[0041]	[0041]
[0042]	[0042]
[0043]	[0043]
[0044]	[0044]
[0045]	[0045]
[0046]	[0046]
[0047]	[0047]
[0048]	[0048]
[0049]	[0049]
[0050]	[0050]
[0051]	[0051]
[0052]	[0052]
[0056]	[0056]
[0057]	[0057]
[0075]	[0072]
FIG.2b	FIG.2b
FIG.3	FIG.3
FIG.4a	FIG.4a
FIG.4b	FIG.4b
FIG.4c	FIG.4c

Edelbrock (EX1032)	Edelbrock Provisional (EX1033)
FIG.4d	FIG.4d
FIG.4e	FIG.4e
FIG.6	FIG.6
FIG.8	FIG.8
Claim 1	<i>See Table below</i>
Claim 16	Abstract, [0008]–[0009], [0031], [0038]–[0039], [0041], [0043], [0045], [0057], [0072]

Second, the Edelbrock Provisional supports Edelbrock’s claim 1.

Edelbrock, Claim 1 (EX1032)	Edelbrock Provisional (EX1033)
A method of forming an electrochemical multilayer test sensor, the multilayer test sensor including a base, a second layer and a reactive layer, the reactive area including an enzyme, the test sensor being adapted to be used in a meter and assist in determining the concentration of an analyte, the method comprising the acts of:	Abstract, [0008]–[0009], [0057], [0072]
partially defining a plurality of electrodes and their respective conductive leads on the base;	Abstract, [0008]–[0009], [0045], [0057], [0072]
after partially defining the plurality of electrodes and their respective conductive leads on	Abstract, [0008]–[0009], [0031], [0038]–[0039], [0041], [0043], [0045], [0057], [0072]

Edelbrock, Claim 1 (EX1032)	Edelbrock Provisional (EX1033)
the base, attaching the base to a second layer to define a reaction zone in which the plurality of electrodes are fully defined; and	
after attaching the base to the second layer, fully defining the plurality of conductive leads on the base of the test sensor.	Abstract, [0008]–[0009], [0030]–[0039], [0041], [0057], [0072]

EX1002-Decl., ¶¶32–33.

B. Grounds for Challenge

Petitioner requests cancellation of claims 1–13, 15–16, 18–30, and 32–37 of the '981 patent based on the following grounds:

Ground	References	Basis	Claims
I	Bhullar, Boogaard, Angell	§103	18–30, 32–37
II	Edelbrock, Boogaard, Angell	§103	1–13, 15–16, 18–30, 32–34
III	Edelbrock, Boogaard, Angell, Bhullar	§103	35–37

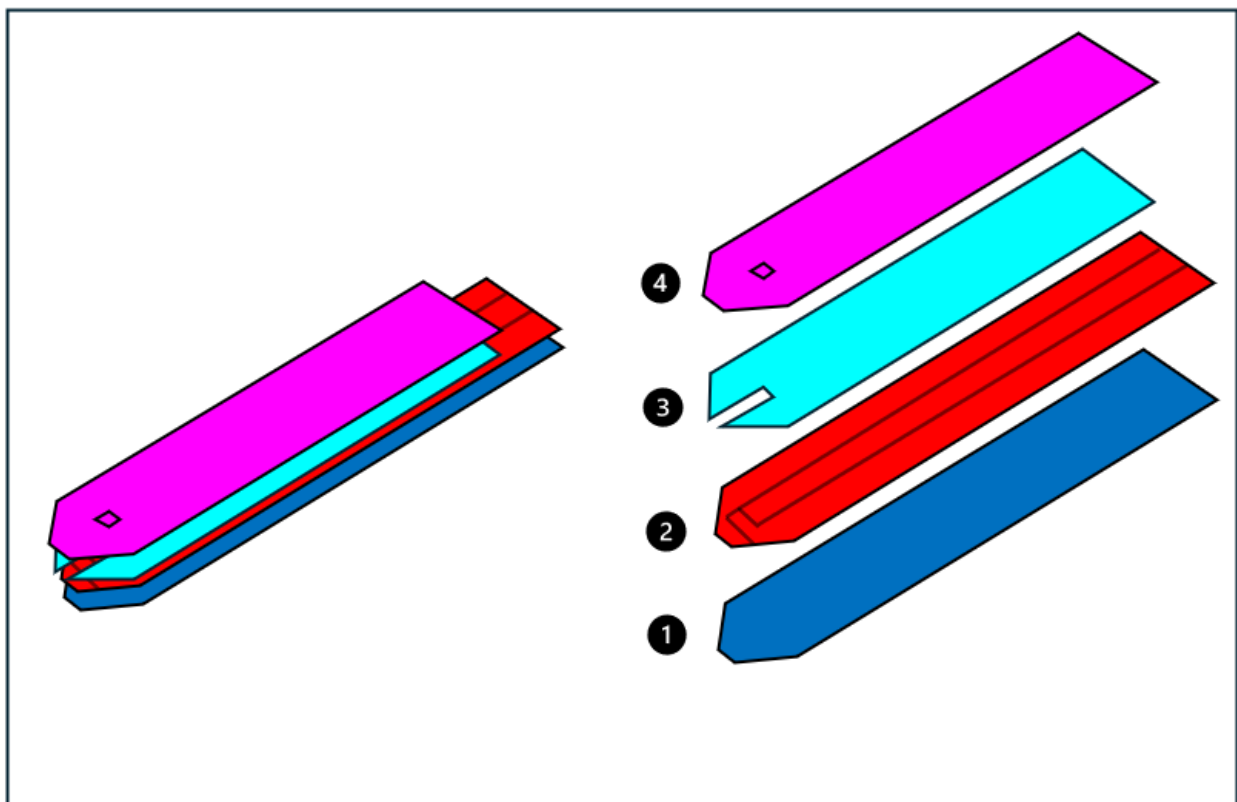
This Petition, supported by the Declaration of Dr. David Cunningham (“Decl.”)(EX1002), demonstrates that each challenged claim is invalid and there is a reasonable likelihood that Petitioner will prevail with respect to at least one claim. *See* 35 U.S.C. §314(a).

VI. TECHNOLOGY BACKGROUND

Since the 1980s, glucose test strips have used the same basic principles: the strip includes chemicals so that, when blood is added, an electrochemical reaction occurs that indicates the level of glucose present in the blood. EX1031-Henning-Cunningham, 20–28; EX1002-Decl. ¶36.

A. Test Strips

A typical test strip is made up of multiple layers, illustrated below:



E.g., EX1011-Winarta, FIG.2; EX1007-Bhullar, FIG.1; EX1032-Edelbrock, FIG.2b. The **base layer (1)** is typically a non-conductive material such as plastic. The **conductive layer (2)** is typically a film of conductive material (e.g., gold) deposited on top of the base layer. Lasers may be used to etch/scribe patterns into the conductive layer to form electrodes. The **spacer layer (3)** is a non-conductive material that typically includes a cut-out channel where the electrodes reside. A chemical reagent is typically deposited into the channel, covering the electrodes. Finally, a **cover layer (4)** forms the top of the channel. When blood enters the channel, glucose reacts with the reagent, producing electrons that are detected with the electrodes to determine blood glucose level. EX1007-Bhullar, [0024]; EX1032-Edelbrock, [0041]; EX1011-Winarta, 1:48–7:56. EX1002-Decl. ¶¶37–41.

B. Manufacturing Processes

In a **reel-to-reel** process—known years before the '981 patent—a reel (or roll) of base material is fed through multiple stations to assemble the layers and components and, eventually, the sheet of multiple test strips is cut into individual test strips. EX1007-Bhullar, [0043]–[0047]; EX1060-Atkin, 138; EX1064-Harvey, 2. EX1002-Decl. ¶¶42–46.

By the 1990s, various methods of laser ablation—using a laser to remove conductive material—had been used to form electrodes on test strips. EX1011-

Winarta, 4:30–39; 6:58–65; EX1007-Bhullar, [0019]; EX1009-Miyazaki, 6:51–54, 14:28–36, FIG.1(b). “**Scribing**” (EX1011-Winarta, 4:30-30) or “**direct writing**” (EX1032-Edelbrock, [0041]) refers to moving/traversing a laser beam along the conductive layer in a specified pattern, forming the electrodes. *See* EX1074-Koo, 2:20–3:17, FIGS.1–2. Gaps formed by laser ablation are sometimes called “**kerfs**.” *E.g.*, EX1035-Boogaard, 50. A variety of lasers were known to be suitable for laser ablation in test strips, including carbon dioxide (CO₂), Neodymium:Yttrium Aluminum Garnet (Nd:YAG), and excimer lasers. EX1011-Winarta, 6:65–57; EX1034-Angell, 65; EX1038-Chryssolouris, 17; EX1066-Fisher, 7–9; EX1052-Sercel, 76. This included using two lasers for laser ablation with different properties, as laser properties are considered by those of skill when choosing a suitable laser. EX1073-Allan, 43; EX1060-Atkin, 139. Such properties included wavelength, power output, and laser beam spot size. *E.g.*, EX1035-Boogaard, 50. EX1002-Decl. ¶¶47–56.

VII. THE '981 PATENT

A. Overview

The '981 patent discloses a conventional glucose test strip. EX1001-'981, 1:12–2:4, FIG.1A, 4:14–51, 3:37–39, 3:63–5:11, 6:14–8:36. The specification describes prior art methods to make electrodes on a test strip, including reel-to-reel

processing using a laser. EX1001-'981, 1:53–62 (citing Miyazaki's (EX1009) use of a laser to form slits), 8:48–9:3, 10:8–20. According to the '981 patent, however, the prior art (*e.g.*, Miyazaki) used only one laser, which was “inefficient, time consuming, or unsuitable....” EX1001-'981, 1:58–67. The '981 patent's alleged improvement was to use multiple lasers. *E.g.*, EX1001-'981, 9:16–10:33, Claim 18. But, as described below, using two lasers—and all other aspects of the challenged claims—were well-known. EX1002-Decl. ¶¶57–65.

B. Prosecution History

The Examiner rejected Applicant's original claimed methods reciting multiple lasers as obvious in view of USPN 2005/0019953 (“Groll”)(EX1055). EX1003-'981FH, 260–68. In response, Applicant argued Groll taught a particular type of laser (a “broad field laser that passes through a mask” that “does not move relative to the electrical component being formed”) and amended then-pending claims to require “movement” of the lasers (in issued claims 1 and 18) and a “focused laser beam” (in issued claim 18), to allegedly distinguish them from Groll. *Id.*, 283, 288–89. The Examiner allowed the amended claims. *Id.*, 302. As explained below, these added features were disclosed in prior art publications that were not before the Examiner. EX1002-Decl. ¶¶66–69.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) as of the claimed priority date in the field of the ’981 patent would have had a bachelor’s degree or equivalent in mechanical engineering, chemistry, physics, materials science and/or engineering, electrical engineering, chemical engineering, polymer science, or a related field, and at least three years of experience relating to biosensor research and development. Less work experience may be compensated by a higher level of education, such as a Master’s degree. EX1002-Decl. ¶¶70–75.

IX. CLAIM CONSTRUCTION

In the *DDEL* litigation, Petitioner and PO disagree on the construction of certain terms. *See* EX1051, 10–13 (Exhibit B). Here, Petitioner submits that the Board need not construe any terms because the prior art renders obvious the challenged claims under either construction.³ *Nidec Motor Corp. v. Zhongshan*

³ In the *DDEL* litigation, Petitioner contends the ’981 patent fails to inform a POSITA, with reasonable certainty, about the scope of the term “focused laser beam.” Regardless, the prior art used herein plainly discloses a “focused laser beam.”

Broad Ocean Motor Co., 868 F.3d 1013, 1017 (Fed. Cir. 2017). The Board should interpret the claims according to their plain and customary meaning as understood by a POSITA, in accordance with *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). If PO, seeking to avoid the prior art, offers a specific construction or interpretation, Petitioner reserves the right to respond. EX1002-Decl. ¶¶76–80.

X. SPECIFIC GROUNDS FOR PETITION

A. Ground I: Claims 18–30 and 32–37 Are Obvious Over Bhullar, Boogaard, and Angell

1. Bhullar

Bhullar (2004) taught a method to manufacture blood glucose “biosensor strips” using laser ablation. EX1007-Bhullar, [0032]–[0033], [0043]–[0047]. Bhullar’s strips are “produced from rolls of material” including a base layer and conductive layer. *E.g.*, EX1007-Bhullar, Abstract, [0003]–[0006], [0015]–[0017], [0019]–[0025], [0028]–[0031], [0043]–[0047], [0057], [0060], Claim 1, Claim 13, Claim 30, FIGS.1, 4; EX1001-’981, 6:18–21. Bhullar uses lasers to ablate parts of the conductive layer to form gaps that define electrically-isolated conductive components, including electrodes. EX1007-Bhullar, [0019]. Bhullar further discloses cutting the processed roll “to form individual biosensors, which are sorted

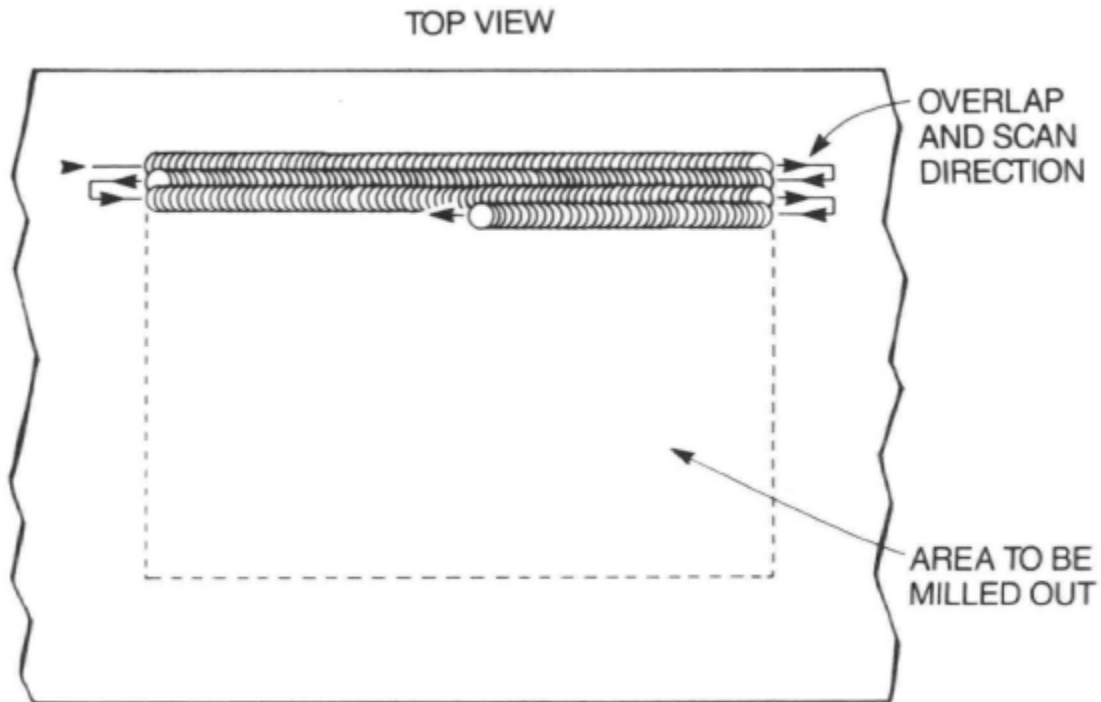
and packed into vials, each closed with a stopper, to give packaged biosensor strips.”

Id., [0047] (element numbers omitted). EX1002-Decl. ¶¶81–88.

Bhullar described suitable laser ablation systems for test strips. EX1007-Bhullar, [0043]–[0044]. For example, Bhullar incorporates USAN 09/411,940 (Bhullar’940)(EX1063) (EX1062-BhullarFH, 6), which explains that laser ablation systems for metals were “known” and specifically incorporates by reference USP 5,593,739 (“Kickelhain”)(EX1056)—which uses a focused laser beam to scribe kerfs in a multilayer material—as providing relevant teachings (EX1063-Bhullar’940, 4). *See* EX1056-Kickelhain, 2:51-55 (“[P]atterned scanning by a focused laser beam.”), 4:51-53, Claim 1, Claim 11. Such use of a focused laser was long known. *See* EX1074-Koo, 2:20–3:17, FIGS.1, 2. EX1002-Decl. ¶¶89–93.

2. Boogaard

Boogaard (1986) taught a focused Nd:YAG laser beam with a positioning system to create kerfs in metals. EX1035-Boogaard, 48–50, FIGS.2a–2b, 4, 7. Figure 4 depicts laser milling, which “is one of the most common laser machining techniques.” *Id.*, 49. The technique “remov[es] deposited metals, such as copper and gold....” at the micrometer scale. *Id.*, 57.



EX1035-Boogaard, FIG.4. EX1002-Decl., ¶¶94–98.

3. Angell

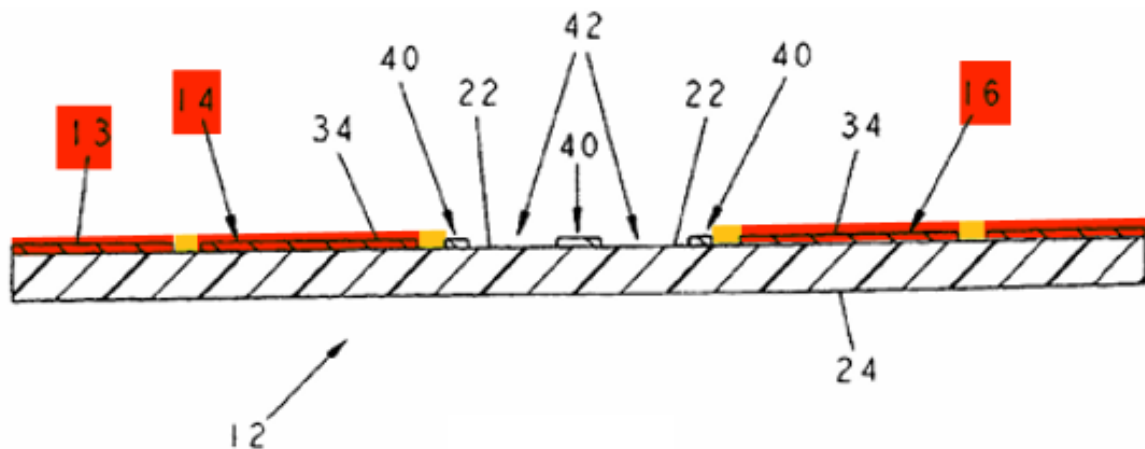
Angell (1997) described using a focused carbon dioxide (CO₂) laser—“[t]he most common industrial laser”—to mill both metals and plastics. EX1034-Angell, 66 (“The most common industrial laser is the CO₂ laser” which “is capable of machining many different types of materials including *metal*, *plastic*, wood, and glass.”), 66 (“[P]rocessing parameters...*focused spot size*,....”). EX1002-Decl., ¶¶99–102.

4. Combination of Bhullar, Boogaard, and Angell (“Bhullar-Boogaard-Angell”)

A POSITA would have been motivated to combine, with a reasonable expectation of success, Bhullar’s manufacturing method with (1) Boogaard’s teachings of a focused Nd:YAG laser beam and positioning system, and (2) Angell’s teaching of a CO₂ laser for ablating both metals and plastics. EX1002-Decl., ¶¶103–106.

(a) Bhullar Combined With Boogaard’s Focused Nd:YAG Laser and Positioning System (“Bhullar-Boogaard”)

Bhullar’s biosensor strip includes laser ablated **gaps** that separate **electrodes**:



EX1007-Bhullar, FIG.4.⁴ To create these gaps, Bhullar teaches that “[t]echniques for forming electrodes on a surface using laser ablation are known,” directing a POSITA to examples described in USAN 09/411,940, incorporated by reference. EX1007-Bhullar, [0019]. USAN 09/411,940, in turn, incorporated by reference the techniques of Kickelhain (EX1063-Bhullar’940, 4), which taught ablation by “patterned scanning by a ***focused laser beam.***” EX1056-Kickelhain, 4:51–53, 2:51–55, Claim 1, Claim 11; *see* Section X.A.1 (Bhullar). Accordingly, a POSITA would have consulted the prior art for suitable laser ablation techniques, including use of a focused laser beam, and readily recognized that Boogaard provides such techniques. EX1002-Decl., ¶¶107–109.

Boogaard, like Bhullar, is directed to applications of micromachining including “removal of thin films from various substrates” “in the microelectronics area...to produce a desired electrical characteristic or geometric shape....” EX1035-Boogaard, 48. Boogaard discloses a focused Nd:YAG laser with a positioning system for etching/milling micron-scale features on a substrate by scanning techniques. *Id.*, 50 (“***[S]canning the focused laser beam over the desired area....***”),

⁴ All color annotations/emphasis added.

FIG.4 (serpentine scan), 51, FIG.7 (double scan), 54, 57 (removing thin metal films).
EX1002-Decl., ¶¶110–111.

Boogaard teaches “the ability to cut out very small...patterns with extremely small kerf widths” suitable to create the ablation gaps in Bhullar. *Id.*, 58. For example, Boogaard’s beam widths are suitable to form the gap widths in Bhullar of “about 25 μm ⁵ to about 500 μm ” and “preferably...about 100 μm to about 200 μm .” EX1007-Bhullar, [0019]. Boogaard’s Nd:YAG laser can produce features in this range using beam diameters of 5–38.1 microns. EX1035-Boogaard, 51 (groove formed by a Nd:YAG laser “can be kept to less than 5 μm in width”), *id.*, 54 (“hole size is...determined by the beam diameter” and “hole sizes can vary from 0.0005 inch [(12.7 micron)] to as large as 0.0015 inch [38.1 micron]”). EX1002-Decl., ¶¶112–114.

