

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BIO IMAGING SAS d/b/a VILBER,

Petitioner,

v.

SPECTRAL INSTRUMENTS IMAGING, LLC

Patent Owner.

Case IPR2023-00449

Patent 8,901,516

PETITION FOR *INTER PARTES* REVIEW

OF U.S. PATENT NO. 8,901,516 B2

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PETITIONER’S EXHIBIT LIST

Exhibit	Document
1001	U.S. Patent No. 8,901,516 B2 (“the ’516 patent”)
1002	Prosecution history of U.S. Patent Application No. 13/222,688, which issued as the ’516 patent (“the ’688 Application”)
1003	<i>Curriculum Vitae</i> of Professor Joseph Talghader, Ph.D.
1004	Declaration of Professor Joseph Talghader, Ph.D., dated January 6, 2023
1005	U.S. Provisional Patent Application No. 61/379,282, (the “’282 Provisional Application,” which the ’516 patent claims benefit to)
1006	U.S. Patent Application Publication No. US 2009/0268426 A1 (“Pohlert”)
1007	U.S. Patent No. 6,454,437 (“Kelly”)
1008	“Nomura” (English Translation of Japanese Patent No. JP 10-040330 A)
1009	U.S. Patent Application Publication No. 2004/0245170 A1 (“Furze”)
1010	U.S. Patent Application Publication No. 2004/0121175 A1 (“Flexman”)
1011	U.S. Patent No. 5,984,494 (“Chapman”)
1012	U.S. Patent No. 6,894,289 (“Nilson”)
1013	U.S. Patent No. 6,033,087 (“Shozo”)
1014	Definition of “Surround” https://www.merriam-webster.com/dictionary/surrounding last visited October 17, 2022

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Exhibit	Document
1015	IEEE Standard C37.20.10-2016 IEEE Standard Definitions for AC (52 kV and below) and DC (3.2 kV and below) Switchgear Assemblies, p.24. Definition of “surface-mounted device”
1016-1019	Reserved.
1020	Complaint for Patent Infringement
1021	Complaint Exhibit A (copy of ’516 patent)
1022	Complaint Exhibit B (Newton 7.0 Manual)
1023	Defendant Scintica Inc’s First Amended Answer to Complaint
1024	Plaintiff’s Disclosure of Asserted Claims and Preliminary Infringement Contentions and Document Production dated July 11, 2022.
1025	Defendant’s Preliminary Invalidity Contentions of Plaintiff’s U.S. Patent No. 8,901,516.
1026-1027	RESERVED
1028	Joint Claim Construction and Prehearing Statement
1029	Joint Claim Construction and Prehearing Statement Exhibit 1
1030	Talghader Expert Report for Claim Construction
1031	Exhibits A-M of Talghader Declaration for Claim Construction
1032	Claim Construction Deposition Transcript of Dr. Joseph Talghader of December 16, 2022
1033	Plaintiff’s Opening Claim Construction Brief

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Exhibit	Document
1034-1038	RESERVED
1039	PCT File History for WO 2012/030981 (counterpart foreign application of the '516 Patent)
1040	"Olympus," certified English translation, Japan Patent Application JP 2004 325174 A, "Fluorescence Detection Device," to Olympus Corporation published Nov. 18, 2004
1041	Japan Patent Application JP 2004 325174 A, "Fluorescence Detection Device," to Olympus Corporation published Nov. 18, 2004
1042	Nichia NSSG100B Green LED Specification, as stored by Archive.Org on Jan. 5, 2006 at https://web.archive.org/web/20060105141816/http://www.nichia.com:80/specification/led_smd/NSSG100B.pdf
1043	"Brydegaard," Broad-band multispectral microscope for imaging transmission spectroscopy employing an array of light-emitting diodes," American Journal of Physics 77(2) pp. 104-110 (February 2009)
1044	"GBox" dated June 4, 2009, as archived on Archive.Org on August 24, 2009 at https://web.archive.org/web/20090824075803/http://www.syngene.com/2009_GBOX2.pdf
1045	"GBox Specification," as accessed from Archive.Org as stored on November 19, 2008 at https://web.archive.org/web/20081119154705/http://www.syngene.com/GBOX_SPEC_2008.pdf

Exhibit	Document
1046	FujiFilm LAS-3000 Imaging System, as archived on Archive.Org on May 8, 2006 and found at https://web.archive.org/web/20060508123945/http://www.immaginiecomputer.it/download/fuji/las3000.pdf
1047	FujiFilm LAS-4000 Luminescent Image Analyzer Service Manual Vers. 4.0 (April 2009)
1048	MF-ChemiBIS by DNr Bio-Imaging Systems, accessed from Archive.Org as stored on April 19, 2009 and found at https://web.archive.org/web/20090419205735/http://www.dnr-is.com:80/src/MF-ChemiBIS.pdf
1049	“Varmette,” U.S. Patent No. 7,381,972 B1, “System and Method for Light Fluorescence Detection”
1050	“Hart,” “Light emitting diode excitation emission matrix fluorescence spectroscopy,” <i>Analyst</i> , 127, pp.1693-1699, Nov. 7, 2002
1051	“Entcheva,” “Fluorescence Imaging of Electrical Activity in Cardiac Cells Using an All-Solid-State System,” <i>IEEE Transactions on Biomedical Engineering</i> , Vol. 51, No. 2, pp.333-341, February 2004
1052	U.S. Patent Application Publication No. 2009/0201577 A1
1053	Delta Optical Filters brochure as archived on August 30, 2006 by Archive.Org at https://web.archive.org/web/20060830163708/http://webserver.delta.dk/C1256ED600446B80/sysOakFil/Filter%20brochure/%24File/Optical%20filters_brochure.pdf