Further, a POSITA would have recognized that Boogaard’s positioning system, wherein the laser is moved relative to the substrate, was suited for implementation in Bhullar. Bhullar’s metallized film is processed as a reel through multiple processing stations, one of which is a laser ablation station to create the

⁵ In this Petition, “ μm ”, “microns”, and “micro-meters” are used interchangeably.

electrodes. See EX1007-Bhullar, [0043], [0044] (“In the laser ablation station, the metallic layer of the metallized film is ablated in a pre-determined pattern, to form a ribbon of isolated electrode sets.”), [0045] (“Upon leaving the laser ablation station, the metallized film is fed into a reagent dispensing station”), [0046], Claims 1-30. Notably, Bhullar’s roll is not cut into individual sensors until the end of the process, when “cover material/spacer substrate subassembly is fed into a sensor lamination & cut/pack station.” *Id.*, [0047]. Thus, it would not have been feasible to hold the laser in place and move the metallized film relative to the laser. Boogaard provided a solution by moving the laser relative to the substrate via a positioning system with the required accuracy. EX1035-Boogaard, 48-49, FIGs.2a–2b. EX1002-Decl., ¶¶115–117.

A POSITA would have been further motivated to combine the teachings of Boogaard with Bhullar because Nd:YAG laser scribing was a known technique for making electrodes. EX1011-Winarta, 6:65–67 (“preferred scribing or scoring method” includes “YAG laser”); Claim 1, Claim 36, 4:32–36. Like Boogaard, Winarta’s method teaches movement of the laser relative to a “a base strip of an insulating material having a layer of conductive material” and “scribing in said conductive material a plurality of lines in a repetitive pattern...forming...conductive paths....” *Id.*, Claim 36, Claim 1, 4:32–36. Thus, a POSITA would have considered

the teachings of Boogaard to be directly applicable to the construction of biosensors by laser ablation. EX1002-Decl., ¶118.

Furthermore, implementing Boogaard’s teachings in Bhullar’s laser ablation station would have amounted to “[a]pplying a known technique to a known device ready for improvement to yield predictable results.” M.P.E.P. §2141. A POSITA would have known to apply Boogaard’s Nd:YAG laser on a positioning system to Bhullar’s laser ablation station to form the gaps shown in Bhullar Figure 4. EX1007-Bhullar, [0043]–[0044]. EX1002-Decl., ¶119.

Implementing Boogaard’s teachings in Bhullar’s laser ablation station would also have been obvious to try. Bhullar/Kickelhain identifies only two laser ablation techniques—use of a moving focused laser or use of a laser with a mask. EX1007-Bhullar, [0043]; EX1056-Kickelhain, 2:47–56, 4:49–5:5, 5:49–55. Given the small number of solutions for laser ablation with a predictable expectation of success (see below), it would have been obvious to try a moving focused laser—like that described in Boogaard—to perform laser ablation to form the gaps shown in Bhullar Figure 4. M.P.E.P. §2141. EX1002-Decl., ¶120.

A POSITA would have had a reasonable expectation of success using Boogaard’s laser milling techniques in Bhullar’s laser ablation station. Boogaard’s embodiments closely match Bhullar’s use of laser ablation on a micron scale and to

ablate gold. EX1035-Boogaard, 57. Moreover, both Bhullar/Kickelhain and Winarta teach scanning with a focused laser beam, and Winarta demonstrated successful construction and testing of functional sensors for blood glucose detection using laser scribing consistent with the methods taught in Boogaard. *See* EX1011-Winarta, 8:42–9:3 (laser scribing), FIG.2, 10:1–67, FIGs.5–6. EX1002-Decl., ¶121.

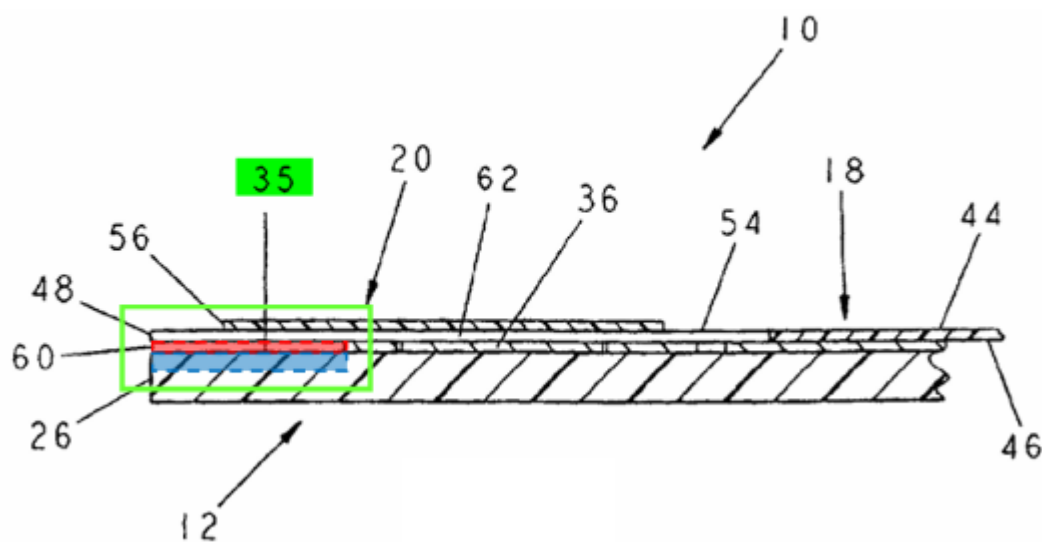
Finally, Boogaard and Bhullar are in the same field of endeavor that includes the manufacture of microelectronic components comprising a base (non-conductive layer) and laser-defined electrodes. EX1007-Bhullar, [0018]–[0020], FIG.2; EX1035-Boogaard, 48, 57–58. EX1002-Decl., ¶122.

Accordingly, a POSITA would have been motivated to combine the teachings of Boogaard and Bhullar incorporating Boogaard’s Nd:YAG laser and positioning system into Bhullar’s laser ablation station, with a reasonable expectation of success. EX1002-Decl., ¶123.

(b) Bhullar-Boogaard Combined With Angell’s Focused CO₂ Laser

A POSITA would have been motivated to combine Bhullar-Boogaard with Angell’s teaching of a CO₂ laser, with a reasonable expectation of success. EX1002-Decl., ¶¶124–136.

Bhullar's test strip includes **recess 35** formed by ablating *both* the *conductive layer* and *a portion of the underlying polymer support substrate* that is wider and deeper than the kerf formed by the first laser. EX1007-Bhullar, [0021] (in addition to "removing the electrical conductor 13 to expose the first surface 22...a portion of the first surface 22 may also be removed to form the recess....").



EX1007-Bhullar, FIG.3; EX1007-Bhullar, [0017] (“Substrate 12...a flexible polymer”). EX1002-Decl., ¶¶124–125.

The need to ablate a wider area than the first kerf including *both* metal and polymer would have led a POSITA to consult prior art for suitable laser ablation techniques, including use of a focused laser beam, and a POSITA would have readily recognized that Angell provides such techniques. Angell discloses wider beam

widths (compared to Nd:YAG laser) suitable for Bhullar's recess. In Figure 2, recess 35 requires a larger ablation area than the ablation lines that isolate the electrodes. EX1007-Bhullar, FIG.2. And Angell's CO₂ laser has wider beam widths suitable for more efficiently ablating a larger area. EX1034-Angell, 69 (CO₂ laser beam widths of 2 mil (50.8 microns) to 10 mil (254 microns)). EX1002-Decl., ¶130.

Angell's focused CO₂ laser can be used to ablate a metal layer. *Id.*, 66; *see* EX1079-Cai, 14:60–15:9 (CO₂ lasers known for cutting gold layer to form electrodes on test strip). Furthermore, Angell recommends using a focused CO₂ laser instead of an Nd:YAG laser to ablate plastics such as the Bhullar's electrode support substrate. EX1034-Angell, 66, 69. A POSITA understood that a CO₂ laser was better suited than an Nd:YAG laser to ablate plastic because the CO₂ laser operates at a longer wavelength that is better absorbed by a plastic compared to an Nd:YAG laser, allowing for faster energy deposition and lower dwell time. EX1073-Allan, 45. Thus, a POSITA would have been motivated to select a second laser (CO₂ laser) to form recess 35 because it would be better than an Nd:YAG laser both in providing a wider beam width and in more efficiently ablating both metal and polymer. Use of multiple laser-types in a medical device manufacturing plant was known. EX1073-Allan, 43; EX1060-Atkin, 139. EX1002-Decl., ¶¶126–129.

A POSITA would have also been motivated by Boogaard's teaching of a positioning system to implement Angell's CO₂ laser in the Bhullar-Boogaard method using a positioning system, with a reasonable expectation of success. It was well-known that Angell's CO₂ laser could be moved with a positioning system and used with scanning techniques to form the larger recess. *E.g.*, EX1072-Martyr, 347–48. EX1002-Decl., ¶131.

Furthermore, implementing Angell's laser ablation teachings in the Bhullar-Boogaard laser ablation station would have amounted to “[a]pplying a known technique to a known device ready for improvement to yield predictable results.” M.P.E.P. §2141. In the resulting Bhullar-Boogaard-Angell combination, Angell's CO₂ laser with a positioning system would be employed in Bhullar's laser ablation station to form the recess. EX1007-Bhullar, [0043]–[0044]. EX1002-Decl., ¶132.

Implementing Angell's CO₂ laser in the Bhullar-Boogaard laser ablation station would also have been obvious to try. Bhullar removes both the conductive layer and the polymer (e.g., plastic) base layer to form a recess. EX1007-Bhullar, Angell discloses four specific lasers—CO₂, Nd:YAG, Nd:YLF, and excimer lasers. EX1034-Angell, 57–66. Accordingly, a POSITA was provided with a small number of solutions for laser ablation with a predictable expectation of success (see below). M.P.E.P. §2141. EX1002-Decl., ¶133.

A POSITA would have had a reasonable expectation of success adding Angell's focused CO₂ laser to Bhullar-Boogaard's laser ablation station. Angell's embodiments closely match Bhullar's use case, including using laser ablation on a micron scale to ablate metal and a polymer. EX1034-Angell, 66. Such success is demonstrated in Winarta, which teaches using a CO₂ laser to both scribe a conductive "gold" layer to form electrodes (EX1011-Winarta, 8:43–55) and to cut a "vent hole" in a plastic layer (*Id.*, 9:15–18; 6:48–51). EX1002-Decl., ¶134.

Finally, as noted above, Angell, Boogaard, and Bhullar are in the same field of endeavor that includes the manufacture of microelectronic components comprising a base (non-conductive layer) and laser-defined electrical components. EX1007-Bhullar, [0018]–[0020], FIG.2; EX1035-Boogaard, 48-50, FIGS.2a–2b, 4; EX1034-Angell, 57–58 (removal of thin metallic films on insulator), FIGS.22–23. EX1002-Decl., ¶¶135–136.

(c) Resulting Bhullar-Boogaard-Angell Combination

The Bhullar-Boogaard-Angell combination would have implemented Bhullar's manufacturing method with (1) Boogaard's teaching to use an Nd:YAG laser to form kerfs requiring ablation of just the conductive layer of Bhullar's metallized substrate, (2) Boogaard's teaching to use a positioning system to implement movement relative to the test sensor, and (3) Angell's teaching to use a

CO₂ laser to form kerfs requiring ablation of both the conductive layer and a portion of the insulating base layer of Bhullar’s metallized substrate. EX1002-Decl., ¶137.

5. Claim 18

(a) [18.pre]: “A method of manufacturing test strips, comprising:”

If the preamble is limiting, Bhullar discloses a method of manufacturing test strips (biosensor strips). EX1007-Bhullar, [0043]–[0047] (“To manufacture biosensor 10...to give packaged *biosensor strips*.”), [0015], [0005], [0019], [0025]; Section X.A.1 (Bhullar), Section X.A.5.(a)-(e) ([18.a]–[18.d]). EX1002-Decl., ¶¶138–141.

(b) [18.a]: “forming a reel containing a conductive layer and a base layer;”

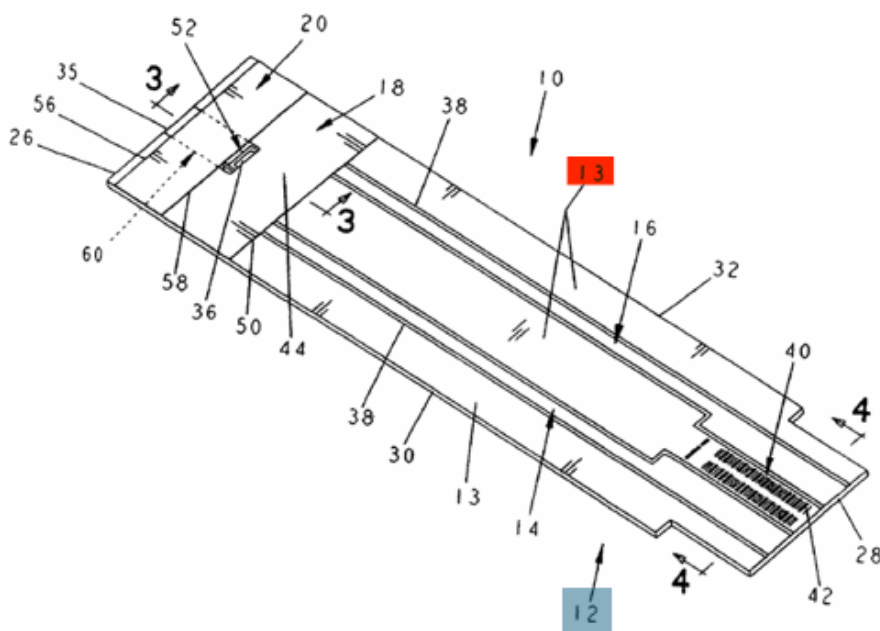
Bhullar renders this limitation obvious. First, Bhullar renders obvious forming a reel (roll). Bhullar teaches that “a roll of metallized electrode support material” is “fed through guide rolls....” EX1007-Bhullar, [0043], [0044], [0046], [0016]. A POSITA would have readily inferred the need to form a reel (roll) for this purpose, providing a motivation to do so. *See In re Preda*, 401 F.2d 825, 826 (CCPA 1968). Furthermore, a POSITA would have had a reasonable expectation of success. For example, Bhullar instructed the POSITA to select “materials that are sufficiently flexible for roll processing....” EX1007-Bhullar, [0016]; *see* EX1064-Harvey, 2

(routine in the art to form roll from sheet of metallized electrode support material).

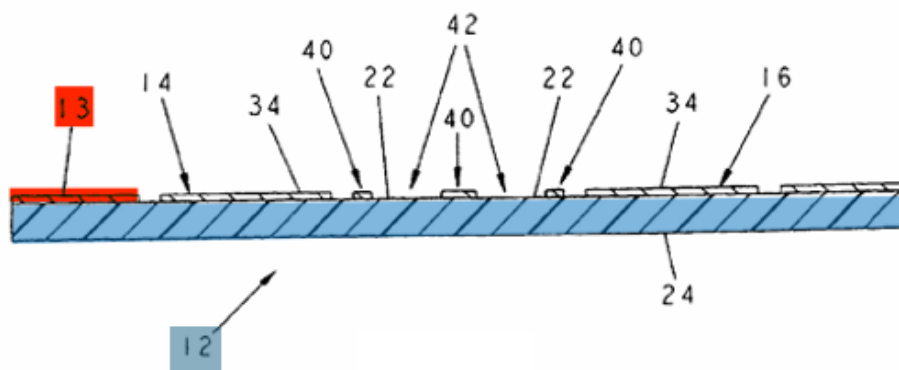
EX1002-Decl., ¶¶142–146.

Second, Bhullar discloses that the reel (roll) of metallized electrode support material “contain[s] a conductive layer and a base layer.” For example, “the biosensor includes a support substrate [base layer]” and “an electrically conductive coating [conductive layer] positioned on the support substrate.” EX1007-Bhullar, Abstract, [0003]–[0006], [0015]–[0017], [0019], [0020]–[0025], [0028]–[0029], [0031], [0043]–[0044], [0047], [0057], [0060], Claim 1, Claim 13, Claim 30. Figures 1 and 4 of Bhullar depict “a biosensor 10 having an electrode-support substrate 12 [base layer], an electrical conductor 13 [conductive layer] positioned on the substrate 12....” EX1007-Bhullar, [0016]. In a preferred embodiment, the electrode-support substrate 12 (base layer) is “a polymer [base layer]...coated with gold [electrical conductor].” *Id.* [0014], [0017], [0018], [0044], Claims 1, 3, 13, 21.

Bhullar, FIG.1



Bhullar, FIG.4



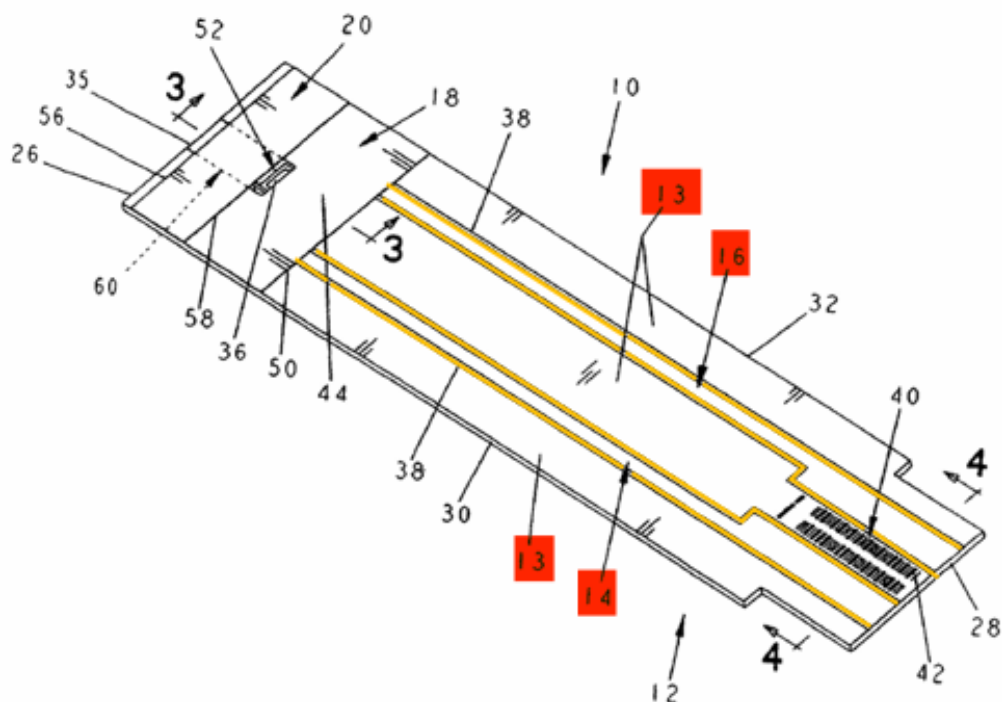
EX1007-Bhullar, FIGS.1, 4; *see* [0014], [0017]–[0018], [0044], Claims 1, 3, 13, 21.

EX1002-Decl., ¶¶147–149.

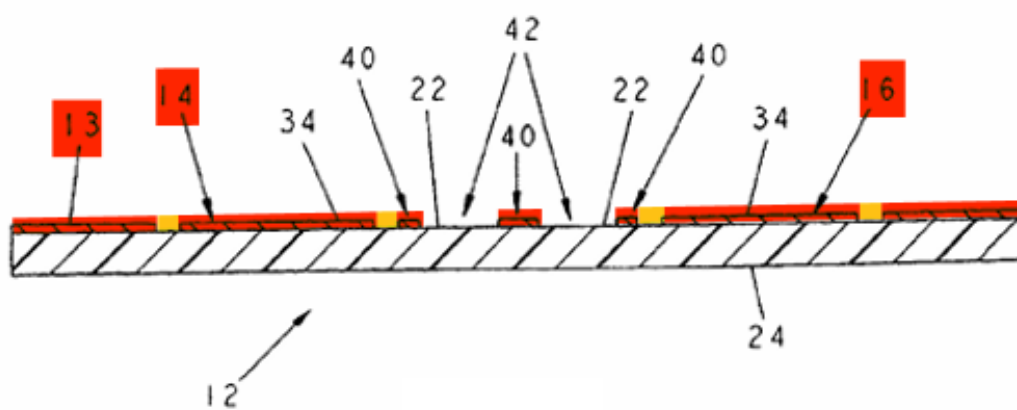
- (c) [18.b]: “forming a first kerf in the conductive layer, wherein the first kerf is formed using a first focused laser beam moved relative to the conductive layer along the first kerf;”

Bhullar-Boogaard-Angell renders this limitation obvious. First, Bhullar discloses “forming a first kerf in the conductive layer.” Bhullar discloses removing a width of conductive layer (“**electrical conductor 13**”) to form a kerf (“**gap**”) of “exposed support substrate” shown below:

Bhullar, FIG.1

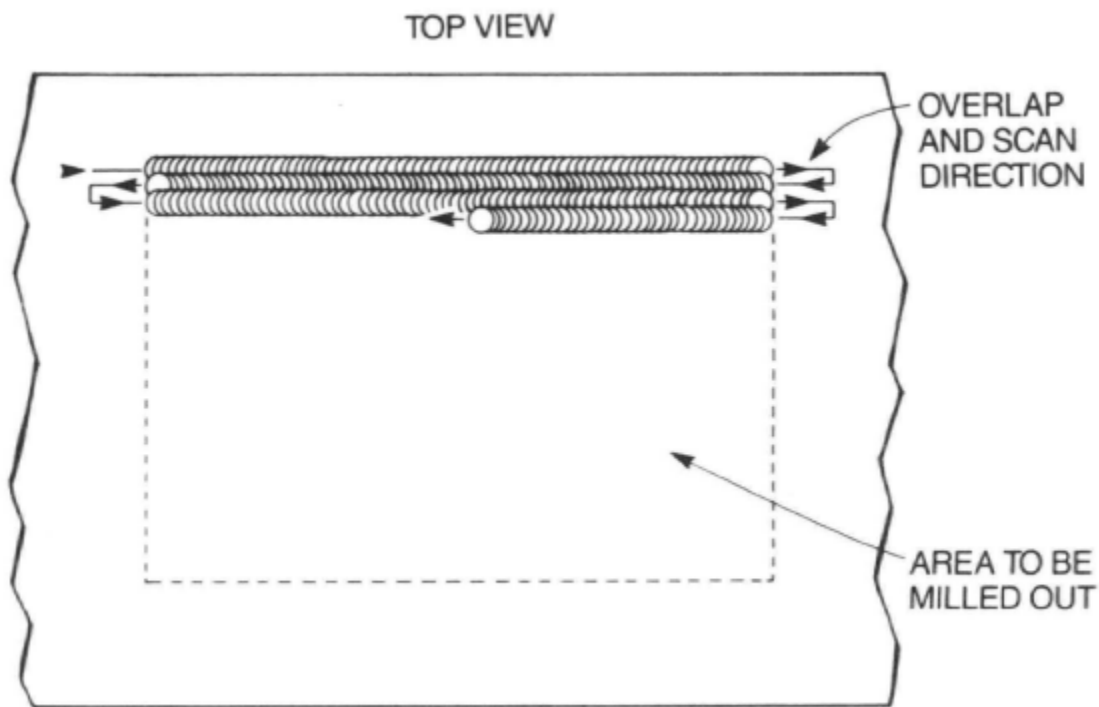


Bhullar, FIG.4



EX1007-Bhullar, FIGS.1, 4, [0019]. EX1002-Decl., ¶¶150–154.

Second, Boogaard teaches that the first kerf is formed using a first focused Nd:YAG laser by “scanning the *focused laser beam* over the desired area back and forth making parallel cuts to form the size and shape desired....[I]ncremental movement[] determines the *kerf* overlap.” EX1035-Boogaard, 50, FIG.4, 49 (focused laser diameters), FIGs.2a-2b.



EX1035-Boogaard, FIG.4 (serpentine scan method), FIG.7 (double scan method).
EX1002-Decl., ¶155.

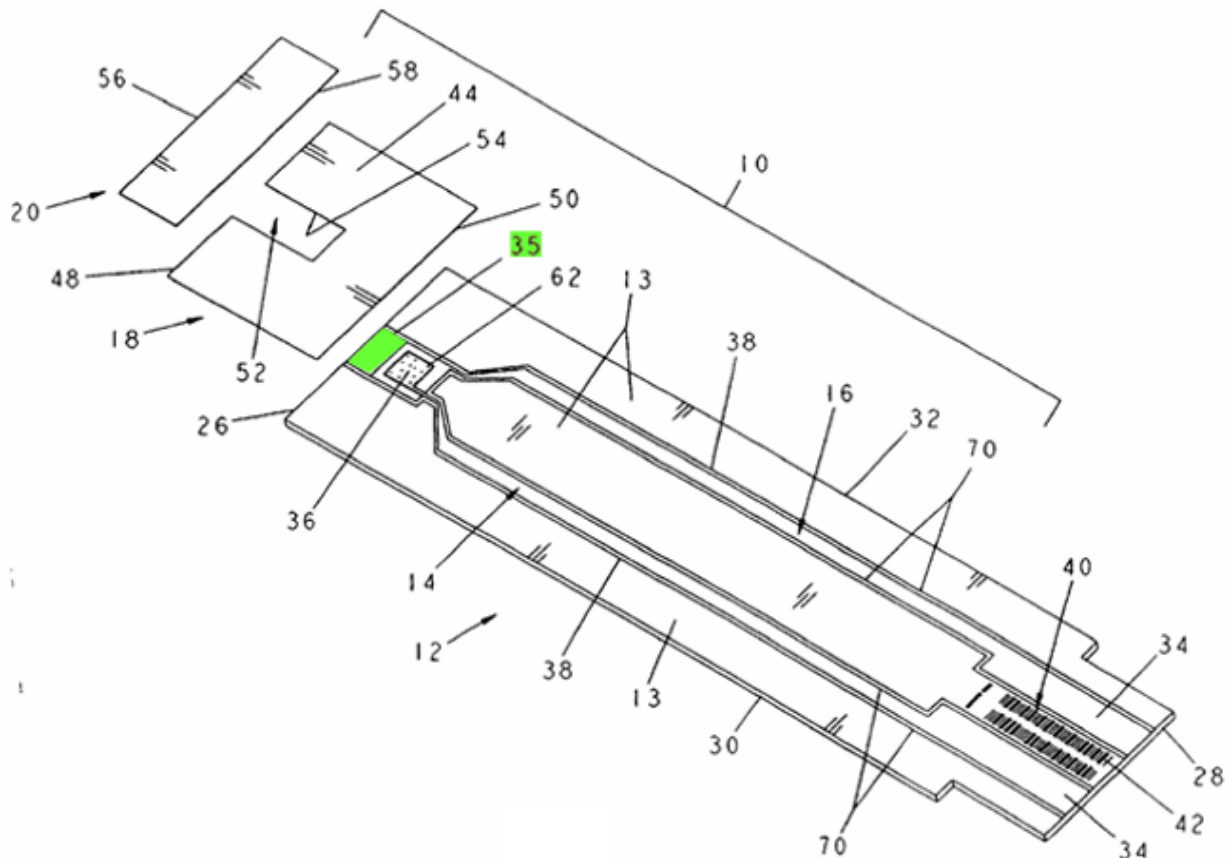
Third, Boogaard’s focused laser is “moved relative to the conductive layer along the first kerf.” For example, “*the beam has been moved around or positioned* with either a rectilinear positioning system (Figure 22 [sp. 22 should be 2a]), driven

by stepper or linear motors, or a galvanometer positioning mechanism (Figure 26 [sp. 26 should be 2b])).” EX1035-Boogaard, 48, FIGs.2a–2b, 50, 51 (“[T]he speed the laser is *moving*....”), 51 (“[B]egin the milling operation in the center of the area and *move toward the outer wall*....”), 52. EX1002-Decl., ¶¶156–157.

For the reasons given in Section X.A.4 (Bhullar-Boogaard-Angell), it would have been obvious to incorporate Boogaard’s Nd:YAG focused laser on a positioning system in Bhullar’s manufacturing method. EX1002-Decl., ¶158.

- (d) [18.c]: “forming a second kerf in the conductive layer, wherein the second kerf is formed using a second focused laser beam moved relative to the conductive layer along the second kerf, the first laser beam being different to the second laser beam;”

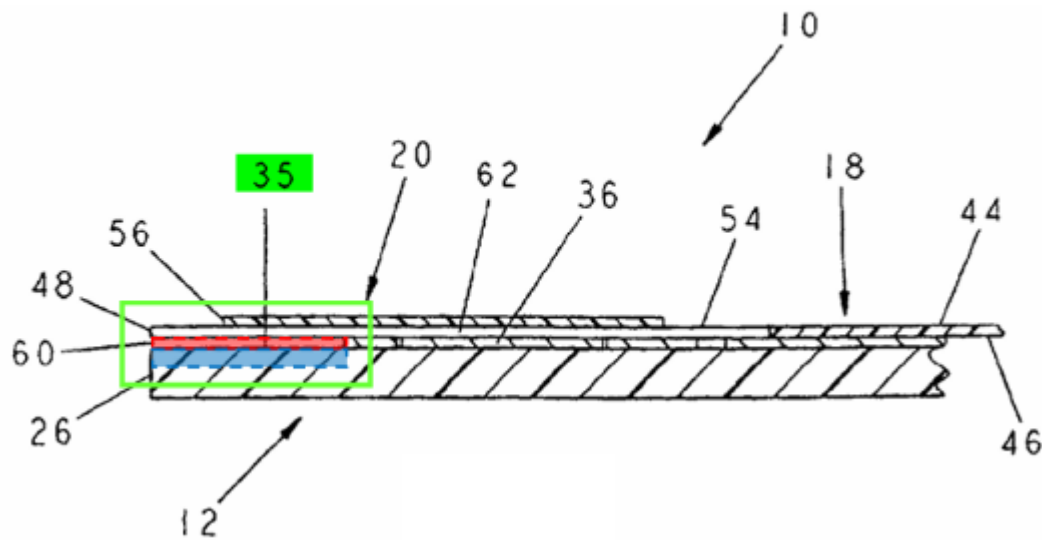
Bhullar-Boogaard-Angell renders this limitation obvious. First, Bhullar discloses forming a second kerf (recess) in the conductive layer “by laser ablation” to “remov[e] the electrical conductor 13 to expose the first surface 22 of the support substrate 12 adjacent to the first end 26.” EX1007-Bhullar, [0021], [0044]. The resulting kerf (**recess 35**) is where “a user of biosensor 10 places a finger having a blood collection incision....” *Id.*, [0049].



Id., FIG.2. EX1002-Decl., ¶¶159–161.

Second, Bhullar-Boogaard-Angell discloses “wherein the second kerf is formed using a second focused laser beam moved relative to the conductive layer along the second kerf.” Bhullar-Boogaard-Angell integrates Boogaard’s teaching that a kerf is formed using a focused laser with a positioning system to move the laser relative to the conducting layer. *See* Section X.A.4 (Bhullar-Boogaard-Angell). And Bhullar states that the same laser ablation techniques are applicable to the second kerf (recess). EX1007-Bhullar, [0021], [0019]. EX1002-Decl., ¶162.

Third, Bhullar-Boogaard-Angell discloses “the first laser beam being different to the second laser beam.” Unlike the first focused laser beam, which ablates only the conductive layer (“electrical conductor 13”), Bhullar teaches that the second laser beam may also ablate a portion of the underlying support substrate 22 to form a second kerf (“recess”) that is deeper than the first kerf. EX1007-Bhullar, [0021]. In Bhullar Figure 3, the second kerf (**recess 35**) is formed from the removal of *electrical conductor* 13 and *removed support substrate* 12:



EX1007-Bhullar, FIG.3. The removed support substrate is made of a polymer, such as plastic. EX1007-Bhullar, [0017]. EX1002-Dec1., ¶¶163–164.

Angell discloses that a CO₂ laser should be selected to ablate a plastic like the support substrate instead of an Nd:YAG laser. EX1034-Angell, 66 (“The most

common industrial laser is the CO₂ laser” which “is capable of machining many different types of materials including *metal, plastic*, wood, and glass.”); 68; *see* Section X.A.4.b (Bhullar-Boogaard Combined with Angell’s Focused CO₂ Laser). Thus, in the Bhullar-Boogaard-Angell combination, the CO₂ laser beam (second laser beam) is different from the Nd:YAG laser beam (first laser beam). EX1002-Decl., ¶¶165–168.

For the reasons given in Section X.A.4 (Bhullar-Boogaard-Angell), it would have been obvious to incorporate Angell’s teaching to use a focused CO₂ laser beam with Boogaard’s teaching of a positioning system in Bhullar’s manufacturing method. EX1002-Decl., ¶169.

(e) [18.d]: “separating one or more test strips from the reel using a singulation process.”

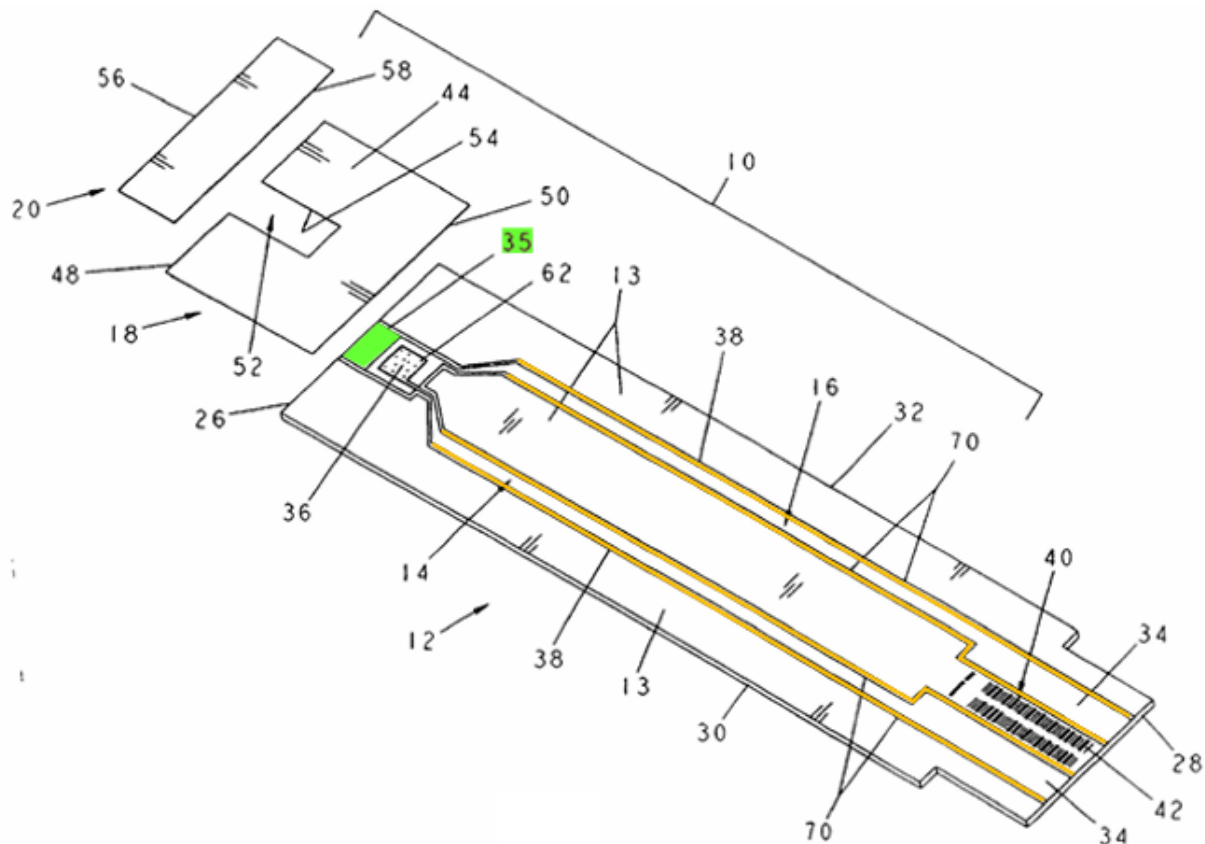
Bhullar discloses this limitation. For example, Bhullar’s method to “manufacture biosensor 10” from a “roll of metallized electrode support material” (EX1007-Bhullar, [0043]) comprises separating (cutting) “the resulting assembled material...*to form individual [single] biosensors 10 [test strips]*” (*Id.*, [0047]). Bhullar’s cutting is “a singulation process” because the ’981 patent discloses that “the singulation process could include...cutting....” EX1001-’981, 12:59-67, claim 18, claim 19. EX1002-Decl., ¶¶170–171.

6. Claim 19

Bhullar discloses the singulation process of cutting, as claimed. EX1007-Bhullar, [0046]–[0047] (“[A]ssembled material is *cut* to form individual biosensors....”); *see* Section X.A.5.e ([18.d]). EX1002-Decl., ¶¶172–173.

7. Claim 20

Bhullar-Boogaard-Angell renders obvious Claim 20. Bhullar's second kerf (*recess 35*) is wider than the **first kerf** formed by the first laser beam.



EX1007-Bhullar, FIG.2. EX1002-Decl. ¶¶174–175.

Accordingly, a POSITA would have been motivated to select a wider beam for the CO₂ laser to make the second kerf, for the reasons given above in Section X.A.4 (Bhullar-Boogaard-Angell). Given the first kerf preferably has a width of 100–200 microns, the recess 35 would have been much wider than 200 microns. EX1007-Bhullar, [0019]; *see id.*, FIG.2 (recess 35 shown as wider cut-out area than gap between conducting elements 13, 14, and 16). This consideration would have motivated the POSITA to select a beam width for the CO₂ laser greater than 200 microns while constraining an Nd:YAG laser to have a beam width of 200 microns or less in order to select laser beam widths that best match the area to be ablated. Angell and Boogaard teach that these selections were feasible. EX1034-Angell, 69 (CO₂ laser having beam width in the range of 10 mil (254 microns)); EX1035-Boogaard, 54 (Nd:YAG laser having beam width of 1.5 mil (38.1 microns)). EX1002-Decl., ¶176.

8. Claim 21

In the Bhullar-Boogaard-Angell combination, the first laser beam is an Nd:YAG laser. *See* Section X.A.5.c ([18.b]). Boogaard discloses Nd:YAG beam widths “at least approximately 20 micro-meters.” EX1035-Boogaard, 54 (Nd:YAG laser having beam width of 1.5 mil (38.1 microns)). As noted above in Section X.A.7 (Claim 20), Bhullar’s preferred kerf width is between 100 microns and 200

microns. Thus, a POSITA would have selected, with a reasonable expectation of success, a first laser beam with a beam width greater than 20 microns to better match the size of the kerf being formed, rendering claim 21 obvious. EX1007-Bhullar, [0019]. EX1002-Decl., ¶¶177–180.

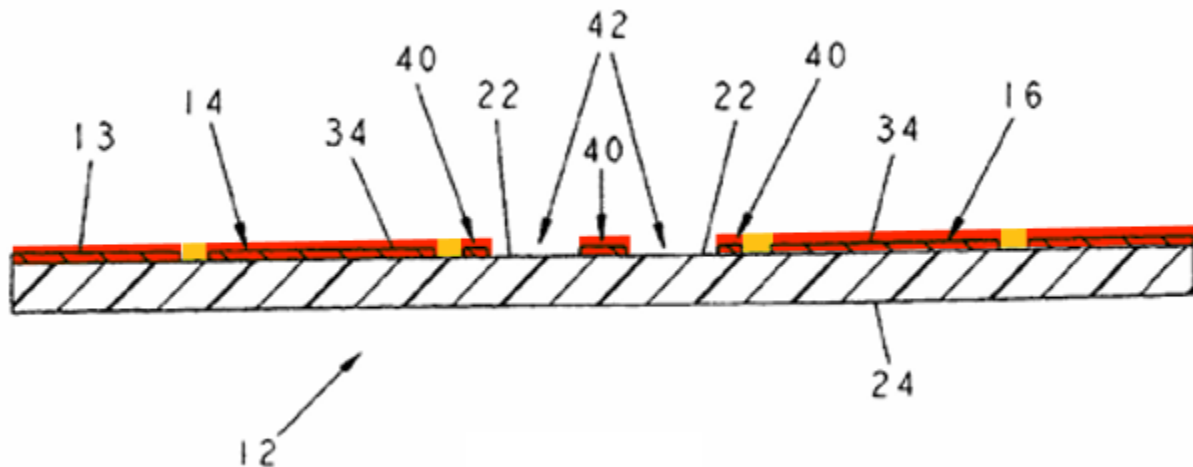
9. Claim 22

In the Bhullar-Boogaard-Angell combination, the second laser beam is a CO₂ laser. *See* Section X.A.5.d ([18.c]). Angell discloses a CO₂ laser beam of 10 mil (254 microns), which exceeds a beam width of at least 100 micro-meters. EX1034-Angell, 69. As noted above in Section X.A.7 (Claim 20), Bhullar’s recess is much larger than 200 microns. Thus, a POSITA would have selected, with a reasonable expectation of success, a first laser beam with a beam width greater than 100 microns to better match the size of the kerf being formed because doing so reduces processing time, rendering claim 22 obvious. EX1002-Decl., ¶¶181–183.

10. Claim 23

Bhullar discloses this limitation. For example, Bhullar teaches use of at least one laser to form adjacent conductive components (two electrodes) by “***removing the electrical conductor 13 from an area extending around the electrodes to form a gap of exposed support substrate*** 12.” EX1007-Bhullar, [0019], FIG.2, FIG.4. That “substantially all” electrical conductor is removed is confirmed by the

disclosure that “the” (not a portion of) electrical conductor is removed to form a “gap” and, in addition, the two electrodes (electrodes 14, 16) are “isolated from the rest of the electrically-conductive material on substrate 12 by a gap.... *Id.* Further, Figure 4 corresponding to Bhullar’s disclosure in paragraph [0019] confirms that at least substantially all electrical conductor is removed between **adjacent conductive components**, including in the **gaps** between the adjacent conductive components, as required by claim 23.



Id., FIG.4. EX1002-Decl., ¶¶184–185.

11. Claim 24

In the Bhullar-Boogaard-Angell combination, the first laser (Nd:YAG laser) emits a first laser beam and is a different type of laser than the second laser (CO₂

laser), which emits a second laser beam, as claimed. *See* Section X.A.4 (Bhullar-Boogaard-Angell); Section X.A.5.c ([18.b]), Section X.A.5.d ([18.c]), EX1002-Decl., ¶¶186–187.

12. Claim 25

In the Bhullar-Boogaard-Angell combination, the first type of laser (Nd:YAG laser) is a solid-state laser. EX1070-Tiffany, 28. The second type of laser is a CO₂ (carbon dioxide) laser. *See* Section X.A.4 (Bhullar-Boogaard-Angell); Section X.A.5.d ([18.c]). EX1002-Decl., ¶¶188–189.

13. Claim 26

In the Bhullar-Boogaard-Angell combination, the first type of laser is an Nd:YAG laser, which operates in the *infrared region* (1000–10,000 nm), as claimed. *See* Section X.A.4 (Bhullar-Boogaard-Angell); Section X.A.5.c ([18.b]); EX1035-Boogaard, 48. EX1002-Decl., ¶¶190–191.

14. Claim 27

In the Bhullar-Boogaard-Angell combination, the first laser beam is emitted by an Nd:YAG laser and the second laser beam is emitted by a CO₂ laser. *See* Section X.A.4 (Bhullar-Boogaard-Angell). An Nd:YAG laser is intended to be operated at a lower power than a CO₂ laser, thus disclosing this limitation, or at least rendering it obvious. EX1035-Boogaard, 48 (Nd:YAG is a medium-powered laser

and provides an example of the laser operating at 800mWatts (0.8 Watts)); EX1034-Angell, 66 (CO₂ beam has a “maximum average power output of...50 to 250 Watts”). EX1002-Decl., ¶¶192–193.