Exhibit	Document
1054	“Colibri Highlights for Fluorescence Microscopy” published by Carl Zeiss MicroImaging GMBH, as stored by Archive.Org on October 27, 2007, at https://web.archive.org/web/20071027081401/http://www.zeiss.co.jp/C1256D18002CC306/0/5600BBFC0C1153F6C12572DB002FC71A/\$file/46-0124_e.pdf
1055	PCT WO 2006/058161 A2, “Reflectometer and Associated Light Source for Use in a Chemical Analyzer”, to Idexx Laboratories, Inc. (“Idexx Labs”)
1056	“ <i>In vivo</i> imaging of light-emitting probes,” B.W. Rice et al., Journal of Biomedical Optics 6(4) pp. 432-440 (October 2001)
1057	Molecular Imager®, VersaDoc™ MP, VersaDoc™ Imaging Systems User’s Manual REV. F (Copyright 2006 Bio-Rad Laboratories, Inc.)
1058	U.S. Patent No. 5,951,838, “Method and Apparatus for Correcting Illumination Non-Uniformities”, by Heffelfinger et al. (“Heffelfinger”) (assigned to Bio-Rad Laboratories)
1059	Molecular Imager VersaDoc MP Imaging Systems Bulletin 5609 (Copyright 2007 Bio-Rad Laboratories, Inc.)
1060	“Hansen,” WO 01/77648 A1 “Method and Apparatus for Detecting Fluorescence of a Sample,” published October 18, 2001
1061	Nichia Green LED Model NSPG500S Specification as stored by Archive.Org on January 4, 2006 at https://web.archive.org/web/20060104083659/http://www.quickar.com/nspg500s.pdf and last accessed on Dec. 29, 2022.
1062	Reserved.

Exhibit	Document
1063	“Gioux,” <i>High-Power, Computer-Controlled, Light Emitting Diode-Based Light Sources for Fluorescence Imaging and Image-Guided Surgery</i> , Molecular Imaging, Vol. 8, No. 3 (May-June 2009), pp. 156-165
1064	“Frangioni”, WO 2009/009671 Frangioni and Gioux – LED LIGHTING MODULES
1065 -1068	<i>Reserved</i>
1069	US 6,867,851 B2 – Talghader patent
1070	“Luxiflux Brochure” for the Luxiflux Fluorescence Excitation System – as saved by Archive.com on Nov. 9, 2006 at https://web.archive.org/web/20061109024740/http://sales.hamamatsu.com/assets/pdf/hpspdf/Luxiflux.pdf and last accessed on Dec. 23, 2022
1071	U.S. Patent Application Publication No. 2009/0152474 A1 (“Berger” or “Luxiflux Patent Application”)
1072	US Patent Application Publication No. 2003/0230728 A1 (“Dai”)
1073	Methods of Site -Specific Labeling of RNA with Fluorescent Dyes, 2009, Methods in Enzymology, Volume 469, ISSN 0076-6879.
1074	U.S. Patent Application Publication No. 2003/0026762 A1 (“Malmros”)
1075	FujiFilm Application Note 9 - archived by Archive.Org on August 31, 2000 at

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Exhibit	Document
	https://web.archive.org/web/20000831233530/http://home.fujifilm.com/products/science/application/pdf/9.pdf
1076	U.S. Patent Application Publication No. 2006/0119865 A1 (“Hoyt”)

I. INTRODUCTION

In 2014, U.S. Patent No. 8,901,516 (“the ’516 patent”) issued to Spectral Instruments Imaging, LLC (“Spectral” or “Patent Owner”). The ’516 patent relates to a light source housing that can be installed in an imaging system to illuminate an object using light emitting diodes (“LEDs”), instead of filtered, broadband light sources (e.g., filtered white light) to excite a fluorescence response from the object. Fluorescence imaging is used in a variety of applications, including medical imaging.

Only months after the ’516 U.S patent issued, the EPO rejected substantially similar claims in a counterpart foreign application, finding them *anticipated*¹ by a reference (“Olympus”, EX1040) that was not considered in the U.S. prosecution. The EPO record shows no response was received, and the application was withdrawn.²

¹ The record indicates substantially similar independent claims were rejected by the EPO as being anticipated by Japan Patent Application JP 2004 325174 A, “Fluorescence Detection Device,” by Olympus Optical Co., (“Olympus,” EX1040). EX1039, pp.170-174.

² EX1039, p.180.

In 2021, Spectral sued Scintica Inc. for infringement of the '516 patent, listing products branded by Petitioner, Bio Imaging SAS d/b/a Vilber (“Vilber”) in Spectral’s complaint³. Petitioner Vilber is not a party to the Spectral Litigation.

Pursuant to 35 U.S.C. §§ 311 *et seq.* and 37 C.F.R. §§ 42.1 *et seq.*, Vilber petitions for an *inter partes* review of the '516 patent. This petition presents compelling evidence of unpatentability using 102(b) printed publications that were not considered in the prosecution of the '516 patent. In addition to the Olympus prior art, a substantial amount of prior art was not considered in the prosecution of the '516 patent, including references showing the widespread use of light emitting diodes for lighting systems used in fluorescence imaging equipment over a year prior to the filing date of the '516 patent. The prior art shows prior art systems adapted to provide multiple wavelength LED lighting and detection equipment that anticipate and render obvious all claims of the '516 patent.

Petitioner requests that the Board institute an IPR of all claims of the '516 patent under 37 C.F.R. § 42.108.

³ *Spectral Instruments Imaging, LLC vs. Scintica Inc.*, No. 4:22-cv-00043 (the “Spectral Litigation”), EX1020.

II. MANDATORY NOTICES

A. Real Party-in-Interest and Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner identifies: Bio Imaging SAS d/b/a Vilber; Bio Imaging Asia PTE LTD, d/b/a Vilber Bio Imaging Asia; and Scintica Inc. as real parties-in-interest.

The '516 patent is asserted in a litigation styled *Spectral Instruments Imaging, LLC vs. Scintica Inc.*, No. 4:22-cv-00043 (the “Spectral Litigation”), filed January 6, 2022 and served on January 7, 2022. Scintica Inc. is the sole defendant in the Spectral Litigation. Bio Imaging SAS d/b/a Vilber (Petitioner) and Bio Imaging Asia PTE LTD, d/b/a Vilber Bio Imaging Asia are not parties to the Spectral Litigation.

Petitioner is not aware of any post-grant proceedings involving the '516 patent.

B. Counsel and Service Information

Lead counsel: Timothy Bianchi (Reg. 39,610). Backup counsel: Domenico Ippolito (Reg. 66,058).