15. Claim 28

The second laser beam in the Bhullar-Boogaard-Angell combination (CO₂ laser) is configured to operate with power (50 Watts) in the range of about 10 to about 100 watts. EX1034-Angell, 66 (CO₂ beam has a “maximum average power output of...50 to 250 *Watts*”). The '981 patent identifies no criticality with the claimed range, admitting that “power output of [lasers such as CO₂] is usually in range about 10–100 watts.” Thus, Angell’s disclosure of 50 Watts in the Bhullar-Boogaard-Angell combination renders Claim 28 obvious. *Ineos USA LLC v. Berry Plastics Corp.*, 783 F.3d 865, 870-871 (Fed. Cir. 2015). EX1002-Decl., ¶¶194–195.

16. Claim 29

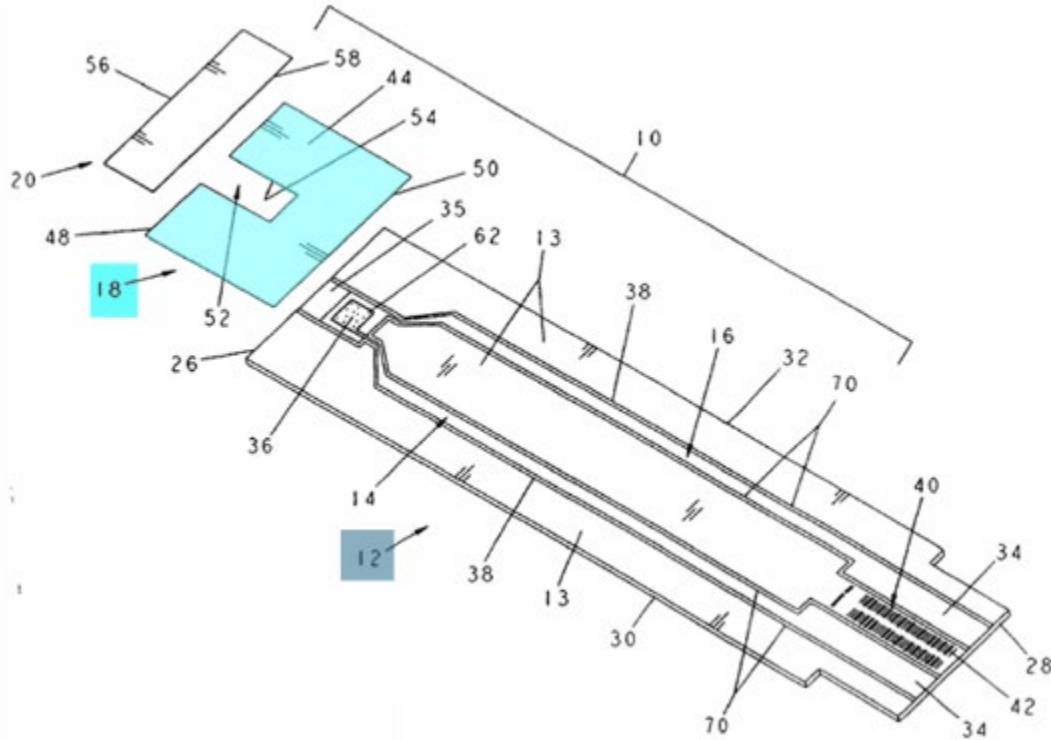
Bhullar discloses contacting at least one chemical component (electrochemical reagent 62) on at least part of the conductive layer (electrode array 36). EX1007-Bhullar, [0032]. Bhullar’s electrochemical reagent “provides electrochemical probes for specific analytes” (*id.*) such as glucose (*id.*, [0033], Table 1). Moreover, the electrode array 36 is part of electrical conductor 13 (the conductive layer). *Id.*, [0016], [0020]. EX1002-Decl. ¶¶196–197.

17. Claim 30

Bhullar discloses that its chemical component (electrochemical reagent) includes potassium ferricyanide. EX1007-Bhullar, [0033] (“An example of a reagent that may be used in biosensor 10...is a reagent for measuring glucose from a whole blood sample” comprising “437.3 mg *potassium ferricyanide*....”). EX1002-Decl. ¶¶198–199.

18. Claim 32

Bhullar’s biosensor 10 has a spacer layer (**spacer substrate 18**) positioned on the base layer (**electrode-support substrate 12**), as claimed. EX1007-Bhullar, [0016]; *see id.*, [0027], [0028], [0046], [0047].



EX1007-Bhullar, FIG.2. EX1002-Decl., ¶¶200–201.

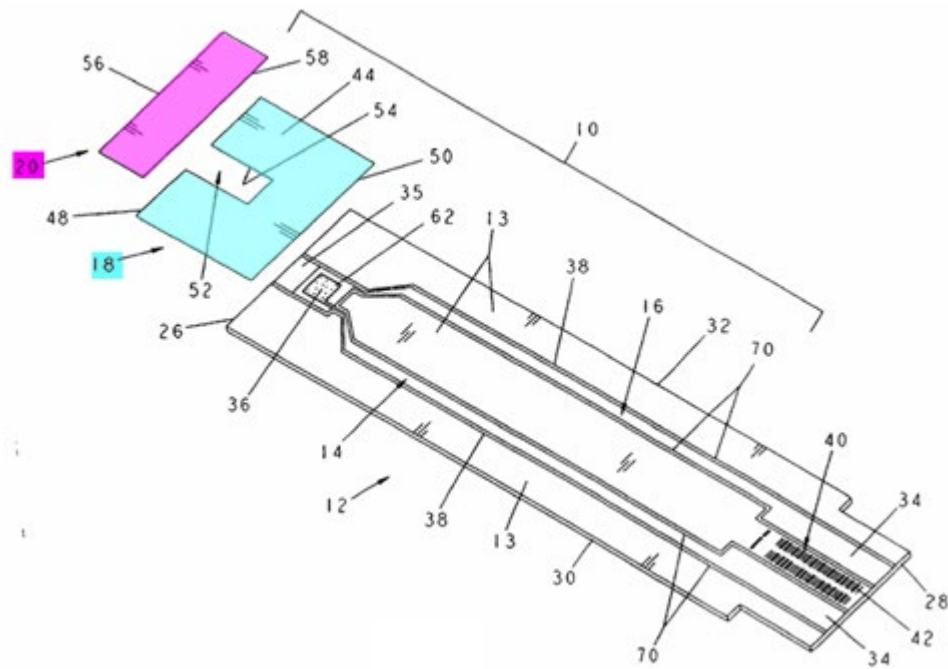
19. Claim 33

Although Bhullar does not expressly disclose forming the recess 35 (the second kerf) after application of the spacer layer, it would have been obvious to try. M.P.E.P. §2141. As shown in Figure 2, Bhullar's spacer layer is notched so that it does not cover recess 35. Thus, there is no barrier to accessing the portion of the substrate from which the second kerf (recess 35) is formed using the second laser beam, nor will application of the second laser beam interfere with the spacer layer. Indeed, since the spacer layer's notch defines the area where recess 35 should be

formed, forming recess 35 *after* applying the spacer layer would help ensure the recess 35 is aligned with the notch. Accordingly, a POSITA would have found it obvious to try forming the second kerf (recess 35) after application of the spacer layer. Indeed, a POSITA would have chosen from only two predictable options: forming the recess before or after application of the spacer layer. Either would yield the predictable solution of forming the recess given that the spacer layer would not obstruct the laser's ability to form the recess. Thus, a POSITA would have enjoyed a reasonable expectation of success for the same reasons given in Section X.A.4 (Bhullar-Boogaard-Angell). EX1002-Dec1. ¶¶202–203.

20. Claim 34

Bhullar's biosensor 10 has a cover (**cover substrate 20**) positioned on the spacer layer (**spacer substrate [18]**), as claimed. EX1007-Bhullar, [0016]; *see id.*, [0029] (“[T]he cover substrate 20 is coupled to the upper surface 44 of the spacer substrate 18”), [0030], [0031], [0046].



EX1007-Bhullar, FIG.2. EX1002-Decl., ¶¶204–205.

21. Claim 35

Bhullar, through incorporation by reference of USAN 09/411,940 (EX1063-Bhullar'940, 4), discloses screen printing for forming large conductive layers. EX1063-Bhullar'940, 1:23–31; *see* EX1067-Vitriol, 215–220. EX1002-Decl., ¶¶206–207.

22. Claim 36

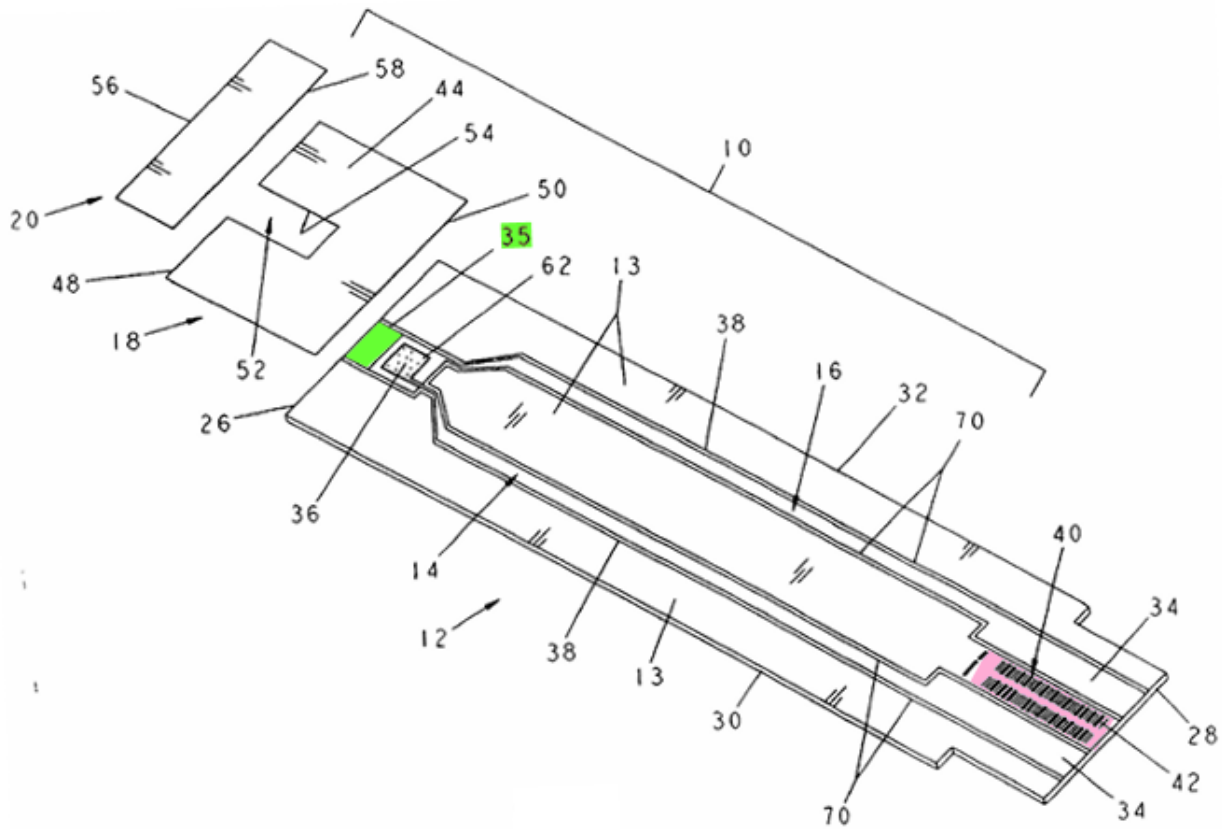
Bhullar teaches the application of a second conductive layer (**conductive material**) to the conductive layer (electrical conductor 13), as claimed, to create a code pattern with contrasting structures to ensure readability of the code. EX1007-

Bhullar, [0023] (“To aid in contrasting the electrical conductivity of the code pattern 40, the electrical conductor 13 of the pattern 40 may be coated *with a second conductive material* (not shown) that is different from the electrical conductor 13.”); *see id.*, [0015]. EX1002-Decl., ¶¶208–211.

A POSITA would have incorporated this teaching of Bhullar to implement Bhullar’s code pattern. EX1002-Decl., ¶¶212–212.

23. Claim 37

It would have been obvious to try forming the second kerf (recess 35) *after* application of the second conductive layer (second conductive material). M.P.E.P. §2141. As shown in Figure 2, Bhullar’s *second conductive material* is placed at the opposite end of the test strip from the **recess**. Thus, using the second laser beam to form the recess (second kerf) has no effect on the second conductive material; nor does application of the second conductive material affect the recess or the area of the substrate from which it is formed.



EX1007-Bhullar, FIG.2. EX1002-Decl., ¶¶213–214.

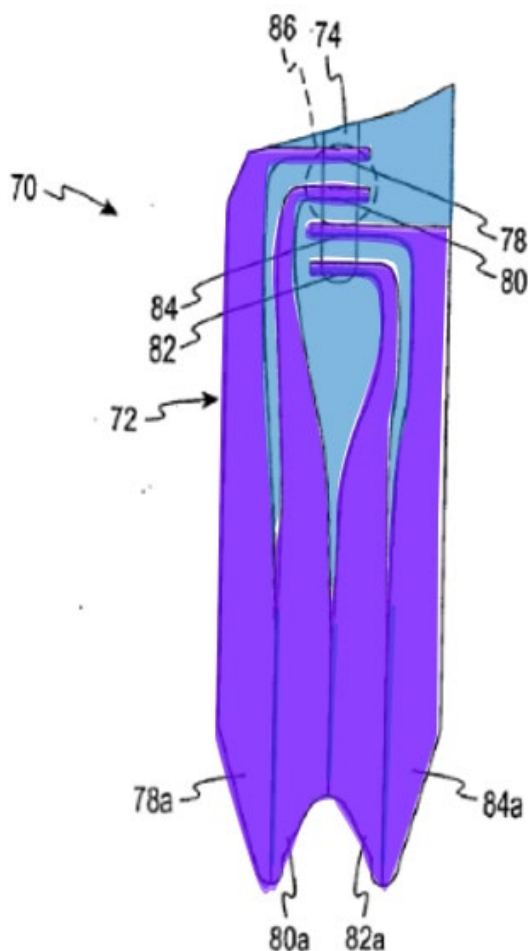
Accordingly, a POSITA would have found it obvious to try forming the second kerf (recess 35) after application of the second conductive layer. Indeed, a POSITA would have chosen from only two predictable options: forming the recess before or after application of the second conductive layer. Either would yield the predictable solution of forming the recess given that the second conductive layer would not obstruct the laser's ability to form the recess. Thus, a POSITA would

have enjoyed a reasonable expectation of success for the same reasons given in Section X.A.4 (Bhullar-Boogaard-Angell). EX1002-Decl., ¶215.

B. Ground II: Claims 1-13, 15-16, 18-30, and 32-34 Are Obvious Over Edelbrock, Boogaard, and Angell

1. Edelbrock

Edelbrock discloses “a method of forming a multilayer test sensor that is adapted to assist in determining a concentration of an analyte.” EX1032-Edelbrock, [0001]. Like the ’981 patent, Edelbrock’s test sensor is used to test blood glucose (*id.*, [0029]), is formed from a “base-ribbon strip” using a “web process” (*id.*, [0036]) and includes a base layer and a conductive layer. *Id.*, [0030], [0035], [0039], [0045]–[0048], FIGS.4a-4e.; EX1001-’981, 6:18–21. Edelbrock’s base-ribbon strip is shown in Figure 2b, including *electrodes* formed of a conductive material such as gold and *gaps* between the electrodes.

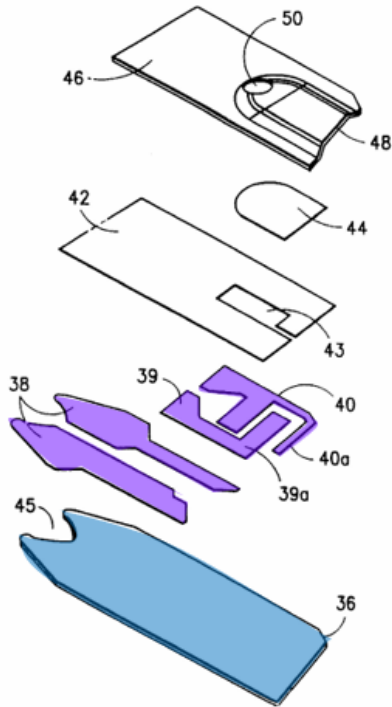


Id., FIG.2b, [0031]–[0035]. EX1002-Dec1., ¶¶216–217.

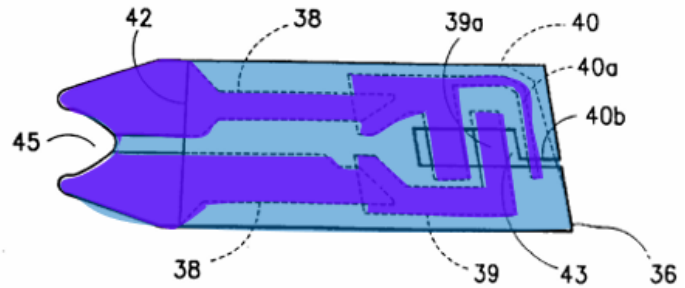
According to Edelbrock, the electrodes may be defined by “direct writing” with a laser as well as “printing (e.g., screen-printing), coating (e.g., reverse roll), vapor deposition, sputtering and electrochemical deposition.” *Id.*, [0041]–[0042]. In addition, Edelbrock discloses that components of Edelbrock’s test sensors are disclosed in USP 6,531,040 (“Musho”)(EX1049). Musho shows a similar design in which the gaps between *conducting components* (“electrical conductor pattern 38,

an[d] electrode pattern[s] (39 and 40)” are an “*insulating base*” 36 that can be made of various polymers or polymer blends. EX1049-Musho, 4:34–39, 3:1–5.

Musho, FIG.1

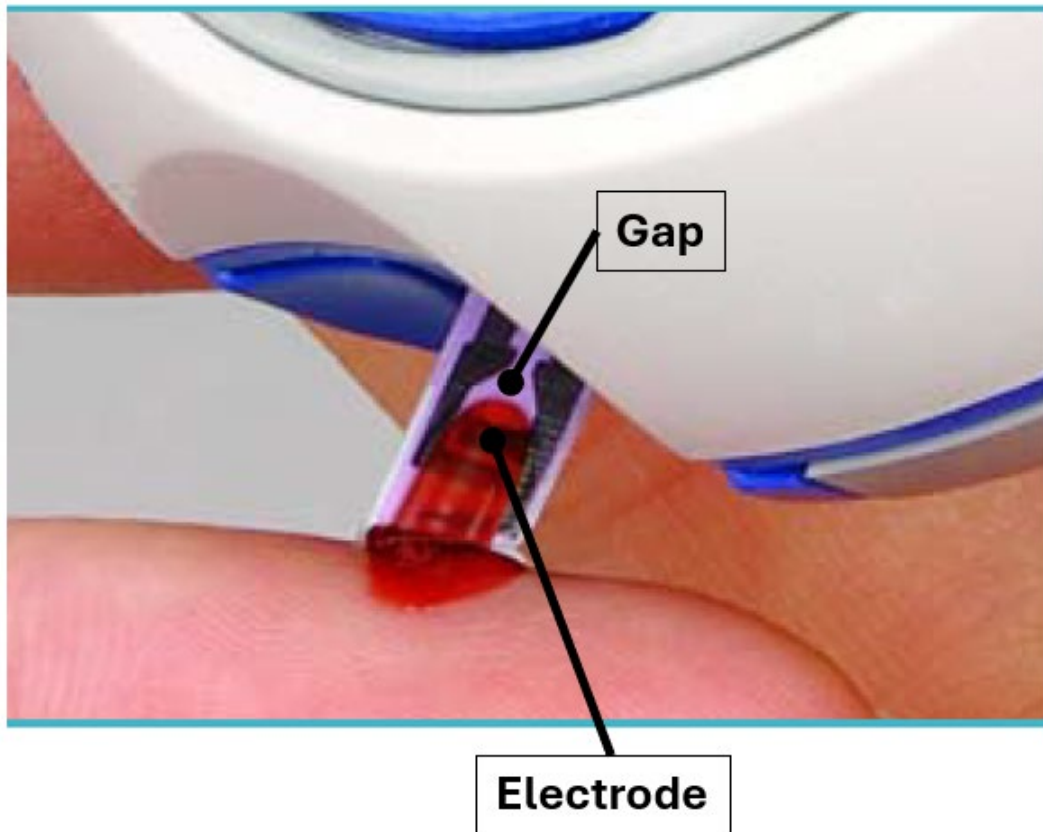


Musho, FIG.2



Id., FIGS.1–2, 3:1–4:34. EX1002-Decl., ¶¶218–219.

In a commercial embodiment, the gaps between electrodes are also insulating:

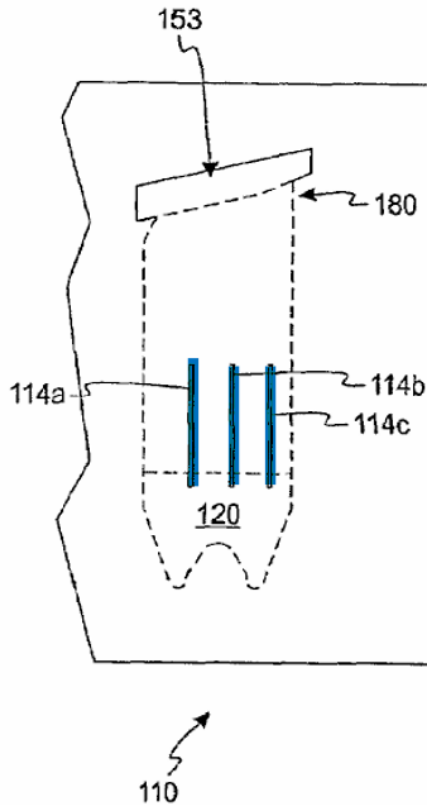


EX1075-Ascensia, 8. Accordingly, a POSITA would have understood Edelbrock, and in particular Edelbrock's Figure 2b, to encompass *electrodes* formed of a conductive material such as gold and insulating *gaps* between the electrodes. EX1002-Decl., ¶¶220–221.

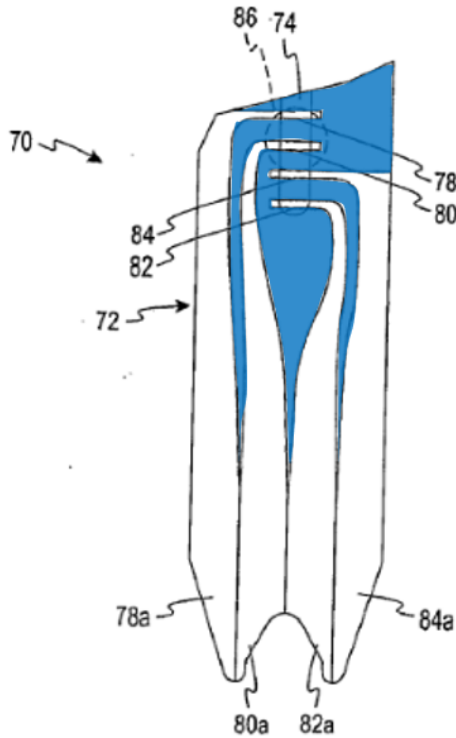
In an embodiment, Edelbrock's method uses different lasers to make "a plurality of laser cuts" in the conductive layer to define electrically isolated conductive components, including electrodes. EX1032-Edelbrock, [0039]–[0041], [0046], FIGS.3, 4a, 4d. Edelbrock's method employs two distinct sets of cuts. A

first set of cuts (shown as elements **114a-c**) defines boundaries between conductive areas 120 shown in Figure 3 below (left). *Id.* Edelbrock states that cuts 114a-c show only initial laser cuts, and additional cuts are made to complete the gaps between conductive areas, resulting in the wide **ablated areas** (corresponding to Edelbrock's **gaps** described above) shown in Edelbrock's Figure 2b (right). *Id.*, [0039] (“[A] plurality of laser cuts 114 a-c ***begins the process*** of defining the plurality of conductive leads in the conductive area 120. In this process, the plurality of electrodes has been partially defined but...are not shown in FIG. 3.”); [0038]; FIG.4a (showing same initial cuts 114a-c).

Edelbrock, FIG.3
Exemplary laser cuts 114a-c
into conductive layer



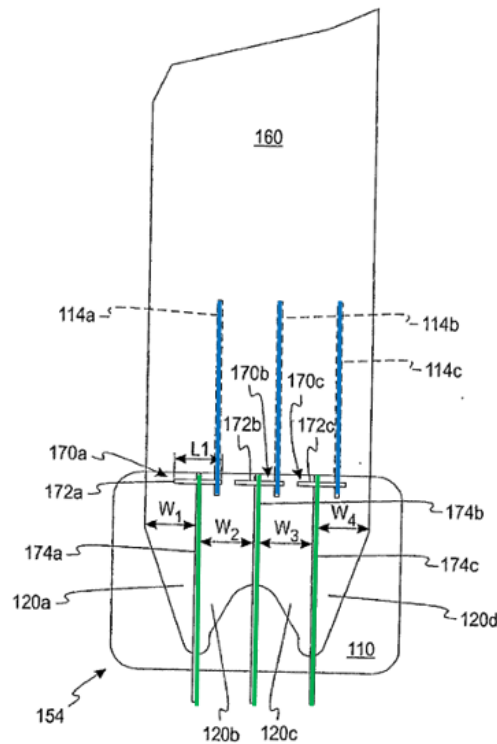
Edelbrock, FIG.2b
Complete set of cuts defining gaps
between conductive areas



Id., FIG.3 (excerpted), FIG.2b (excerpted). EX1002-Decl., ¶222.

Next, “the base-ribbon strip 110 is attached to a lid-ribbon strip 160 [a lid covering the portion of the test sensor shown in blue above] to form a sensor-ribbon strip.... EX1032-Edelbrock, [0043]. As shown below, the lid has an aperture 154 to allow access to the conductive areas 120 within the boundary of the aperture. *Id.*, [0045]. Once this lid is in place, a second set of finer laser cuts (174a-c) is made into the base-ribbon strip. *Id.*, [0046]–[0049]. These additional cuts, when

combined with the first set of laser cuts, complete the formation of the conductive leads. *Id.*



Id., FIG.4d. EX1002-Decl., ¶223.

Edelbrock explains that “laser cuts 170 a-c [which includes laser cuts 174a-c] and the laser cuts 114 a-c are performed at distinct times and are considered to be separate acts....It is contemplated that the laser used in forming the laser cuts 170 a-c and 114 a-c may be different.” *Id.*, [0046]; [0049]. EX1002-Decl., ¶224.

Lastly, test sensors are separated from the sensor ribbon strip using a “mechanical punch.” EX1032-Edelbrock, [0052]. EX1002-Decl., ¶225.

2. Boogaard and Angell

Boogaard is summarized in Section X.A.2 (Boogaard). Angell is summarized in Section X.A.3 (Angell). EX1002-Decl. ¶226.

**3. Combination of Edelbrock, Boogaard, and Angell
("Edelbrock-Boogaard-Angell combination")**

A POSITA would have been motivated to combine, with a reasonable expectation of success, Boogaard's teachings of a focused Nd:YAG laser beam and a laser positioning system in Edelbrock's method to manufacture test sensors. Edelbrock discloses use YAG lasers for "direct writing" of ablation lines by moving a laser relative to a substrate. EX1032-Edelbrock, [0041]. Boogaard provides implementation details for YAG lasers including use of an Nd:YAG laser, particular beam widths, and a positioning system, as described below. *See* Section X.B.2/X.A.2 (Boogaard's Nd:YAG Laser With Positioning System). Given these features, and as explained below, a POSITA would have found it obvious to select Boogaard's Nd:YAG laser to form laser cuts for the narrow kerfs (elements 174a-c) in Edelbrock's test sensor. EX1002-Decl., ¶227.

A POSITA also would have been motivated to combine, with a reasonable expectation of success, Angell's disclosure of a CO₂ laser suitable for ablating wide areas of a conductive layer with Edelbrock's method to manufacture test sensors.

Edelbrock discloses use of CO₂ lasers for “direct writing” of ablation lines. EX1032-Edelbrock, [0041]. Angell provides implementation details for CO₂ lasers including beam widths suitable for large surface areas requiring ablation, like Edelbrock’s conductive substrate, as described below. *See* Section X.B.3.b (Edelbrock-Boogaard Combined With Angell’s Focused CO₂ Laser). Given these features, and for the reasons explained below, a POSITA would have found it obvious to select Edelbrock’s CO₂ laser to form the laser cuts for larger wider kerfs (including elements 114a-c) in Edelbrock’s test sensor. EX1002-Decl., ¶¶228–230.

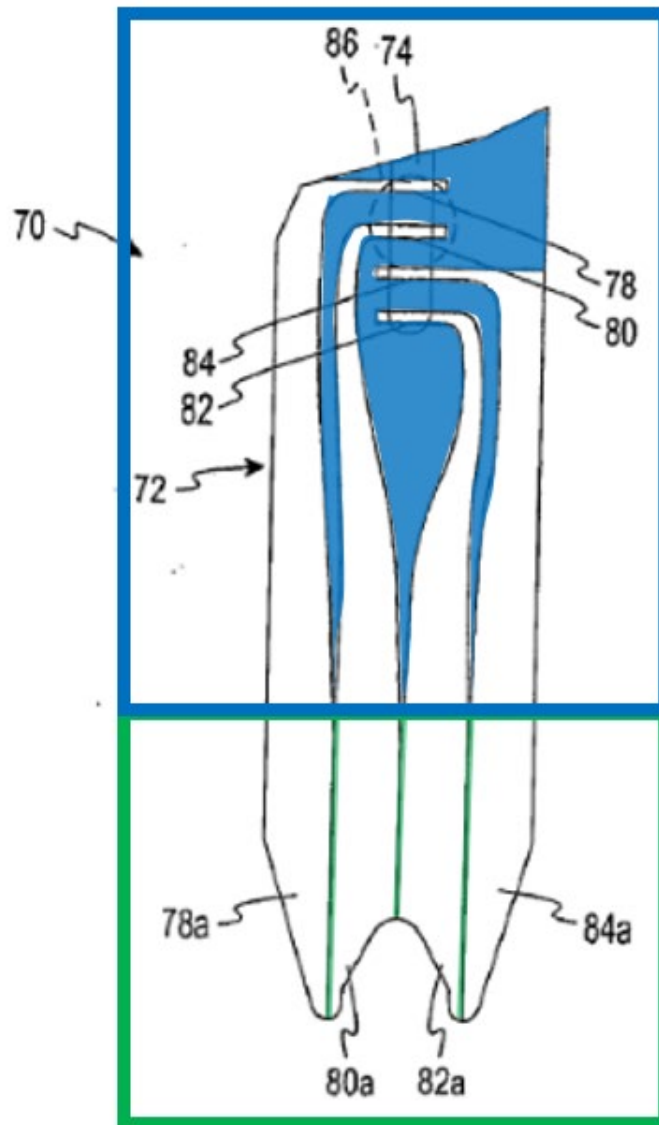
(a) Edelbrock Combined With Boogaard’s Focused Nd:YAG Laser and Positioning System (“Edelbrock-Boogaard”)

Edelbrock discloses the use of a YAG laser for direct writing (ablation of a conductive layer), but does not provide necessary implementation features, including beam width, particular type of YAG laser, positioning system, and which specific laser cuts are best suited for the YAG laser. Thus, a POSITA would have consulted the art for such details and would have recognized that Boogaard provides such details. EX1002-Decl., ¶231.

Boogaard, like Edelbrock, is directed to applications of micromachining including “removal of thin films from various substrates” “in the microelectronics area...to produce a desired electrical characteristic or geometric shape....” EX1035-

Boogaard, 48. Boogaard discloses that a focused Nd:YAG laser is suitable for milling micron scale features on a substrate by scanning techniques. *Id.*, 50 (“A simple operation is begun by *scanning the focused laser beam over the desired area....*”), FIG.4 (serpentine scan on area to be milled), 51, FIG.7 (double scan method on area to be milled), 54, 57 (removal of thin metal films). Boogaard’s teachings provide “the ability to cut out very small...patterns with extremely small kerf widths” which makes the teachings suitable for the kerfs in Edelbrock. *Id.*, 58. EX1002-Decl., ¶¶232–234.

Edelbrock discloses ***fine boundaries***, such as those depicted below, and the need for precise manufacturing tolerances. EX1032-Edelbrock, [0048] (“Laser-cutting is desirable because of the ability to maintain low manufacturing tolerances (typically ***less than 0.005 in. [127 microns]***) when using mechanical or optical guides.”). Boogaard discloses suitable beam widths for the fine boundaries depicted in Edelbrock, such as elements 174a-c in Figure 4d. EX1035-Boogaard, 51 (capable of less than 5-micron beam width), 54 (0.5 mil (12.7 micron) to 1.5 mil (38.1 micron) beam diameter). Thus, such beam widths are suited to *forming **fine boundaries*** between conductive components in Edelbrock’s test sensor (Figure 2b).



Edebrock-1032, FIG.2b. EX1002-Decl., ¶¶235–238.

A POSITA would have recognized that Boogaard's positioning system, wherein the laser is moved relative to the substrate, was particularly suitable for implementing Edelbrock's YAG laser, which is configured to perform "*direct writing of the lines*" in which "*a laser beam of light is moved so as to partially*

define the plurality of electrodes.” EX1032-Edelbrock, [0041]. Boogaard provided a solution to this requirement, namely, to precisely move the laser via a positioning system relative to the substrate. EX1035-Boogaard, 48–49, FIGS.2a, 2b. EX1002-Decl., ¶239.

Furthermore, implementing Boogaard’s laser ablation teachings in Edelbrock’s method would have amounted to “[a]pplying a known technique to a known device ready for improvement to yield predictable results.” M.P.E.P. §2141. Boogaard’s Nd:YAG laser on a positioning system would be employed by Edelbrock to form fine boundaries as discussed above. EX1032-Edelbrock, FIG.2b, FIG.4d(elements 174a–c), [0048]. EX1002-Decl., ¶240.

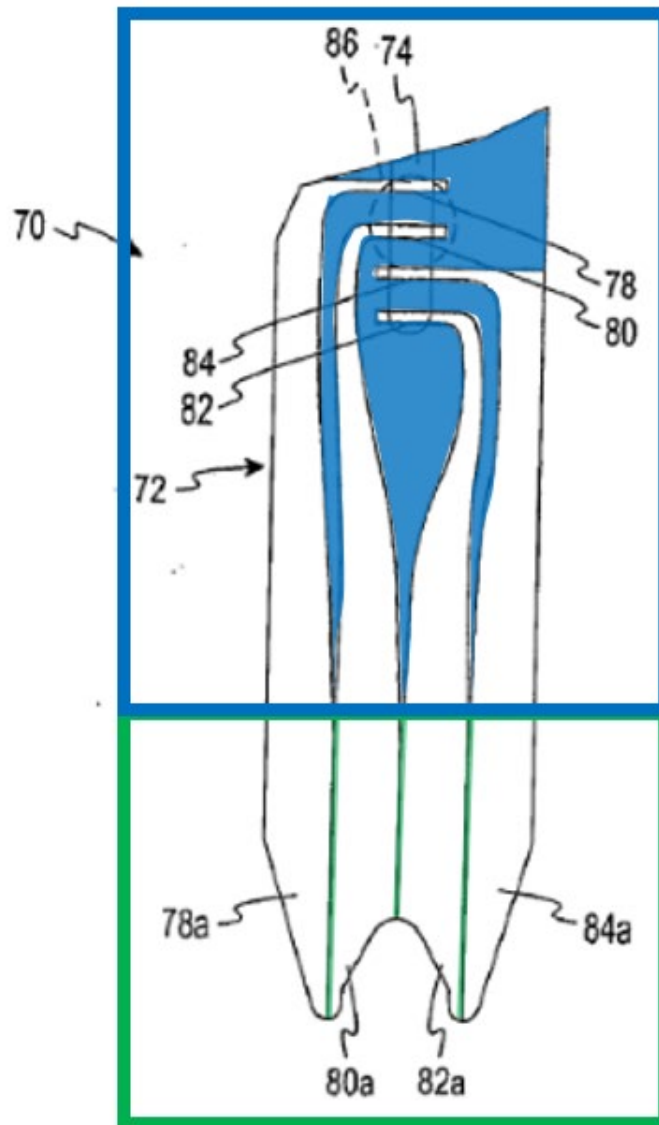
A POSITA would have had a reasonable expectation of success implementing Edelbrock’s laser ablation step using Boogaard’s laser milling techniques. Both Boogaard and Edelbrock use laser ablation on the same materials on a micron scale. In particular, Boogaard teaches use of the Nd:YAG laser to ablate gold (EX1035-Boogaard, 57), which is also the first example of a conductive layer mentioned by Edelbrock. EX1032-Edelbrock, [0035] (“The electrodes are formed of conductive materials such as, for example, metallic materials (e.g., *gold*,....)”). EX1002-Decl., ¶241.

Finally, as noted above, Boogaard and Edelbrock are in the same field of endeavor that includes the manufacture of microelectronic components comprising a base (non-conductive layer) and laser-defined electrodes. EX1035-Boogaard, 48, 57-58. EX1002-Decl., ¶242.

Accordingly, a POSITA would have been motivated to combine the teachings of Boogaard and Edelbrock to incorporate into Edelbrock's method for manufacturing a test sensor Boogaard's Nd:YAG laser and positioning system, with a reasonable expectation of success. EX1002-Decl., ¶243.

**(b) Edelbrock-Boogaard Combined With Angell's
Focused CO₂ Laser**

As shown in section X.B.3.a, it was obvious to utilize a focused Nd:YAG laser to form ablation lines in the range of 5–38.1 microns for defining *fine boundaries* between Edelbrock's conductive/reactive area. However, a significant portion of Edelbrock's test sensor must be ablated to form *insulating gaps* between electrodes.



EX1032-Edelbrock, FIG.2b; Section X.B.1 (Edelbrock). EX1002-Decl. ¶244.

Because Edelbrock expressly discloses using different lasers, a POSITA would have consulted the prior art to identify a second laser suitable for removing larger areas and would have readily recognized Angell's teachings. Like Edelbrock and Boogaard, Angell teaches laser micromachining using a focused laser at suitable

beam widths that would assist forming wider kerfs required by Edelbrock. EX1034-Angell, 66 (“beam can...*be focused* to about a 50 micron spot...”), 69 (“CO₂...lasers are used in focal point machining where usually a single element lens is used to *focus* the beam”), 69 (CO₂ laser beam widths of 2 mil (50.8 microns) to 10 mil (254 microns)). EX1002-Decl. ¶¶245–248.

A POSITA would have also been motivated by Boogaard’s teaching of a positioning system to implement Angell’s CO₂ laser in the Edelbrock-Boogaard method using a positioning system with a reasonable expectation of success. It was well-known that Angell’s CO₂ laser, like Boogaard’s Nd:YAG laser, could be moved with a positioning system relative to an ablation target. *E.g.*, EX1071-Hellrung, 267; EX1035-Boogaard, 49. EX1002-Decl., ¶249.

A POSITA would have had a reasonable expectation of success adding Angell’s CO₂ laser as a second laser for implementing the Edelbrock-Boogaard method because Angell, Boogaard, and Edelbrock all use laser ablation on metals at a micron scale. EX1034-Angell, 66. EX1002-Decl., ¶250.

Finally, as noted above, Angell, Boogaard, and Edelbrock are in the same field of endeavor including manufacture of microelectronic components comprising a base (non-conductive layer) and laser-defined electrical components. EX1034-

Angell, 57–58 (removal of thin metallic films on insulator), FIG.22, FIG.23. EX1002-Decl., ¶251.

Accordingly, a POSITA would have been motivated to combine the teachings of Angell with the method of Edelbrock-Boogaard to incorporate Angell’s CO₂ laser, with a reasonable expectation of success. EX1002-Decl., ¶252.

(c) Resulting Edelbrock-Boogaard-Angell Combination

The Edelbrock-Boogaard-Angell combination would have implemented (1) Boogaard’s teaching to use an Nd:YAG laser to form the fine kerfs in Edelbrock’s pattern; (2) Boogaard’s teaching to use a positioning system to implement Edelbrock’s movement relative to the test sensor, and (3) Angell’s teaching to use a CO₂ laser to form the wider kerfs/gaps in Edelbrock’s pattern. EX1002-Decl., ¶253.

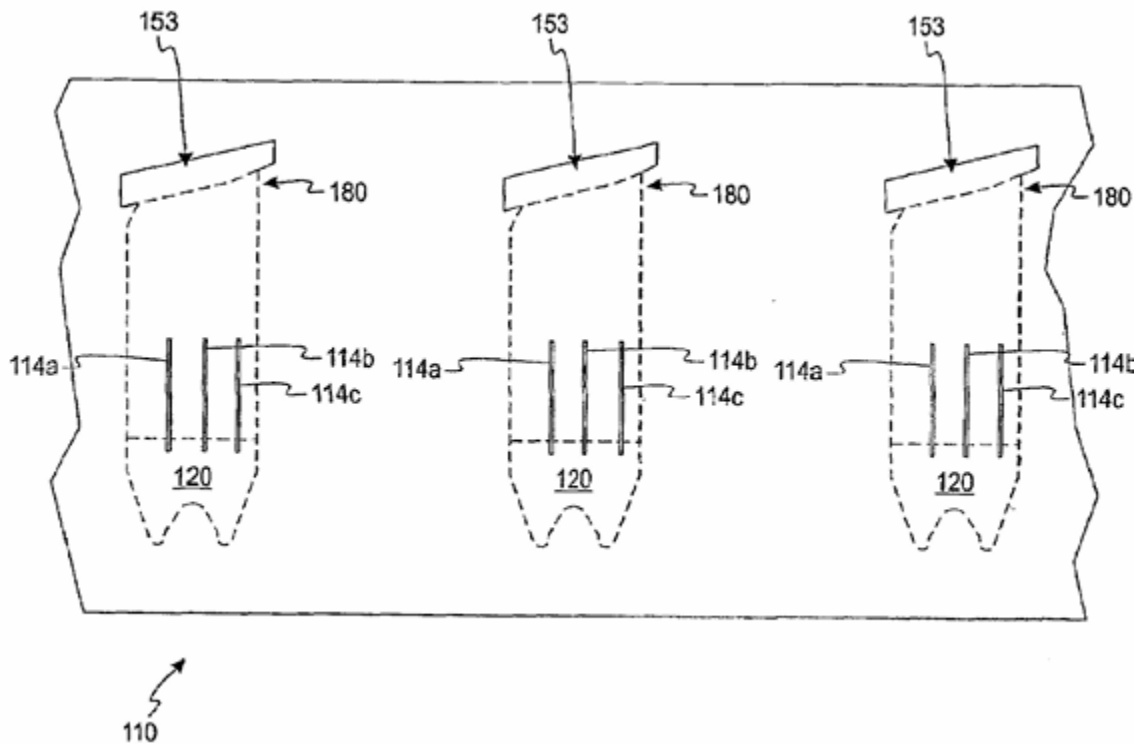
4. Claim 1

(a) [1.pre]: “A method of manufacturing test strips, comprising:”

If the preamble is limiting, Edelbrock discloses a method of manufacturing test sensors (test strips). EX1032-Edelbrock, [0001] (teaching “*a method of forming a multilayer test sensor* that is adapted to assist in determining a concentration of an analyte”); Section X.B.1 (Edelbrock); Sections X.B.4.b–e ([1.a]–[1.d]). EX1002-Decl., ¶¶254–257.