Service information is SCHWEGMAN LUNDBERG & WOESSNER, P.A., 1600 TCF Tower, 121 South 8th St., Minneapolis, MN 55402, email: SLW-PTAB@SLWip.com, tbianchi@slwip.com, DIppolito@slwip.com. Petitioner consents to electronic service.

III. PAYMENT OF FEES

The undersigned authorizes the Office to charge the fee required by §42.15(a) for this Petition to Deposit Account No. 19-0743. Any additional fees that might be due are also authorized.

IV. REQUIREMENTS FOR IPR

A. Grounds for Standing

Pursuant to 37 CFR §42.104(a), Petitioner certifies the '516 patent is available for IPR and Petitioner is not barred or estopped from requesting *inter partes* review of the patent on the grounds identified in this petition.

B. Identification of Challenge

Pursuant to 37 CFR §42.104(b), Petitioner requests IPR of claims 1-27 (the Challenged Claims) and that the Board cancel same as unpatentable.

1. Specific Art on Which the Challenge is Based

Name	Exhibit	Published	Prior Art
Olympus	EX1040	11/18/2004	§102(b)
Frangioni	EX1064	1/15/2009	§102(b)
Hansen	EX1060	10/18/2001	§102(b)
Brydegaard	EX1043	February 2009	§102(b)
Malmros	EX1074	2/6/2003	§102(b)
GBox	EX1044	8/24/2009	§102(b)

These references and arguments of the grounds of this petition were not considered in the U.S. prosecution.

The references are all prior art under 35 U.S.C. § 102(b) to the Provisional Application filing date; however, the '516 patent is not entitled to the provisional filing date and Petitioner reserves the right to challenge the effective filing date if necessary in this proceeding.

The '516 patent issued from an application filed 8/31/2011, therefore pre-AIA law applies.

2. Statutory Grounds on Which the Challenge is Based

Petitioner respectfully requests cancelation of the Challenged Claims on the following grounds:

35 U.S.C. § 102 Grounds

Ground 1: Claims 1, 3, 4, 7, 9-11, 14-17, 23, and 25 are anticipated by Olympus.

35 U.S.C. § 103 Grounds

Ground 2: Claims 2, 5, and 20 are obvious in view of Olympus.

Ground 3: Claims 6, 10-12, 18, 21, 22, and 26 are obvious in view of Olympus and Frangioni.

Ground 4: Claims 8, 13, 19 and 27 are obvious in view of Olympus and Hansen and/or Malmros.

Ground 5: Claim 24 is obvious in view of Olympus and Brydegaard.

Ground 6: Claims 1-23 and 25-27 are obvious in view of GBox and Olympus.

Ground 7: Claim 24 is obvious in view of GBox, Olympus, and Brydegaard.

V. BACKGROUND

A. Overview of '516 patent

The '516 patent discusses “imaging systems” that “capture various types or modes of images.” The captured light “may be generated by a bio-luminescence process, a fluorescence process,” or “reflected by the object.” EX1001, 1:20-32. The '516 patent describes a light system called an “excitation light source assembly 10” (FIG. 1), which is a component of an imaging system 12 (FIG. 2). The excitation light source assembly 10 illuminates an object on a stage 60 to excite fluorescence in it and camera 36 of the system images the fluorescence. EX1001, 2:49-54, 3:24-39, 6:11-28; FIGS. 1-2.

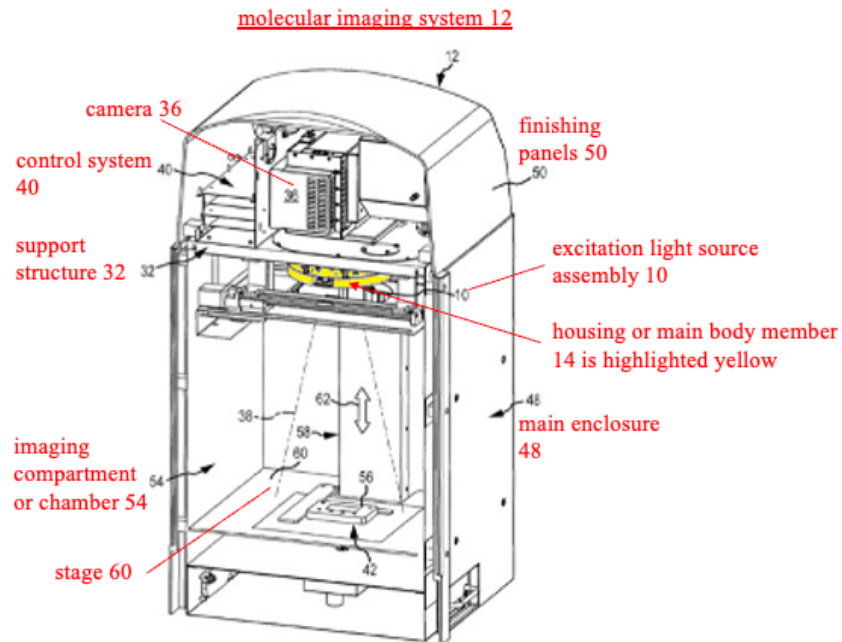


FIG. 2

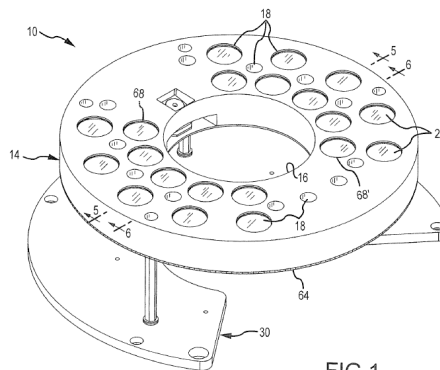
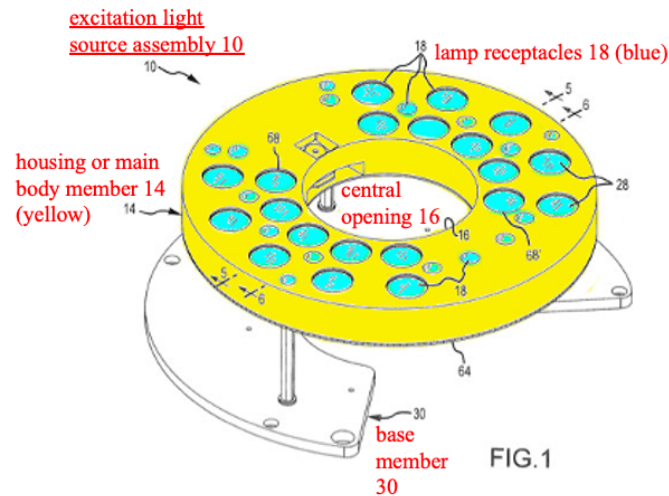


FIG. 1

'516 Patent FIGS. 1, 2

As depicted in FIG. 1, annotated below, the excitation light source assembly 10 includes a “housing or main body member 14” (highlighted yellow) defining a central opening 16 and a number of lamp receptacles 18 (blue). The base member 30 of the excitation light source assembly 10 is labeled separately. The base member

mounts to support structure 32 inside main enclosure 48 so that a lens assembly 34 of camera 36 is substantially aligned (i.e., concentric) with central opening 16 of a main body 14 of excitation light source assembly 10. EX1001, 4:20-34.



'516 Patent FIG. 1 (annotated)

The '516 patent identifies the structure 110 of FIGS. 9-11 as a “second embodiment” and the structure 210 of FIGS. 12-13 as a “third embodiment.” EX1001, 3:3-15. The second embodiment 110 shows eight “ housings or main bodies 114,” each individually mounted to a C-shaped base member 130 and each having a single removable lamp receptacle 118:

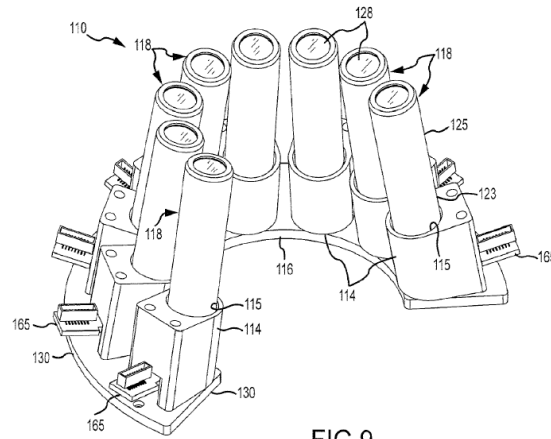


FIG. 9

'516 Patent FIG. 9

EX1001, 3:3-11, 11:4-12:40, FIGS. 9-11. The '516 refers to the C-shaped base member 130 as having a "central opening 116." *Id.*, 11:22-24.

The third embodiment 210 shows a C-shaped housing or main body 214 that defines a "central opening 216:"

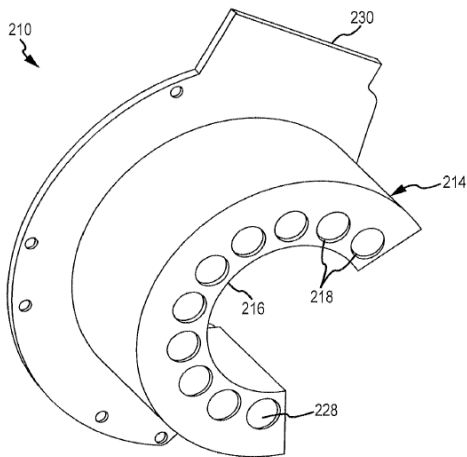


FIG. 12

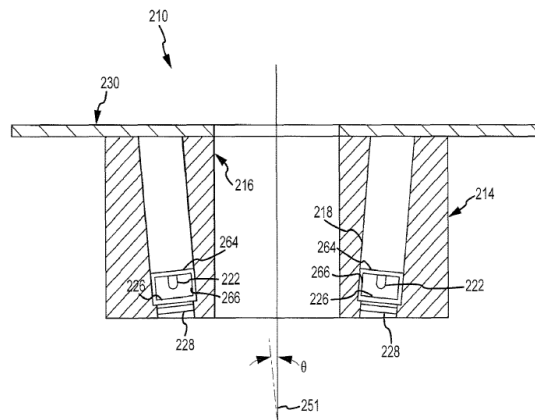


FIG. 13

'516 Patent FIGS. 12-13

EX1001, 12:41-13:15, FIGS. 12-13.

The '516 patent claims with element identifiers are listed in **APPENDIX A**.

B. Prosecution History of the '516 patent

The '516 patent application (U.S. Ser. No. 13/222,688 or the "'688 Application"), filed on August 31, 2011, claims the benefit of U.S. Provisional No. 61/379,282, filed September 1, 2010 (EX1005, the "Provisional Application"), and incorporates it by reference "for all that it discloses." EX1001, p.1, 1:5-9; EX1002, pp.23-48.⁴

The Patent Office issued a restriction requirement and Applicant elected a group "drawn to an excitation light source assembly comprising a housing defining a central opening therein and diffusers," and withdrew original claims 9-18. EX1002, pp.763-767 (Restriction Requirement, 11/21/2012); pp.771-772 (Election of Invention 12/12/2012).

⁴ The '516 patent includes substantial new matter over the contents of the Provisional Application. The prior art submitted in this petition is §102(b) prior art to the '516 regardless of the priority date accorded to the claims. Petitioner reserves the right to challenge the effective filing date of the '516 patent claims.

1. Pohlert, Kelly, and Nomura Based Rejections

The Patent Office rejected the pending claims based on combinations of Pohlert (EX1006), Kelly (EX1007), and Nomura (EX1008).⁵ Office Action of 1/30/2013, EX1002, pp.775-787. The rejection states:

[] Pohlert teaches a stand-mounted light panel for natural illumination in film, television or video (title) and further teaches a central opening (103, fig. 1, 303 figs. 4-5) having a plurality of lamp receptacles (lamp segment 306, fig. 4; panel frame or frame, abstract, fig. 47a, pars. 0179-0180, receives the LEDs; see also figs. 48a-50b) surrounding the central opening (303, fig. 4; 3803, fig. 38A) [].