(b) [1.a]: “forming a reel containing a conductive layer and a base layer;”

Edelbrock discloses this limitation. First, Edelbrock forms a reel. Edelbrock’s uses “a *web process*” to form “an electrochemical test...from a *test-sensor ribbon*.” EX1032-Edelbrock, [0036]. A “web process” refers to “reel-to-reel processing.” EX1061-Chrisey, 35; EX1064-Harvey, 2. In this process, the “base-ribbon strip 110” shown in Edelbrock’s Figure 3 is provided in the form of a reel and processed to form “test sensors 180.” EX1032-Edelbrock, [0037]–[0056].



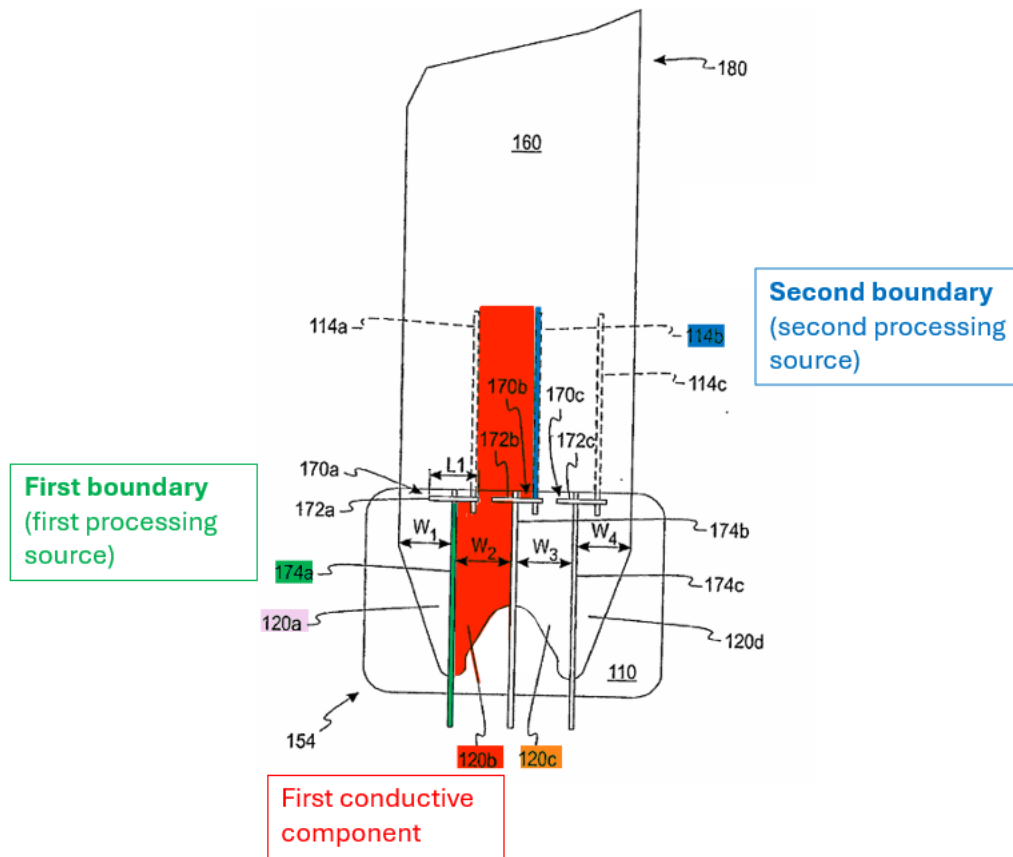
Id., FIG.3, [0037]. EX1002-Decl., ¶¶258–264.

Second, Edelbrock's base-ribbon strip (reel) includes a polymer "base layer." EX1032-Edelbrock, [0030] (disclosing that "[t]he multilayer test sensors...include at least a base" made of "polyethylene terephthalate (PET)"); *see* EX1057-Goosey, 9-11. EX1002-Decl., ¶¶263–264.

Finally, Edelbrock's base-ribbon strip (reel) includes a "conductive/reactive area" (conductive layer) identified as element 120 in Figure 3 above. EX1032-Edelbrock, FIG.3, [0038], [0035], [0039], FIGS.4a–4e, [0045]–[0048]. EX1002-Decl., ¶265.

- (c) [1.b]: "forming a first conductive component, wherein the first conductive component includes at least one first boundary formed by the movement of a first processing source along the at least one first boundary and at least one second boundary formed by the movement of a second processing source along the at least one second boundary, the second processing source is not the same as the first processing source, and the at least one first boundary is not the same as the at least one second boundary;

Edelbrock-Boogaard-Angell discloses this limitation. First, Edelbrock forms a **first conductive area 120b** (first conductive component) that includes **element 174a** (first boundary) and a different **element 114b** (second boundary).



Id., FIG.4d, [0046]-[0052]. EX1002-Decl., ¶¶266–267.

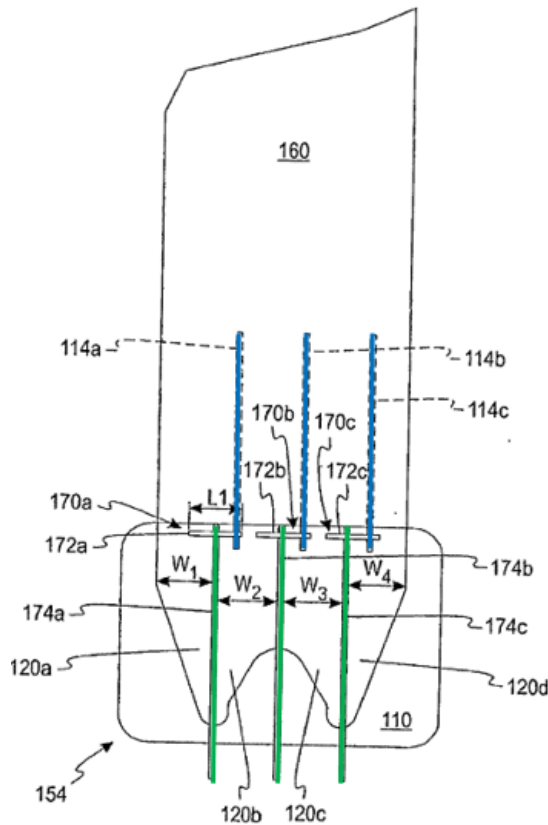
Element 174a is “at least one first boundary” of the first conductive component **120b** because it is a boundary between first conductive component **120b** and third conductive component **120a**. EX1032-Edelbrock, [0039], FIG.4d. Similarly, **element 114b** is “at least one second boundary” of the first conductive component because is a boundary between first conductive component **120b** and second conductive component **120c**. *Id.*, [0046], [0049], FIG.4d. Laser cuts **114b**

and **174a** ablate conductive material between adjacent portions of conductive area 120 thereby defining boundaries that “define[] a plurality of electrodes.” *Id.*, [0041]. (“[T]he plurality of electrodes on the base-ribbon strip 110 is partially formed with a laser using *direct writing of the lines*” wherein “a laser beam of light is moved so as to partially define the plurality of electrodes. Lasers that produce a beam of energy *capable of removing a layer* and that can be moved to form a pattern may be used in this method.”). EX1002-Decl., ¶¶268–269.

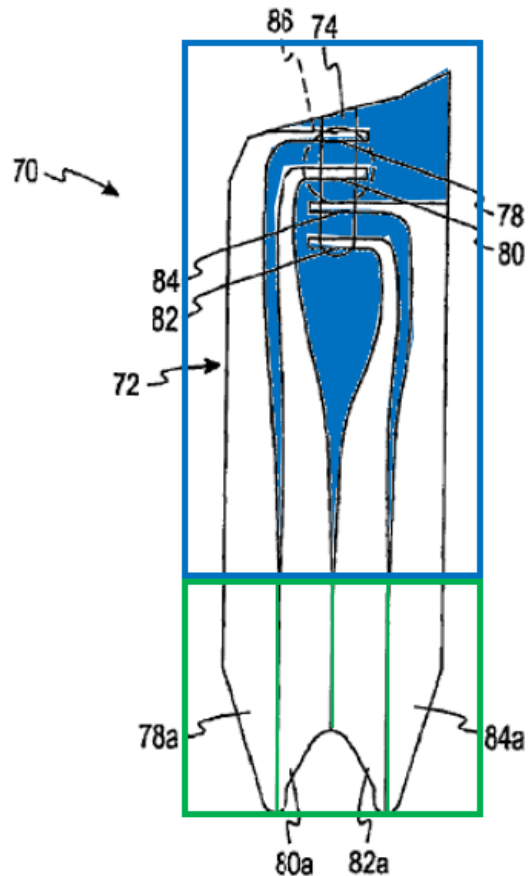
In the Edelbrock-Boogaard-Angell combination, the first boundary (**element 174a**) is formed by Boogaard’s Nd:YAG laser (first processing source) and the second boundary (**element 114b**) is formed by a different laser, Angell’s CO₂ laser (a different second processing source). *See* Section X.B.3. EX1002-Decl. ¶270.

As explained above, a POSITA would have been motivated to use Boogaard’s Nd:YAG laser to create **element 174a** (first boundary). Section X.B.3 (Edelbrock-Boogaard-Angell). As shown below, **element 174a** defines a relatively narrow gap, motivating the use of the laser with the narrower of the two beam choices, i.e., Boogaard’s Nd:YAG laser instead of Angell’s CO₂ laser. *Id.*

Edelbrock, FIG.4d



Edelbrock, FIG.2b



Id., FIG.4d, 2b. EX1002-Decl., ¶271.

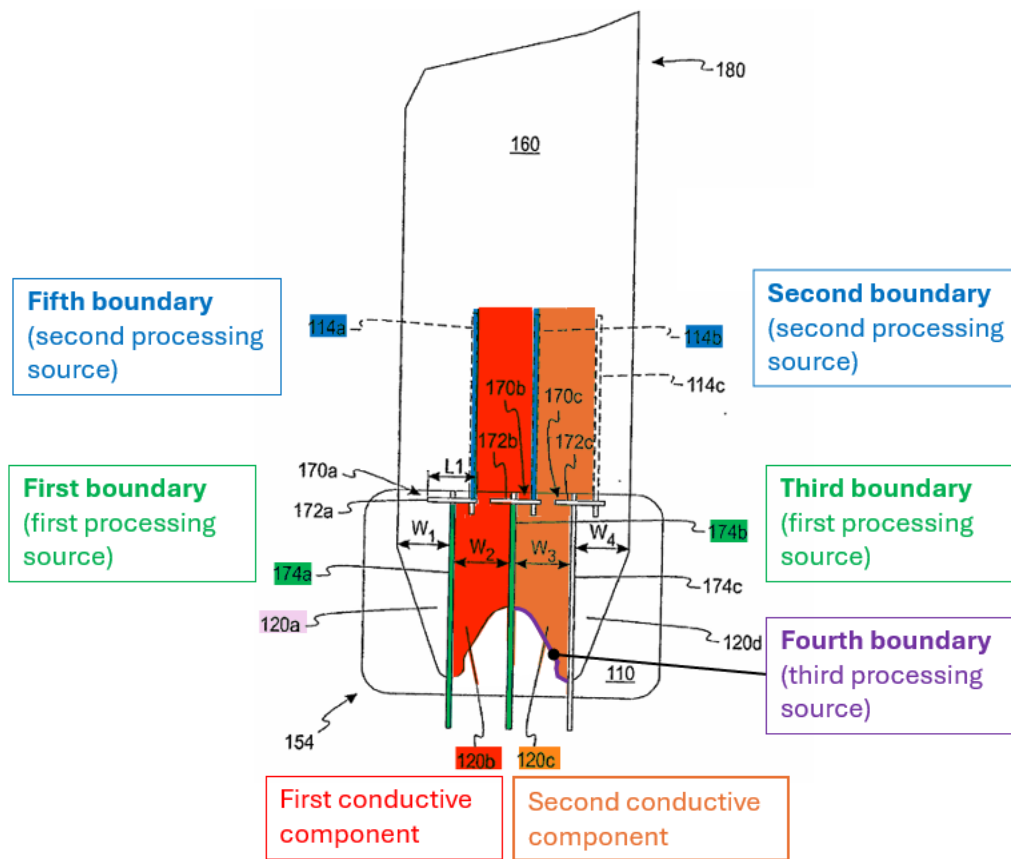
As explained above, for **element 114b** (second boundary) a POSITA would have been motivated to use CO₂ laser because its wider beam could ablate more material where required compared to Boogaard's Nd:YAG laser. Section X.B.3 (Edelbrock-Boogaard-Angell). **Element 114b** is one of a number of cuts made to

form relatively large gaps between conductive areas shown above. *Id.*; Section X.B.1 (Edelbrock). EX1002-Decl., ¶272.

Finally, **element 174b** (first boundary) is formed by movement of the first processing source (Nd:YAG laser), along the first boundary. Section X.B.3 (Edelbrock-Boogaard-Angell). Similarly, Edelbrock's **element 114b** (second boundary) is formed by movement of the second processing source (CO₂ laser), along the second boundary. *Id.*; EX1032-Edelbrock, [0041]. EX1002-Decl., ¶273.

- (d) **[1.c]: “forming a second conductive component, wherein the second conductive component includes at least one third boundary formed by the movement of the first processing source along the at least one third boundary and at least one fourth boundary formed by a third processing source not the same as the first processing source, and the at least one third boundary is not the same as the at least one fourth boundary; and”**

Edelbrock-Boogaard-Angell discloses this limitation. First, Edelbrock forms a **second conductive area 120c** (second conductive component) that includes **element 174b** (third boundary) between the first conductive component **120b** and the second conductive component **120c**.



EX1032-Edelbrock, FIG.4d, [0046]–[0052]. EX1002-Decl., ¶¶274–275.

Element 174b (third boundary) is a boundary of the second conductive component **120c** for the reasons above regarding in reference to element 174a's (first boundary) relationship to the first conductive component 120b. *See* Section X.B.4.c ([1.b]). Moreover, **element 174b** (third boundary) is formed by Boogaard's Nd:YAG laser (first processing source) for the same reasons given above for **element 174a** (first boundary). *Id.* Further, **element 174b** (third boundary) is

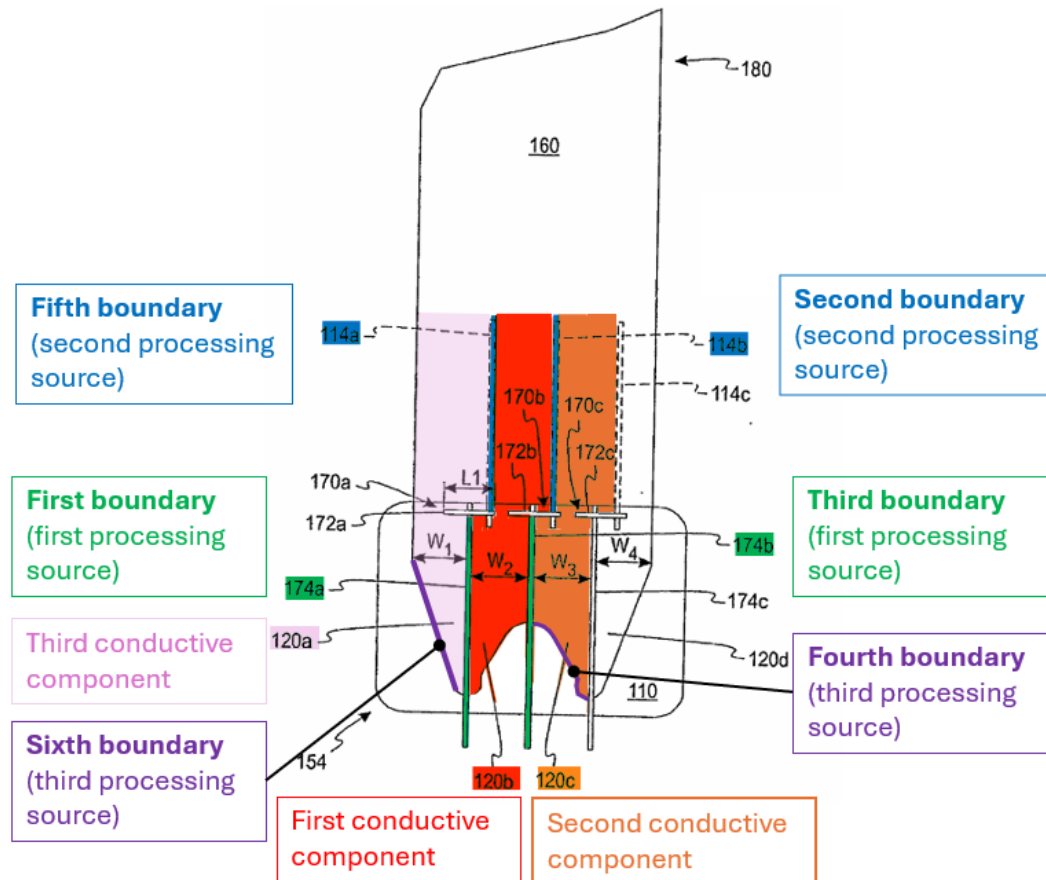
formed by movement of the first processing source (Nd:YAG laser) along the third boundary as described above for **element 174a** (first boundary). *Id.* EX1002-Decl. ¶276.

Edelbrock further discloses a distinct “**fourth boundary**,” shown above in Figure 4d, that is different from **element 174b** (third boundary). EX1032-Edelbrock, FIG.4d, [0046]–[0052], FIG.3, [0037]–[0044]. The **fourth boundary** is a free edge of the test sensor that is stamped out using a mechanical punch—not a laser. *Id.*, [0052] (“[A] mechanical punch is used to excise a plurality of test sensors in the sensor-ribbon strip.”). Thus, Edelbrock’s third processing source (the mechanical punch) used to form the **fourth boundary** is not the same as the first processing source (laser). *See* Section X.B.4.c ([1.b]). EX1002-Decl., ¶277.

- (e) **[1.d]: “forming a third conductive component, wherein the third conductive component includes at least one fifth boundary formed by the movement of the second processing source along the at least one fifth boundary and at least one sixth boundary formed by the third processing source not the same as the second processing source, and the at least one fifth boundary is not the same as the at least one sixth boundary.”**

Edelbrock-Boogaard-Angell discloses this limitation. First, Edelbrock forms a **third conductive area 120a** (third conductive component) that includes **element**

114a (fifth boundary) between the first conductive component **120b** and the third conductive component **120a**.



processing source) for the reasons above for **element 114b** (second boundary). *Id.* In addition, **element 114a** (fifth boundary) is formed by movement of the second processing source (CO₂ laser) along the fifth boundary for the reasons above for **element 114b** (second boundary). *Id.* EX1002-Decl., ¶280.

Edelbrock further discloses a distinct “**sixth boundary**,” shown in Figure 4d below, that is different from **element 114a** (fifth boundary). EX1032-Edelbrock, FIG.4d, [0046]–[0052], FIG.3, [0037]–[0044]. The **sixth boundary** is a free edge of the test sensor that is formed using a mechanical punch—not a laser. EX1032-Edelbrock, [0052]. Thus, Edelbrock’s third processing source (the mechanical punch) used to form the **sixth boundary** is not the same as the second processing source (laser). *See* Section X.B.4.d ([1.c]). EX1002-Decl., ¶281.

5. Claims 2 and 3

Edelbrock discloses that the first processing source and the second processing source each perform laser ablation, as claimed. EX1032-Edelbrock, [0041], [0046]; *see* Section X.B.4.c ([1.b]). EX1002-Decl., ¶¶282–283.

6. Claim 4

Edelbrock discloses that the third processing source is a “mechanical punch,” which is stamping, as claimed. EX1032-Edelbrock, [0052]; *see* Section X.B.4.d ([1.c]). EX1002-Decl., ¶¶284–285.

7. Claim 5

In the Edelbrock-Boogaard-Angell combination, the first processing source is an Nd:YAG laser configured with a first ablative beam width in the range of 5–38.1 microns and the second processing source is a CO₂ laser configured with a second ablative beam width in the range of 50.8–254 microns. *See* Section X.B.3 (Edelbrock-Boogaard-Angell), X.B.4.c–e ([1.b]–[1.d]). EX1002-Decl., ¶¶286–288.

8. Claim 6

In the Edelbrock-Boogaard-Angell combination, the first ablative beam width is 38.1 microns, which is at least approximately 20 microns, as claimed. Section X.B.7 (Claim 5). EX1002-Decl., ¶¶289–290.

9. Claim 7

In the Edelbrock-Boogaard-Angell combination, the second ablative beam width is 254 microns, which is at least approximately 100 microns. Section X.B.7 (Claim 5). EX1002-Decl., ¶¶291–292.

10. Claim 8

Edelbrock discloses part of this limitation because Edelbrock teaches “produc[ing] a beam of energy *capable of removing a layer*” using direct writing. EX1032-Edelbrock, [0041]. Forming Edelbrock’s electrodes by “removing a layer”

of conductive material discloses removing “substantially all of the conductive material...” EX1002-Decl., ¶¶293–296.

Edelbrock-Boogaard-Angell renders obvious the remaining part of this limitation, “a distance between the adjacent conductive components is substantially equal to at least one of the first ablative beam width and the second ablative beam width.” For example, element 174a (first boundary) is formed by Boogaard’s Nd:YAG laser having a beam width in the range of between 5–38.1 microns. *See* Section X.B.7 (Claim 5). A POSITA would have understood that a beam width of 38.1 microns was a sufficient distance between the first conductive component (Edelbrock’s element 120b) and the third conductive component (Edelbrock’s element 120a). *E.g.*, EX1007-Bhullar, [0019] (teaching typical gap widths “about 25 μm to about 500 μm ” in similar test strip). Thus, it would have been obvious to select Boogaard’s Nd:YAG laser having a 38.1-micron beam width to form a gap with a width of 38.1 microns. Moreover, a POSITA would have been motivated to do so because setting the beam width equal to the distance defined by the first boundary implies that only a single cut is needed, which conserves laser energy and manufacturing time by avoiding the need to form the first boundary using multiple kerfs (laser scans). A POSITA would have had a reasonable expectation of success because implementing this approach amounts to simply operating Boogaard’s

Nd:YAG laser to form a single cut for the first boundary. EX1002-Decl., ¶¶297–298.