EX1002, p.778.

Pohlert FIGS. 4-5 show a ring-shaped lighting frame with a central opening 303 with low power lamps 305, which include LEDs for illumination. EX1006, ¶¶0096, 0098, 0179.

⁵ Additional references were used to reject claim 5 (Furze, EX1009) and claim 27 (Flexman, EX1010).

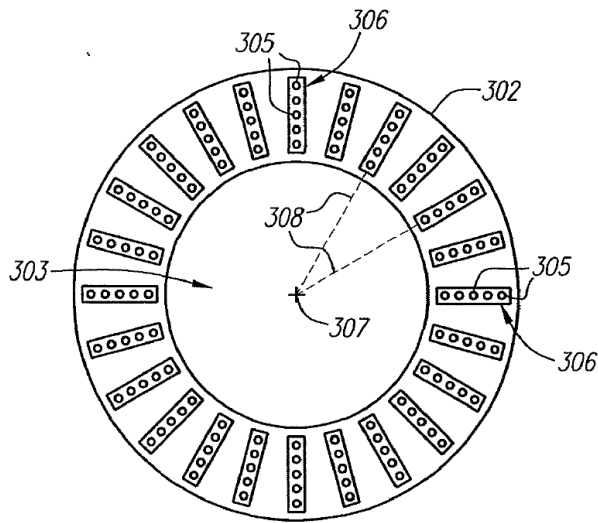


FIG. 4

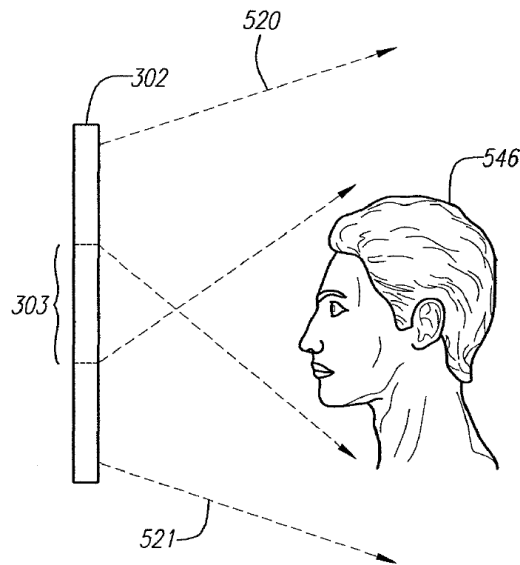


FIG. 5

Pohlert, FIGS. 4-5.

Pohlert describes several lighting structures, including light panels 4702. Light panels 4702 are shown “as being generally rectangular in shape,” but may be of “any suitable shape, including, for example, hexagonal, octagonal, or other polygonal or semi-polygonal, or round, oval, square, or ring-shaped (such as illustrated in FIG. 4, for example).” EX1006, ¶0180.

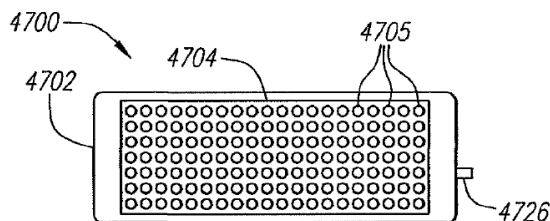


FIG. 47A

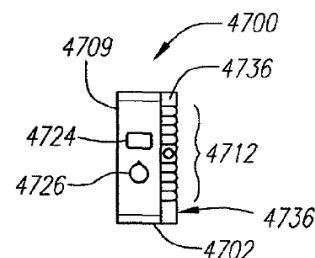


FIG. 47B

Pohlert, FIGS. 47A-47B, Rectangular Light Panel Example

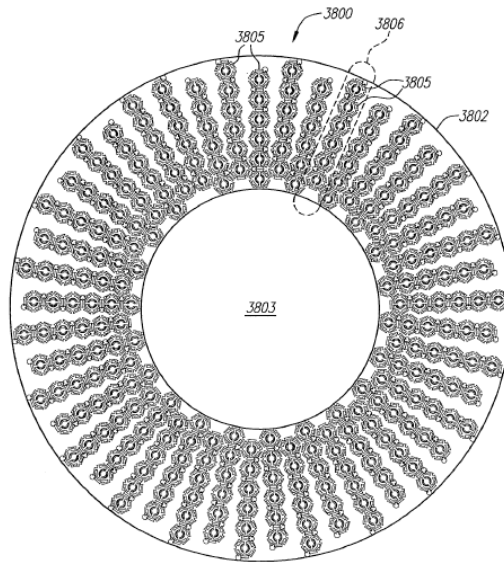
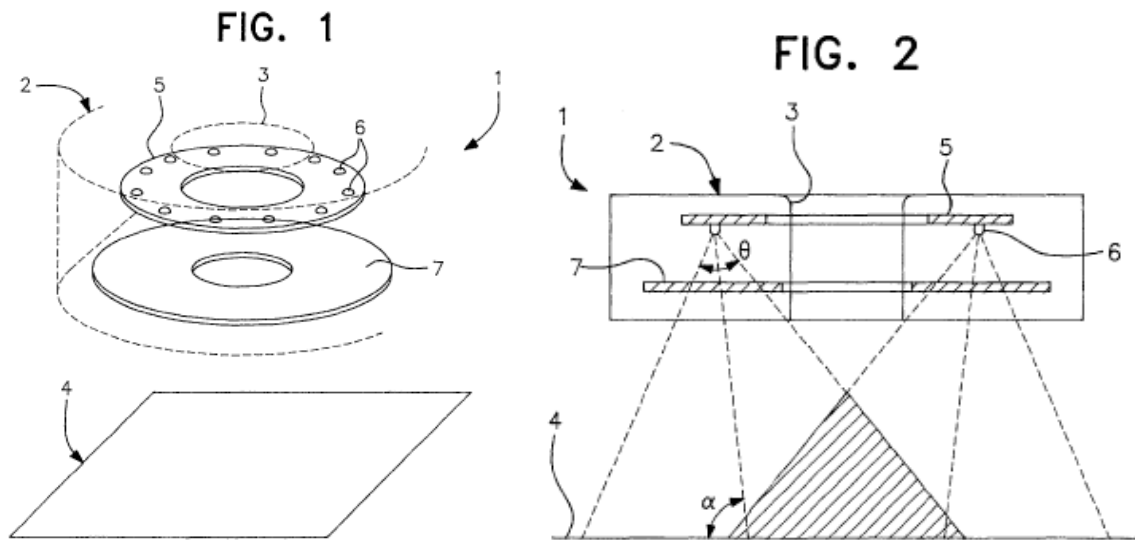


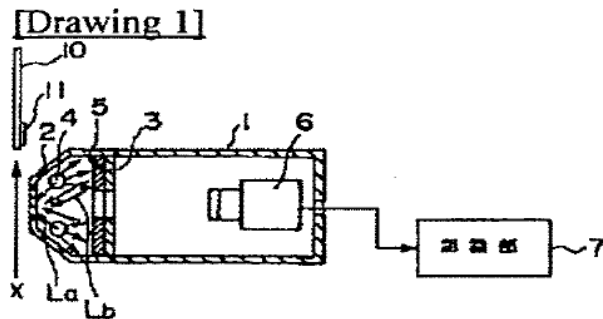
FIG. 38A
Pohlert, FIG. 38A, Ring-Shaped Lighting Panel 3800 with Surface Mount LEDs 3805.

The rejection stated, “[h]owever, Pohlert does not explicitly state a housing defining a central opening which contains the structure which holds a plurality of lamps, for connecting the camera to a central aperture. Kelly teaches a ring lighting (title) and further teaches a housing (2, figs.1-2) defining a central opening (3 figs.1-2) which contains the structure which holds a plurality of lamps (6 figs. 1-2), for connecting the camera to a central aperture (abstract, figs. 102).” EX1002, p.779.



Kelly, EX1007, FIGS. 1-2.

The rejection combined Nomura with Pohlert and Kelly for its teaching of “an apparatus comprising a central hole aligned with a camera having a plurality of light sources surrounding the central aperture being used as an excitation light source.”
 EX1002, p.779.



Nomura, EX1008, FIG. 1.

a) Applicant Argued the Claims Require a Housing
Defining a Plurality of Lamp Receptacles

Applicant filed an Amendment with remarks in response to the Office Action, stating: “Independent claim 1 **requires that housing 14 define a *plurality of lamp receptacles 18.***” Amendment of April 30, 2013, at EX1002, p.829 (entire Amendment at pp.812-837) (italics in original, bolding added). Applicant argued that Pohlert and Kelly were distinguishable from claim 1, stating “[n]owhere does Pohlert disclose, or even suggest, an embodiment having a **housing that defines both** a central opening therein **as well as a plurality of lamp receptacles**” and “...Kelly’s **housing 2 also does not define a plurality of lamp receptacles.**” *Id.* (bolding added). Applicant added: “Significantly, Nomura’s case 1 also does not define a plurality of lamp receptacles. Nomura discloses only one [receptacle].” EX1002, p.830.

b) Applicant Argued that Light Sources “Mounted On” a
Surface are not “Positioned Within” Lamp Receptacles

Pohlert’s figures, such as FIG. 4, show surface-mounted light sources, such as lamp segments 306 comprising a plurality of low power lamps 305, which comprise light emitting diodes (LEDs) and in various embodiments include surface mount LEDs. Pohlert, ¶¶0098, 0155, FIG. 4.

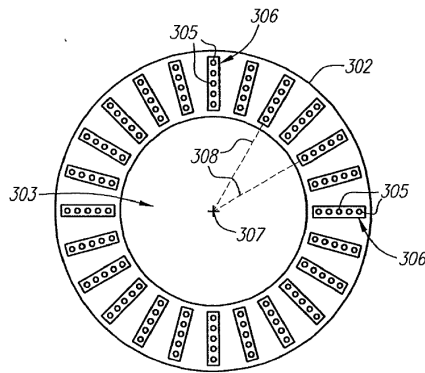


FIG. 4

Pohlert, FIG. 4.

Figures 11 and 12 of Pohlert show a plurality of lamps 1112 mounted on lighting frame 1101, which can be covered with other structures, such as a diffusion filter 1205, a color filter 1215, and a cover 1218. Pohlert, ¶¶0144, 0149, FIGS. 11, 12.

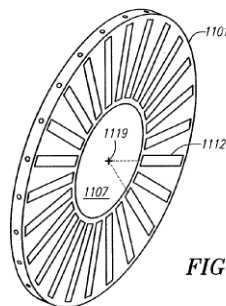


FIG. 11

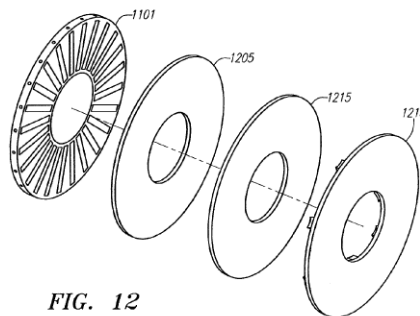


FIG. 12

Pohlert, FIGS. 11-12.

Applicant argued that a light source positioned within lamp receptacles (as recited in claim 1) is different than the surface-mounted light sources of Pohlert and Kelly:

“Independent claim 1 requires that housing 14 define a **plurality** of lamp receptacles 18. Claim 1 also requires at least one light source 20 to be positioned **within** each of the plurality of lamp receptacles 18. These limitations are not met by any of Pohlert, Kelly, and Nomura. For example, while Pohlert discloses several different lighting frame embodiments (e.g., 202, 302, 1101, etc., shown in Figs. 1-4, 11, and 12), none of Pohlert’s lighting frames define a plurality of lamp receptacles within which are received the light sources. To the contrary, Pohlert mounts his light sources directly **on** the surfaces of his lighting frames. See, for example, Figures 2, 4, 11, 12, 15c, 30a, 30b, and 30c of Pohlert. [] Pohlert further fails to disclose a lighting system wherein the light sources are positioned **within** each of its receptacles.”

EX1002, p.829 (emphasis in original).