11. Claim 9

In the Edelbrock-Boogaard-Angell combination, the first processing source includes a Nd:YAG laser type and the second processing source includes a CO₂ laser type, and those laser types are not the same. *See* Sections X.B.3 (Edelbrock-Boogaard-Angell), X.B.4.c–e ([1.b]–[1.d]). EX1002-Decl., ¶¶299–300.

12. Claim 10

In the Edelbrock-Boogaard-Angell combination, the first type of laser is an Nd:YAG laser, which is a solid-state laser. EX1070-Tiffany, 28. The second type of laser is a CO₂ (carbon dioxide laser), as claimed. *See* Sections X.B.3 (Edelbrock-Boogaard-Angell), X.B.4.c–e ([1.b]–[1.d]), X.B.11 (Claim 9). EX1002-Decl., ¶¶301–302.

13. Claim 11

In the Edelbrock-Boogaard-Angell combination, the first type of laser is an Nd:YAG laser, which operates in the infrared region (1000–10,000 nm). *See* Section X.B.11 (Claim 9); EX1035-Boogaard, 48. EX1002-Decl., ¶¶303–304.

14. Claim 12

In the Edelbrock-Boogaard-Angell combination, the first processing source is an Nd:YAG laser operated at 0.8 watts (EX1035-Boogaard, 48) and the second processing source is a CO₂ laser operated at a “maximum average power output of...50 to 250 Watts.” EX1034-Angell, 66; *see* Sections X.B.3 (Edelbrock-Boogaard-Angell), X.B.4.c–e ([1.b]–[1.d]). Thus, Edelbrock-Boogaard-Angell discloses this limitation, or at least renders it obvious. EX1002-Decl., ¶¶305–306.

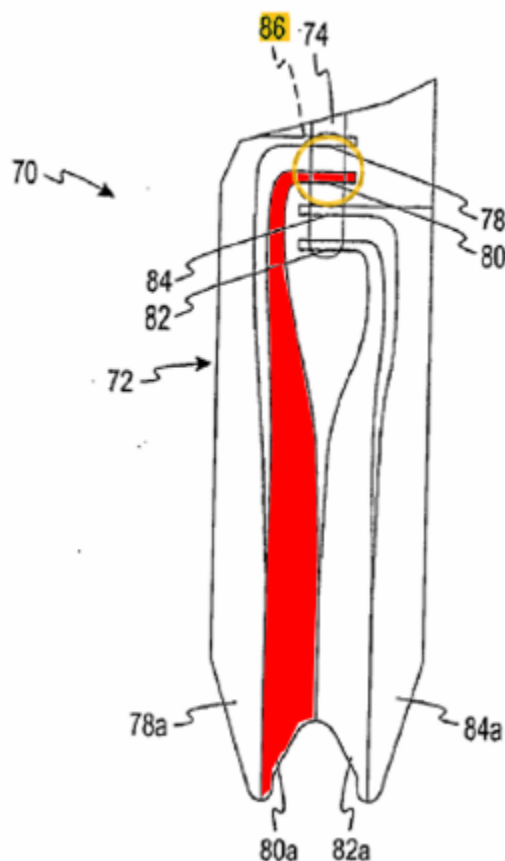
15. Claim 13

The second laser beam in the Edelbrock-Boogaard-Angell combination (CO₂ laser) is configured to operate with power (50 Watts) in the range of about 10 to about 100 watts, rendering Claim 13 obvious. EX1034-Angell, 66; EX1001-’981, 9:32–43; *see* Section X.A.15 (Ground I, Claim 28). EX1002-Decl., ¶¶307–308.

16. Claim 15

Edelbrock forms a **reactive layer** 86 containing an “enzyme” and “electron acceptor (e.g., a ferricyanide salt)” (chemical component) that contacts the **first conductive component** (*see* Section X.B.4.c ([1.b])). EX1032-Edelbrock, [0032] (“As shown in FIG. 2b, the test sensor 70...includes a *reactive or fluid-receiving area 86* that....includes a reagent” that “typically contains an *enzyme* (e.g., glucose oxidase), which reacts with...an *electron acceptor* (e.g., a ferricyanide salt) to

produce an electrochemically measurable species that can be detected by *the electrodes.*”), Claims 1, 16. The **reactive layer** (86) containing the chemical component contacts the **first conductive component**:



EX1032-Edelbrock, FIG.2b. EX1002-Decl. ¶¶309–312.

17. Claim 16

Edelbrock’s reagent layer includes a “ferricyanide salt,” rendering potassium ferricyanide (a well-known ferricyanide salt) obvious. EX1032-Edelbrock, [0032];

EX1069-O’Leary, 175–179 (potassium ferricyanide is a common ferricyanide salt used in biotechnology applications). EX1002-Decl. ¶¶313–314.

18. Claim 18

- (a) [18.pre]: “A method of manufacturing test strips, comprising:”**

See [1.pre]. EX1002-Decl., ¶315.

- (b) [18.a]: “forming a reel containing a conductive layer and a base layer;”**

See [1.a]. EX1002-Decl., ¶316.

- (c) [18.b]: “forming a first kerf in the conductive layer, wherein the first kerf is formed using a first focused laser beam moved relative to the conductive layer along the first kerf;”**

Edelbrock-Boogaard-Angell discloses this limitation. First, Edelbrock discloses “forming a first kerf in the conductive layer.” Edelbrock teaches a distinct step of making a “plurality of laser cuts **170a-c**,” and one of the cuts, e.g., 170a, is a first kerf. EX1032-Edelbrock, [0046]–[0047].



Id., FIG.4a, 4d, [0046]–[0051]. EX1002-Dec1., ¶¶317–320.

Second, Edelbrock-Boogaard-Angell discloses “wherein the first kerf is formed using a first focused laser beam moved relative to the conductive layer along the first kerf.” Edelbrock discloses “direct writing of the lines” where a “laser beam of light [e.g., YAG] is moved so as to partially define the plurality of electrodes,” which applies to forming cut 170a (first kerf). EX1032-Edelbrock, [0041], [0046] (forming “laser cuts 170a-c” using “processes discussed above”). In the Edelbrock-

Boogaard-Angell combination, Boogaard's YAG laser used to form Edelbrock's first kerfs 170a-c is a "focused laser beam." EX1007-Boogaard, 49-50. EX1002-Decl., ¶¶321–322.

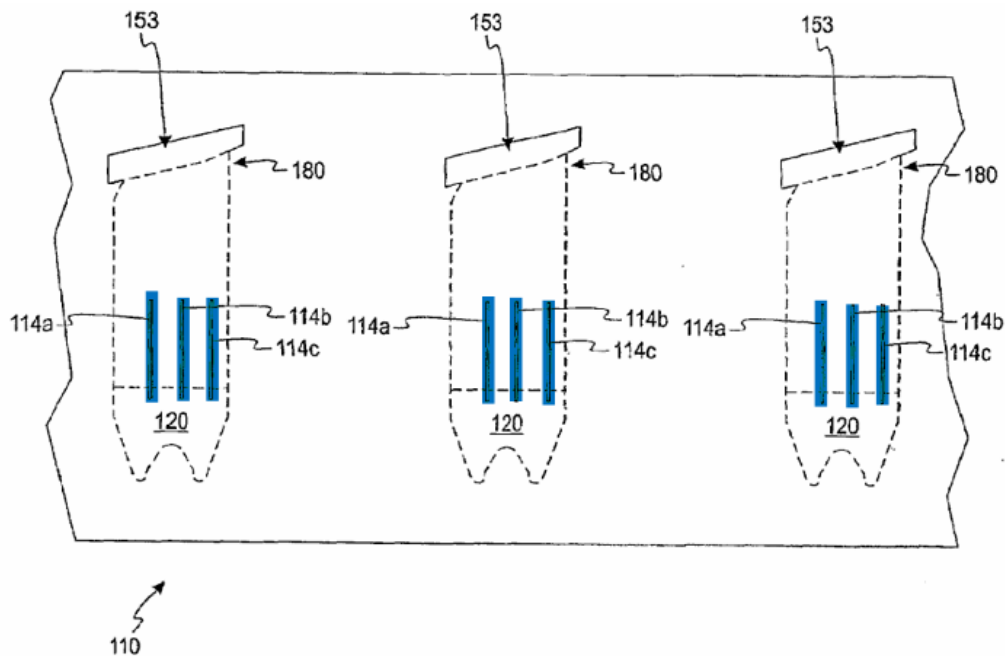
Alternatively, the first kerf may be one of "a plurality of laser cuts 114a-c. EX1032-Edelbrock, [0039], [0046]. Limitation [18.b]'s "first kerf" and "first focused laser beam" are interchangeable with Limitation [18.c]'s "second kerf" and "second focused laser beam" without any change in the scope of the claims. Accordingly, selecting one of cuts 114a-c, which are formed by Angell's CO₂ laser, also meets the requirements of Limitation [18.b]. *See* Section X.B.18.d ([18.c]). For dependent claims 19–30 and 35–37, the first kerf is mapped to element 170a; for dependent claims 32–34, the first kerf is mapped to element 114a.

	"first kerf"	"second kerf"
Claims 19–30, 35–37	Element 170a	Element 114a
Claims 32–34	Element 114a	Element 170a

EX1002-Decl., ¶¶323–324.

- (d) [18.c]: “forming a second kerf in the conductive layer, wherein the second kerf is formed using a second focused laser beam moved relative to the conductive layer along the second kerf, the first laser beam being different to the second laser beam;”

Edelbrock-Boogaard-Angell discloses this limitation. First, Edelbrock discloses “forming a second kerf in the conductive layer.” Edelbrock teaches making “a plurality of laser cuts 114 a-c” to begin “the process of defining the plurality of conductive leads in the conductive area 120.”



EX1032-Edelbrock, FIG.3; [0039], [0046]. EX1002-Decl., ¶¶325–328.

Second, Edelbrock-Boogaard-Angell discloses “wherein the second kerf is formed using a second focused laser beam moved relative to the conductive layer

along the second kerf.” As explained above, Edelbrock discloses “direct writing” by moving a CO₂ laser to form the second kerf. EX1032-Edelbrock, [0041] (“[T]he plurality of electrodes on the base-ribbon strip 110 is partially formed with a laser using *direct writing of the lines*....[A] *laser beam of light is moved so as to partially define the plurality of electrodes*. Lasers that produce a beam of energy capable of removing a layer and that can be moved to form a pattern...are *carbon dioxide-based lasers* and yttrium-based lasers such as yttrium aluminum garnet (YAG) lasers.”); Section X.B.18.c ([18.b]). In the Edelbrock-Boogaard-Angell combination, Angell’s CO₂ laser used to form Edelbrock’s second kerfs 114a-c is a focused laser beam because Angell teaches that the laser produces a “focused spot size.” EX1034-Angell, 66. EX1002-Decl., ¶¶329–330.

Finally, Edelbrock-Boogaard-Angell discloses “the first laser beam being different to the second laser beam.” EX1032-Edelbrock, [0046] (“[T]he laser used in forming the laser cuts 170 a-c and 114 a-c may be *different*.”). In the Edelbrock-Boogaard-Angell combination, the first laser is Boogaard’s Nd:YAG laser and the second laser is Angell’s CO₂ laser. Sections X.B.3 (Edelbrock-Boogaard-Angell). EX1002-Decl., ¶331.

Alternatively, the second kerf may be one of laser cuts 170a-c, and the first kerf may be one of laser cuts 114a-c. EX1032-Edelbrock, [0039], [0046]. As

explained above, Limitation [18.b]’s “first kerf” and “first focused laser beam” are interchangeable with Limitation [18.c]’s “second kerf” and “second focused laser beam” without any change in the scope of the claims. Section X.B.4.c ([18.b]). Accordingly, one of cuts 170a-c, which are formed by Boogaard’s Nd:YAG laser, also meets the requirements of limitation [18.c]. For dependent claims 19–30 and 35–37, the second kerf is mapped to element 114a. For dependent claims 32–34, the second kerf is mapped to element 170a.

	“first kerf”	“second kerf”
Claims 19–30, 35–37	Element 170a	Element 114a
Claims 32–34	Element 114a	Element 170a

EX1002-Decl., ¶332.

(e) [18.d]: “separating one or more test strips from the reel using a singulation process.”

Edelbrock discloses this limitation. Edelbrock’s method comprises use of a “mechanical punch...to excise a plurality of test sensors in the sensor-ribbon strip....” EX1032-Edelbrock, [0052]. Mechanical “punching” is a “singulation process” according to the ’981 patent. EX1001-’981, 12:59–61. EX1002-Decl., ¶333.

19. Claim 19

Edelbrock discloses the singulation process of stamping. EX1032-Edelbrock, [0052] (use of a “***mechanical punch***...to excise a plurality of test sensors in the sensor-ribbon strip”). A mechanical punch process is a form of stamping. EX1002-Decl., ¶¶334–335.

20. Claim 20

Following the preamble, the remainder of Claim 20 is substantively the same as Claim 5, where Claim 20’s “first laser beam has a first beam width” corresponds to Claim 5’s “first processing source includes a first laser configured to emit a first ablative beam width” and Claim 20’s “second laser beam has a second beam width” corresponds to Claim 5’s “second processing source includes a second laser configured to emit a second ablative beam width.” Accordingly, Edelbrock-Boogaard-Angell renders obvious Claim 20 for the reasons explained for Claim 5. EX1002-Decl., ¶¶336–338.

21. Claim 21

Following the preamble, the remainder of Claim 21 is substantively the same as Claim 6, where Claim 21’s “first beam width” corresponds to Claim 6’s “first ablative beam width.” Accordingly, Edelbrock-Boogaard-Angell renders obvious Claim 21 for the reasons explained for Claim 6. EX1002-Decl., ¶¶339–341.

22. Claim 22

Following the preamble, the remainder of Claim 22 is substantively the same as Claim 7, where Claim 22’s “second beam width” corresponds to Claim 7’s “second ablative beam width.” Accordingly, Edelbrock-Boogaard-Angell renders obvious Claim 22 for the reasons explained for Claim 7. EX1002-Decl., ¶¶342–344.

23. Claim 23

Following the preamble, the remainder of Claim 23 is substantively the same as one of the limitations in Claim 8, where Claim 23’s “at least one laser beam removes substantially all conductive material between adjacent conductive components” corresponds to Claim 8’s “wherein substantially all of the conductive material between adjacent conductive components is removed” Accordingly, Edelbrock-Boogaard-Angell renders obvious Claim 23 for the reasons explained for Claim 8. EX1002-Decl., ¶¶345–347.

24. Claim 24

In the Edelbrock-Boogaard-Angell combination, the first laser beam (Nd:YAG laser) is a different type of laser than the second laser beam (CO₂ laser), as claimed. *See* Section X.B.11 (claim 9). EX1002-Decl., ¶¶348–349.

25. Claim 25

Following the preamble, the remainder of Claim 25 is identical to Claim 10. Therefore, Claim 25 is rendered obvious by Edelbrock-Boogaard-Angell for the reasons explained for Claim 10. EX1002-Decl., ¶¶350–352.

26. Claim 26

Following the preamble, the remainder of Claim 26 is identical to Claim 11. Therefore, Claim 26 is rendered obvious by Edelbrock-Boogaard-Angell for the reasons explained for Claim 11. EX1002-Decl., ¶¶353–355.

27. Claim 27

Following the preamble, the remainder of Claim 27 is substantively the same as Claim 12, where Claim 27’s “first laser beam is emitted from a first laser” corresponds to Claim 12’s “first processing source includes a first laser” and claim 27’s “second laser beam is emitted from a second laser” corresponds to claim 12’s “second processing source includes a second laser.” Accordingly, Edelbrock-Boogaard-Angell renders obvious Claim 27 for the reasons explained for Claim 12. EX1002-Decl., ¶¶356–359.

28. Claim 28

Following the preamble, the remainder of Claim 28 is identical to Claim 13. Therefore, Claim 28 is disclosed by Edelbrock-Boogaard-Angell for the reasons explained for Claim 13. EX1002-Decl., ¶¶360–362.

29. Claim 29

Following the preamble, the remainder of claim 29 is substantially the same as Claim 15, where Claim 29’s “at least part of the conductive layer” corresponds to Claim 15’s “the first conductive component.” Accordingly, Edelbrock-Boogaard-Angell renders obvious Claim 29 for the same reasons given with respect to claim 15. EX1002-Decl. ¶¶363–365.

30. Claim 30

Following the preamble, the remainder of Claim 30 is identical to Claim 16. Therefore, Claim 30 is rendered obvious by Edelbrock-Boogaard-Angell for the reasons explained for Claim 16. EX1002-Decl., ¶¶366–367.

31. Claim 32

Edelbrock discloses the application of a spacer layer (spacer) to a base layer (base). Edelbrock’s method includes “attaching the base to a second layer” (EX1032-Edelbrock, Claim 1, Claim 16) “wherein the second layer is a *spacer*.” *Id.*, Claim 8, Claim 18, [0043] (“[S]econd layer may be a spacer-ribbon strip such as

shown in FIGS. 7-9.”), [0054]–[0056], [0030], FIGS. 7a–7b, 8, 9a–9b, [0065]–[0066], [0081]–[0082]. EX1002-Decl., ¶¶368–372.

32. Claim 33

Edelbrock discloses claim 33. Per Section X.18.d ([18.c]), the second kerf is mapped to element 170a for claim 33 (and claim 32, from which claim 33 depends). Edelbrock’s second set of cuts 170a-c including element 170a used to form test sensors (second kerf) is formed after the spacer-ribbon strip 305 (spacer layer) is attached. EX1032-Edelbrock, [0056] (“The cuts 170 a-c are formed *after* the lid-ribbon strip 160, *the spacer-ribbon strip 305* and the base-ribbon strip 175 *are attached.*”); [0037]; [0046]; FIG.4, 6, 8, Claim 1. EX1002-Decl., ¶¶373–375.

33. Claim 34

Edelbrock discloses the application of a cover (lid) to the spacer layer (a spacer ribbon strip) to form a spacer-lid ribbon strip that is then attached to the base. EX1032-Edelbrock, [0043] (“[T]he second layer may be a *spacer-lid ribbon strip combination* in which the spacer-ribbon strip and lid-ribbon strip have been *previously attached* [application] before the spacer-lid ribbon strip combination is later attached to the base-ribbon strip.”), [0044]. Edelbrock’s lid-ribbon strip is a “cover to the spacer layer” because Edelbrock’s spacer-ribbon strip is between the base-ribbon strip and the lid-ribbon strip. *Id.*, [0056] (“[O]nly a small portion of the

spacer-ribbon strip 305 is visible through the aperture 155 of the lid-ribbon strip 160.”). EX1002-Decl., ¶¶376–378.

C. Ground III: Claims 35-37 Are Obvious Over Edelbrock, Boogaard, Angell, and Bhullar (“Edelbrock-Boogaard-Angell-Bhullar”)

1. Edelbrock, Boogaard, Angell, and Bhullar

Edelbrock, Boogaard, Angell, and Bhullar are summarized in Sections X.B.1 (Edelbrock), X.B.2/X.A.2 (Boogaard), X.B.2/X.A.3 (Angell), and X.A.1 (Bhullar), respectively. EX1002-Decl., ¶¶379–382.

2. Combination of Edelbrock, Boogaard, Angell, and Bhullar (“the Edelbrock-Boogaard-Angell-Bhullar combination”)

A POSITA would have been motivated, with a reasonable expectation of success, to combine Edelbrock, Boogaard, and Angell for the reasons given above. *See* Section X.B.3. A POSITA would have been further motivated to incorporate teachings from Bhullar, with a reasonable expectation of success, to form the Edelbrock-Boogaard-Angell-Bhullar combination. EX1002-Decl., ¶383.

First, as explained above, Edelbrock and Bhullar are from the same field of endeavor (manufacturing glucose test strips using micromachining), and all four references are directed to techniques for micromachining using laser ablation. *See* Sections X.B.1 (Edelbrock), X.B.2/X.A.2 (Boogaard), X.B.2/X.A.3 (Angell), and

X.A.1 (Bhullar). Moreover, a POSITA would have considered Boogaard and Angell to be pertinent prior art to teach laser ablation techniques that were applicable to the methods of Edelbrock and Bhullar. *See* Sections X.B.2/X.A.2 (Boogaard), X.B.2/X.A.3 (Angell). EX1002-Decl., ¶384.

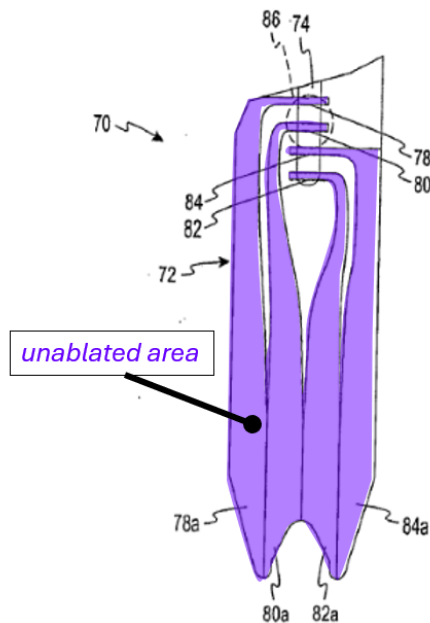
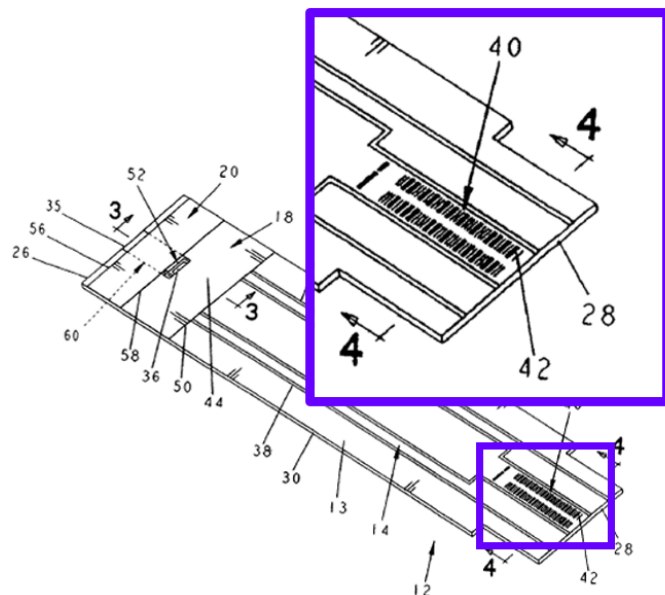
Second, a POSITA would have been motivated to incorporate Bhullar’s teaching to incorporate a code pattern on the test strip. Bhullar explains that it was “known to include a code on a test strip that identifies the manufacturing batch of the strip,” and specifically refers to background art for this general teaching. EX1007-Bhullar, [0002] (citing WO99/22236(EX1078-Heinonen)). Thus, although Edelbrock does not discuss adding a code to its test sensor, a POSITA would have been motivated to incorporate such a technique to track manufacturing batches of test sensors, and would have looked to relevant teachings in the art. Bhullar teaches how to add such a code to a sensor through laser ablation techniques, consistent with the manufacturing techniques employed by Edelbrock. EX1007-Bhullar, [0016], [0018]–[0021], [0043]–[0047]. EX1002-Decl. ¶¶385–386.