Applicant further argued that “[i]ndependent claims 19 and 35 [which issued as claims 14 and 25] are allowable over Pohlert, Kelly, and Nomura for the same reasons expressed above for claim 1.” *Id.*, p.830.

In the next Office Action, the Examiner withdrew the prior rejection based on Plaintiff's arguments. EX1002, p.844 (Office Action of July 10, 2013). The Examiner acknowledged Plaintiff's exclusion of surface mounted devices, stating

Pohlert [] fails to explicitly state that said light source is positioned within each of a plurality of lamp receptacles. Nevertheless, those skilled in the art appreciate that such a configuration was known and would have been a matter of design choice since there were a finite number of predictable configurations (i.e., **surface mount**, recessed receptacle).

Id., p.847 (bolding added for emphasis). The Examiner made a new rejection using a new reference, Chapman (EX1011), to provide a recessed receptacle teaching: "Substituting the **surface mount configuration taught by Pohlert** with the receptacles taught by Chapman would have been obvious" *Id.* (bolding added for emphasis). The Examiner thus differentiated surface mount devices from recessed devices based on Applicant's arguments regarding Pohlert.

c) Applicant Characterizes the Present Invention as a ***Single Excitation Light Source Assembly*** for Multiple Narrow Band Illumination

In the next two responses, Applicant asserted:

The excitation light source assembly of the present invention may be used to advantage to illuminate an object or a specimen with light in **multiple narrow bands**

or colors, thereby allowing **a single excitation light source assembly** to be used in imaging applications involving a wide range of fluorescent materials that are excited over a wide range of wavelengths.”

EX1002, p.881 (Amendment dated 10/10/2013), and pp.930-931 (Response dated 5/9/2014)(bolding added). Thus, Applicant characterized the **present invention** as a **single assembly** for **multiple narrow-band excitation** over a “wide range of fluorescent materials.”⁶

d) Applicant Represents that the Claimed Excitation Light Sources are Narrow-Band Light Sources

In response to rejection of the ’516 patent claims over a combination of Nilson and Shozo, Applicant submitted a declaration asserting that Nilson filters light, but even if the filter only allows “through 1 photon out of 1,000,000,” this “will still be a significant source of unwanted ‘background’” light. By contrast, the declarant asserted that the “narrow-band light sources used in the invention

⁶ Patent Owner’s “single assembly” characterization is consistent with the ’516 patent referring to “the single housing 14 of excitation light source assembly 10.” EX1001, 8:21-22; *see*, EX1001, 13:13-14 and EX1005, ¶0019 (housing fabricated as a “single piece”) and EX1005, ¶0020 (the “single housing of the excitation light assembly”).

described in the subject patent application ... will not introduce ... significant amounts of unwanted background light.” EX1002, ¶¶10-19, pp.940-944, (Declaration of Michael B. Nelson).

The application was allowed and the ’516 patent issued on Dec. 2, 2014.

VI. LEVEL OF ORDINARY SKILL

A person of ordinary skill in the art at the time of the alleged invention of the ’516 patent (“POSA”). should have an understanding of light sources, structures for holding and electrically connecting the light sources, optical devices such as filters and diffusers, cameras, and control systems to operate the light sources. A POSA would have at least a bachelor’s degree in engineering or physics and about two years of experience in imaging systems or studies or research relating to light sources used in imaging systems. Additional education may supplement practical experience and additional practical experience may supplement education. EX1004, ¶22.

Petitioner submits the declaration of Dr. Joseph Talghader, a Ph.D. and engineering professor with experience in optics, light emitting devices, optical and infrared materials and detectors, optical filters, optical diffusers, and fluorescent imaging devices, such as those referenced in the ’516 patent. Prof. Talghader’s education and technical experience qualifies him as a POSA. EX1004, ¶¶1-22. Prof.

Talghader prepared an expert report for Scintica Inc. regarding claim construction in the Spectral Litigation. EX1030.

VII. CLAIM CONSTRUCTION

Claim terms subject to IPR are construed according to the *Phillips* standard applied in district court. 37 C.F.R. § 42.200(b). Only terms necessary to resolve the controversy must be construed. *Nidec Motor v. Zhongshan Broad Ocean Motor*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Petitioner submits with this Petition proposed claim constructions that parallel those advanced by defendant Scintica in the Spectral Litigation, where claim construction briefing is ongoing. Petitioner includes the relevant publicly available litigation documents providing the Spectral Parties' positions and arguments as of the date of this filing. (e.g., EX1020-1033).

A. Petitioner's Proposed Claim Constructions

1. ***“a housing defining a central opening therein and a plurality of lamp receptacles [therein*] surrounding the central opening”*** **(claims 1, 14, [and 25*])**

a) Claims 1 and 14

Independent claims 1 and 14 of the '516 patent recite “*a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening.*” The housing phrase is nearly identical in independent claim 25; the word “*therein*” is inserted after “*receptacles*” in the housing phrase of claim 25.

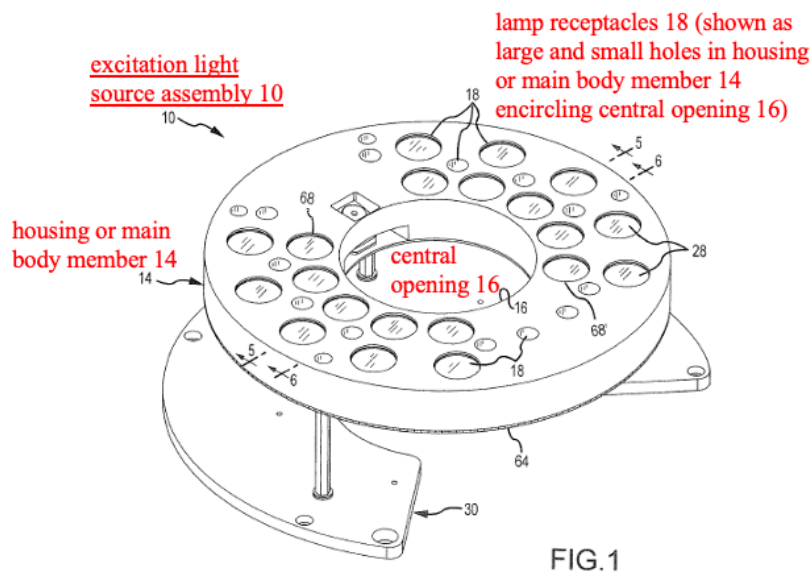
Petitioner proposes that the housing phrase be construed to mean **a main body member having an opening through its center** [the “central opening”], **the member having a plurality of holes in the member that encircle⁷ the opening** [“lamp receptacles”]. This construction clarifies that the central opening and receptacles are holes defined by the housing. Thus, it is the shape or form of the housing which defines these holes. *See*, §26 Claiming Holes, *Landis on Mechanics of Patent Claim Drafting*, Fourth Ed. (one approach to describing holes is to recite structure defining a hole, groove, etc.; “[t]he hole is thus defined in terms of the structure that forms it.”).