Moreover, Edelbrock’s test strip has a large percentage of unablated area that could be used for the code pattern. *See* Section X.B.3 (Edelbrock-Boogaard-Angell). A POSITA looking to implement Bhullar’s code would have recognized that these unablated areas were not being used by the conductive components in Edelbrock and

could be advantageously employed to form Bhullar's code. Thus, implementing the teaching of Bhullar's code on Edelbrock's test sensor would have merely amounted to applying a known technique to a known method ready for improvement to yield predictable results. EX1002-Decl. ¶¶387–388.

Furthermore, a POSITA would have had a reasonable expectation of success in incorporating Bhullar’s teachings of manufacturing a code in Edelbrock’s test sensor. Both Edelbrock and Bhullar utilize laser ablation techniques that can be implemented using Boogaard’s and Angell’s lasers. *See* Sections X.A.2–3. In addition, Edelbrock’s **unutilized areas** provided ample unused space to implement Bhullar’s code pattern (*e.g.*, **code pattern 40**).

Edelbrock, FIG.2b

Bhullar, FIG.1

EX1032-Edelbrock, FIG.2b; EX1007-Bhullar, FIG.1. EX1002-Decl., ¶389.

Finally, Bhullar specifies a meter configured to read the code. EX1007-Bhullar, [0040]–[0041]. Accordingly, it would have been obvious for a POSITA to combine the teachings of Bhullar in the Edelbrock-Boogaard-Angell combination to include a code pattern. EX1002-Decl., ¶¶390–391.

3. Claim 35

Bhullar, through incorporation by reference of USAN 09/411,940 (EX1063-Bhullar’940, 4), discloses screen printing for forming large conductive layers. EX1063-Bhullar’940, 1:23–31; *see* EX1067-Vitriol, 215–220. EX1002-Decl., ¶¶392–393.

4. Claim 36

Bhullar teaches the application of a second conductive layer (second conductive material) to the conductive layer (electrical conductor 13), as claimed, to create a discernible code pattern that has contrasting structures to ensure readability of the code. EX1007-Bhullar, [0023]; *see id.*, [0015]. A POSITA would have incorporated this teaching of Bhullar specifically for purposes of implementing Bhullar’s code pattern. EX1002-Decl., ¶¶394–396.

5. Claim 37

It would have been obvious to try forming the second kerf after application of Bhullar's second conductive layer (second conductive material). M.P.E.P. §2141. As explained above, Edelbrock's test strip has a large percentage of unablated area where adding a code would not interfere with adding the second kerf. Section X.C.2 (Edelbrock-Boogaard-Angell-Bhullar). Thus, there is no barrier to accessing the portion of the substrate used to form the second kerf with the second laser beam, nor would application of the second laser beam have impacted the second conductive material (Bhullar's code). EX1002-Decl., ¶¶397–398.

Accordingly, a POSITA would have found it obvious to try forming the second kerf *after* application of the second conductive layer. Indeed, a POSITA would have chosen from only two predictable options: forming the second kerf before or after application of the second conductive layer. Either would yield the predictable solution of forming both Bhullar's code and defining the other conductive components on Edelbrock's test sensor. Thus, a POSITA would have enjoyed a reasonable expectation of success for the same reasons given in Section X.C.2 (Combination of Edelbrock, Boogaard, Angell, and Bhullar). EX1002-Decl., ¶399.

XI. SECONDARY CONSIDERATIONS

PO has not presented any secondary considerations during prosecution or in the *DDEL* litigation, and Petitioner is not aware of any. Anyway, where, as here, there is a strong showing of obviousness, secondary considerations cannot dislodge the primary conclusion of obviousness. *Tokai Corp. v. Easton Enters., Inc.*, 632 F.3d 1358, 1371 (Fed. Cir. 2011). Moreover, if PO provides alleged objective evidence in its preliminary response, the Board should nonetheless institute trial because “detailed consideration of secondary consideration evidence may not be undertaken until [Petitioner] has had an opportunity to test it.” *Amneal Pharms., LLC v. Supernus Pharms., Inc.*, IPR2013-00368, Paper 8, at 12–13 (P.T.A.B. Dec. 17, 2013). Accordingly, should PO present evidence of secondary considerations, Petitioner reserves the right to respond.

XII. THE BOARD SHOULD NOT DISCRETIONARILY DENY INSTITUTION

A. Discretionary Denial Under 35 U.S.C. §325(d) Would Be Inappropriate

Discretionary denial under §325(d) would be inappropriate because the Office was never previously presented with the grounds set forth in the Petition. *See Advanced Bionics, LLC v. MED-EL Elektromedizinische Gerate GmbH*, IPR 2019-01469, Paper 6 (P.T.A.B. Feb. 13, 2020). None of Edelbrock, Bhullar, Boogaard,

or Angell were made of record by the Examiner during prosecution or cited in an IDS. Nor did the Examiner consider the same or substantially the same arguments as presented in Petitioner’s grounds. For example, during prosecution, applicant argued that Groll did not teach a “focused laser beam” or the “movement” limitations of claims 1 and 18. *See* Section VII.B. These limitations are taught in Petitioner’s grounds, none of which were before the Examiner. Thus, as the first part of the *Advanced Bionics* test is not satisfied, Petitioner respectfully submits that discretionary denial under §325(d) is inappropriate.

B. Discretionary Denial Under 35 U.S.C. §314(a) Would Be Inappropriate

The *Fintiv* factors weigh against denial of institution.

1. Whether court granted a stay or evidence exists that one may be granted if IPR instituted

This factor weighs against denial. Neither party has yet requested a stay pending IPR. The Court has indicated, however, that it would “entertain a stipulation or request for a global stay” in view of “the insufficiency of [PO’s] counterclaims” raised in Petitioner’s motion to dismiss PO’s counterclaims. EX1076-Memorandum-Opinion, 23. Because the Court has indicated it would be amenable to a stay, this factor weighs against denial.

2. Proximity of trial date to projected statutory deadline for final written decision

This factor is neutral. While the scheduled trial date is currently September 28, 2026, the most recent statistics on median time-to-trial for civil actions in District of Delaware is over 32 months, which would place trial in approximately February 2027. EX1065-District-Court-Statistics. Judge Williams’ median time to trial for the past 5 years is also 32 months. EX1077-Judge-Williams-Statistics. Thus, these statistics put trial approximately 4 months after the projected statutory deadline for final written decision of September 2026. IPR2021-00748, Paper 10, 12–13 (P.T.A.B. October 7, 2021).

3. Investment in *DDEL* litigation

This factor weighs against denial. The case is in its relatively early stages. *Markman* has not occurred, minimal fact discovery has taken place, no depositions have been noticed, and PO has yet to file amended counterclaims after the Court granted-in-part Petitioner’s motion to dismiss.

4. Overlap between issues

This factor weighs against denial because Petitioner has entered a *Sotera* stipulation. Section IV.

5. Whether petitioner and defendant are same party

This factor is neutral because the parties in the *DDEL* litigation are the same.
See IPR2020-00122, Paper 15, 10 (P.T.A.B. May 15, 2020).

6. Other circumstances

This Petition presents compelling evidence that, if left un rebutted, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence. *See id.*, 3–4.

XIII. CONCLUSION

Petitioner respectfully requests institution of *inter partes* review.

Respectfully submitted,

/ Jonathan P Knight /

Jonathan P. Knight, Reg. No. 69,866

Table of Claims

Claim 1	
Limitation	Claim Language
[1.pre]	A method of manufacturing test strips, comprising:
[1.a]	forming a reel containing a conductive layer and a base layer;
[1.b]	forming a first conductive component, wherein the first conductive component includes at least one first boundary formed by the movement of a first processing source along the at least one first boundary and at least one second boundary formed by the movement of a second processing source along the at least one second boundary, the second processing source is not the same as the first processing source, and the at least one first boundary is not the same as the at least one second boundary;
[1.c]	forming a second conductive component, wherein the second conductive component includes at least one third boundary formed by the movement of the first processing source along the at least one third boundary and at least one fourth

	boundary formed by a third processing source not the same as the first processing source, and the at least one third boundary is not the same as the at least one fourth boundary; and
[1.d]	forming a third conductive component, wherein the third conductive component includes at least one fifth boundary formed by the movement of the second processing source along the at least one fifth boundary and at least one sixth boundary formed by the third processing source not the same as the second processing source, and the at least one fifth boundary is not the same as the at least one sixth boundary.

Claim 2

The method of claim 1, wherein the first processing source is configured to perform at least one technique selected from the group consisting of laser ablation, stamping, cutting, and etching.

Claim 3

The method of claim 1, wherein the second processing source is configured to perform at least one technique selected from the group consisting of laser ablation, stamping, cutting, and etching.

Claim 4

The method of claim 1, wherein the third processing source is configured to perform at least one technique selected from the group consisting of laser ablation, stamping, cutting, and etching.

Claim 5

The method of claim 1, wherein the first processing source includes a first laser configured to emit a first ablative beam width and the second processing source includes a second laser configured to emit a second ablative beam width, wherein the first ablative beam width and the second ablative beam width are not the same.

Claim 6

The method of claim 5, wherein the first ablative beam width is at least approximately 20 micro-meters.

Claim 7

The method of claim 5, wherein the second ablative beam width is at least approximately 100 micro-meters.

Claim 8

The method of claim 5, wherein substantially all of the conductive material between adjacent conductive components is removed and a distance between the adjacent conductive components is substantially equal to at least one of the first ablative beam width and the second ablative beam width.

Claim 9

The method of claim 1, wherein the first processing source includes a first type of laser and the second processing source includes a second type of laser, wherein the first type of laser and the second type of laser are not the same.

Claim 10

The method of claim 9, wherein the first or second type of laser is selected from the group consisting of a solid-state laser, a copper vapor laser, a diode laser, a carbon dioxide laser, and an excimer laser.

Claim 11

The method of claim 9, wherein the first or second type of laser operates in a region selected from at least one of an ultraviolet, a visible, and an infrared region.

Claim 12

The method of claim 1, wherein the first processing source includes a first laser operating at a first power and the second processing source includes a second laser operating at a second power, wherein the first power and the second power are not the same.

Claim 13

The method of claim 12, wherein the first or second laser power is in the range of about 10 to about 100 watts.

Claim 15

The method of claim 1, further including the step of contacting the first conductive component with at least one chemical component.

Claim 16
The method of claim 15, wherein the at least one chemical component includes at least one compound selected from the group consisting of potassium ferricyanide, ruthenium hexamine, glucose oxidase and glucose dehydrogenase.

Claim 18	
Limitation	Claim Language
[18.pre]	A method of manufacturing test strips, comprising:
[18.a]	forming a reel containing a conductive layer and a base layer;
[18.b]	forming a first kerf in the conductive layer, wherein the first kerf is formed using a first focused laser beam moved relative to the conductive layer along the first kerf;
[18.c]	forming a second kerf in the conductive layer, wherein the second kerf is formed using a second focused laser beam moved relative to the conductive layer along the second kerf, the first laser beam being different to the second laser beam;
[18.d]	separating one or more test strips from the reel using a singulation process.

Claim 19

The method of claim 18, wherein the singulation process includes at least one technique selected from the group consisting of laser ablation, stamping, cutting, and etching.

Claim 20

The method of claim 18, wherein the first laser beam has a first beam width and the second laser beam has a second beam width, wherein the first beam width and the second beam width are not the same.

Claim 21

The method of claim 20, wherein the first beam width is at least approximately 20 micro-meters.

Claim 22

The method of claim 20, wherein the second beam width is at least approximately 100 micro-meters.

Claim 23

The method of claim 18, wherein at least one laser beam removes substantially all conductive material between adjacent conductive components.

Claim 24

The method of claim 18, wherein the first laser beam is emitted from a first type of laser and the second laser beam is emitted from a second type of laser, wherein the first type of laser and the second type of laser are not the same.

Claim 25

The method of claim 24, wherein the first or second type of laser is selected from the group consisting of a solid-state laser, a copper vapor laser, a diode laser, a carbon dioxide laser, and an excimer laser.

Claim 26

The method of claim 24, wherein the first or second type of laser operates in a region selected from at least one of an ultraviolet, a visible, and an infrared region.

Claim 27

The method of claim 18, wherein the first laser beam is emitted from a first laser operating at a first power and the second laser beam is emitted from a second laser operating at a second power, wherein the first power and the second power are not the same.

Claim 28

The method of claim 27, wherein the first or second laser power is in the range of about 10 to about 100 watts.

Claim 29

The method of claim 18, further including the step of contacting at least part of the conductive layer with at least one chemical component.

Claim 30

The method of claim 29, wherein the at least one chemical component includes at least one compound selected from the group consisting of potassium ferricyanide, ruthenium hexamine, glucose oxidase and glucose dehydrogenase.

Claim 32

The method of claim 18, further including application of a spacer layer to the conductive layer or the base layer.

Claim 33

The method of claim 32, wherein the second kerf is formed after application of the spacer layer.

Claim 34

The method of claim 32, further including application of a cover to the spacer layer.

Claim 35

The method of claim 18, wherein the conductive layer is formed using a technique selected from the group consisting of direct writing, sputtering, screen printing, contract printing, and lamination.

Claim 36

The method of claim 18, further including the step of applying to the conductive layer at least one of a second conductive layer and a semi-conductive layer.

Claim 37

The method of claim 36, wherein the second kerf is formed after application of at least one of the second conductive layer and the semi-conductive layer.

Table of Exhibits for U.S. Patent 8,128,981 Petition for *Inter Partes* Review

Exhibit	Description
1001	U.S. Patent No. 8,128,981 (“’981 patent”)
1002	Declaration of Dr. David Cunningham Regarding U.S. Patent No. 8,128,981 (“Decl.”)
1003	File History for U.S. Patent No. 8,128,981
1004	District Court, Trividia’s Counterclaims
1005-1006	RESERVED
1007	U.S. Pub. No. 2004/0200721 (“Bhullar”)
1008	RESERVED
1009	U.S. Patent No. 6,875,327 (“Miyazaki”)
1010	RESERVED
1011	U.S. Patent No. 6,258,229 (“Winarta”)
1012-1030	RESERVED
1031	Timothy P. Henning & David D. Cunningham, <i>Biosensors for Personal Diabetes Management</i> , in COMMERCIAL BIOSENSORS: APPLICATIONS TO CLINICAL, BIOPROCESS AND ENVIRONMENTAL SAMPLES 3–46, (John Wiley & Sons, 1998) (“Henning-Cunningham”)
1032	U.S. Pub. No. 2009/0159197 (“Edelbrock”)
1033	U.S. App. No. 60/754,141 (“Edelbrock-Prov”)
1034	James Angell et al., <i>Processing Parameters for Laser Micromachining</i> , in SPIE VOL. 2993 LASERS AS TOOLS FOR MANUFACTURING 65–74 (1997) (“Angell”)
1035	Jerry Boogaard, <i>Precision Laser Micromachining</i> , in SPIE Vol. 611 LASER PROCESSING OF SEMICONDUCTORS AND HYBRIDS 48–59 (1986) (“Boogaard”)

Exhibit	Description
1036-1037	RESERVED
1038	George Chryssolouris, <i>Lasers for Machining</i> , in LASER MACHINING THEORY AND PRACTICE 17–46 (Springer Science+Business Media, 1991) (“Chryssolouris”)
1039-1048	RESERVED
1049	U.S. Patent No. 6,531,040 (“Musho”)
1050	RESERVED
1051	Claim Construction Chart, Dkt. 61, <i>Roche Diabetes Care, Inc. v. Trividia Health, Inc.</i> , Case No. 1:24-cv-00668 (DDE) (Feb. 6, 2025)
1052	J. Sercel, et al, <i>Industrial microprocessing applications of excimer lasers</i> , in SPIE VOL. 998 EXCIMER BEAM APPLICATIONS 76–83 (1988) (“Sercel”)
1053-1054	RESERVED
1055	U.S. Pub. No. 2005/0019953 (“Groll”)
1056	U.S. Patent No. 5,593,739 (“Kickelhain”)
1057	Martin Goosey, <i>Introduction to Polymers and their Important Properties for Electronic Applications</i> , in PLASTICS FOR ELECTRONICS (2nd ed. 1999) (“Goosey”)
1058	Declaration of June A. Munford (“Munford-Decl.”)
1059	RESERVED
1060	Micah Atkin et al., <i>A Microfabricated Polymer Filter Device for Bio-Applications</i> , in SPIE VOL. 5345 MICROFLUIDICS, BIOMEMS, AND MEDICAL MICROSYSTEMS II 138–146 (2004) (“Atkin”)
1061	Douglas B. Chrisey & Alberto Piqué, <i>Introduction to Direct-Write Technologies for Rapid Prototyping Applications</i> & Jie Zhang, et al., <i>Role of Direct-Write Tools and Technologies for Microelectronic Manufacturing</i> , in DIRECT-WRITE TECHNOLOGIES FOR RAPID PROTOTYPING APPLICATIONS: SENSORS, ELECTRONICS,

Exhibit	Description
	AND INTEGRATED POWER SOURCES 1–13, 33–54 (Academic Press 2002) (“Chrissey”)
1062	File History for U.S. Pub. No. 2004/0200721 (“BhullarFH”)
1063	File History for USAN 09/411,940 (“Bhullar’940”)
1064	E. Harvey, <i>Microsensors for Minimally Invasive Diagnostics</i> , THE INSTITUTION OF ELECTRICAL ENGINEERS (1995) (“Harvey”)
1065	District Court Time to Trial Statistics (“District-Court-Statistics”)
1066	John C. Fisher, <i>A Brief History of the Nd:YAG Laser</i> , in ADVANCES IN ND:YAG LASER SURGERY 7–9 (S. N. Joffee et al. ed. 1988) (“Fisher”)
1067	William A. Vitriol, <i>Thick Film and Ceramic Technologies for Hybrid Multichip Modules</i> , in MULTICHIP MODULE TECHNOLOGIES AND ALTERNATIVES: THE BASICS 215–254 (D. A. Doane et al. ed. 1993) (“Vitriol”)
1068	RESERVED
1069	Niall O’Leary, et al., <i>A robust procedure for the automated measurement of total serum bilirubin using potassium ferricyanide</i> , 30:2 ANN. CLIN. BIOCHEM. (1993) (“O’Leary”)
1070	William B. Tiffany, <i>Drilling, marking and other applications for industrial Nd:YAG lasers</i> , in SPIE VOL. 527 APPLICATIONS OF HIGH POWER LASERS 28–36 (1985) (“Tiffany”)
1071	D. Hellrung et. al., <i>Laser beam removal of micro-structures with Nd:YAG-Lasers</i> , in SPIE Vol. 3097 LASERS IN MATERIAL PROCESSING 266–273 (1997) (“Hellrung”)
1072	D. R. Martyr & T. Holt, <i>High Power Laser Processing of Materials</i> , in SPIE VOL. 801 HIGH POWER LASERS 344–353 (1987) (“Martyr”)
1073	Roger Allan, <i>Lasers in the factory: Nd: YAG and CO2 lasers are growing in popularity for cutting, drilling, welding, scribing, and</i>

Exhibit	Description
	<i>heat-treating a host of metals and nonmetals</i> , 16:5 IEEE SPECTRUM (May 1979) (“Allan”)
1074	U.S. Patent No. 4,081,653 (“Koo”)
1075	Bayer HealthCare Ascensia Breeze User Manual (2003) (“Ascensia”)
1076	Memorandum Opinion in Case No. 1:24-cv-00668-GBW, Dkt. 62 (“Memorandum-Opinion”)
1077	Judge Gregory B. Williams Time to Trial Statistics (“Judge-Williams-Statistics”)
1078	International Patent Application Publication No. WO99/022236 (“Heinonen”)
1079	U.S. Patent No. 7,547,383 (“Cai”)

CERTIFICATE OF SERVICE

I hereby certify that on March 6, 2025, I caused a true and correct copy of the foregoing materials:

- Petition for *Inter Partes* Review of U.S. Patent No. 8,128,981 Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104
- Table of Exhibits for Petition for *Inter Partes* Review of U.S. Patent No. 8,128,981
- Exhibits 1001–1004, 1007, 1009, 1011, 1031–1035, 1038, 1049, 1051, 1052, 1055–1058, 1060–1067, 1069–1079
- Word Count Certificate of Compliance
- Roche Power of Attorney
- Fee Authorization

to be served via Federal Express on the following attorney of record as listed on USPTO Patent Center:

GREENBERG TRAURIG
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WORD COUNT CERTIFICATE OF COMPLIANCE

I hereby certify that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 8,128,981 contains 13,773 words as measured by the word processing software used to prepare the document, in compliance with 37 C.F.R. § 42.24(d).

Respectfully submitted,

Dated: March 6, 2025

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