Petitioner’s construction is consistent with the ’516 patent specification and arguments made by Patent Owner in prosecution. For example, the **’516 patent specification** states that housing or main body member 14 defines a central opening

⁷ The Merriam-Webster Dictionary states that “surround” means to “enclose on all sides, envelop,” or “to extend around the margin or edge of, encircle.”

<https://www.merriam-webster.com/dictionary/surrounding>, last visited October 17, 2022 (EX1014).

and a plurality of receptacles.⁸ EX1001, 3:24-30. “Housing or main body member 14” is one example. It “defines” central opening 16 and lamp receptacles 18 surrounding (or encircling) the central opening 16, shown in FIG. 1 of the ’516 patent:



Certain **dependent claims** of the ’516 patent explicitly recite “lamp receptacles **defined by** said housing.” EX1001, claim 4 (dependent on claim 1), claim 16 (dependent on claim 14), and claims 26 and 27 (dependent on claim 25). EX1001, 13:49-50, 14:47-48, 16:4-5, 16:11-12.

⁸ The ’516 also states that housing 214 of FIG. 12 “defines” a central opening and a plurality of receptacles. EX1001, 12:41-47.

Petitioner’s “housing” construction is consistent with numerous references in the ’516 patent to “housing or main body member 14” and references to a “single housing” and a housing fabricated as a “single piece.” EX1001, 3:25-27, 6:35-36, 7:19, 7:27-28, 4:22, 8:21-22, 13:13-14. (The Provisional Application does not mention “lamp receptacles,” but instead refers to “elongated holes.” EX1005, p.6, ¶0002 and pp.6-43, generally.)

Patent Owner’s **prosecution statements** also support Petitioner’s proposed construction. For example:

- Patent Owner asserted that “[i]ndependent **claim 1 requires that housing 14 define a *plurality* of lamp receptacles 18.**” EX1002, p.829 (bolding added, italics in original); *see* Section V(B)(1)(a). Housing 14 is the “first embodiment” of the ’516 patent. EX1001, FIG. 1. The other “second” and “third” embodiments were not separately argued.
- Patent Owner argued that the remaining independent claims were patentable for the “same reasons” as independent claim 1, tying Patent Owner’s characterization of claim 1 (i.e., that it requires housing 14 to define a plurality of receptacles) to independent claims 14 and 25. EX1002, p.830; *see* Section V(B)(1)(b).
- Patent Owner characterized “the excitation light source assembly of the **present invention**” as “a **single** excitation light source assembly.” EX1002, p.881 and 931 (bolding added); *see* Section V(B)(1)(c).

b) Claim 25

Regarding claim 25, it is Petitioner's position that the additional "therein" inserted after "lamp receptacles" is redundant since the housing is "defining" the holes that are lamp receptacles, and so the holes are in the housing that defines them. Patent Owner said the same thing in prosecution, stating:

In summation, then, no combination of Pohlert, Kelly, and Nomura would result in an excitation light source that meets the claimed limitations that **require** the housing to define "a plurality of lamp receptacles" **therein** and further wherein the light sources are "positioned within each of the plurality of lamp receptacles" as specifically required by claim 1.

EX1002, p.830 (bolding added). Patent Owner then represented the same was true for the remaining two independent claims: "[i]ndependent claims 19 and 35 [i.e., issued claims 14 and 25] are allowable over Pohlert, Kelly, and Nomura **for the same reasons expressed above for claim 1.**" *Id.* (bolding added); *see* Section V(B)(1)(b). Hence, the prosecution record shows that Patent Owner argued all independent claims "**require**" that lamp receptacles be in the housing.

Based on the foregoing, Petitioner proposes the "housing" recitations of claims 1, 14, and 25 be construed as: **a main body member having an opening through its center, the member having a plurality of holes in the member that encircle the opening.**

2. ***“positioned within” as used in “a light source positioned within each of the plurality of lamp receptacles” (claims 1 and 25) and “at least one narrow-band light source positioned within at least one of the plurality of lamp receptacles” (claim 14)***

Patent Owner argued that light sources mounted on surfaces, such as the surface mount LEDs on Pohlert’s frames, are not “a light source positioned within each of the plurality of lamp receptacles.” EX1002, p.829, *see* Section V(B)(1)(b). The Examiner accepted Patent Owner’s argument and withdrew the Pohlert’s surface mounted LEDs because it was not a light source positioned within a lamp receptacle. EX1002, 847 (examiner stating “Pohlert [] fails to explicitly state that said light source is positioned within each of a plurality of lamp receptacles.”).

To reflect Patent Owner’s exclusion of surface mounted light sources, Petitioner proposes that “a light source positioned within each of the plurality of lamp receptacles” of independent claims 1 and 25 means **“a non-surface-mounted light source in each of the plurality of holes in the member.”**

Petitioner also proposes that *“at least one narrow-band light source positioned within at least one of the plurality of lamp receptacles”* as recited in independent claim 14 means **“a non-surface-mounted narrow-band light source in at least one of the plurality of holes of the member.”**

3. “diffuser” (claims 1, 4, 14, 15)

The '516 patent states that a “diffuser 26 diffuses or spreads light produced by the light source 20, thereby generally providing for more even illumination than would be provided by light source 22 alone.” '516 patent, 9:22-25. Petitioner’s expert generally agrees with this characterization, but observed it is incomplete because a POSA would understand that a diffuser diffuses or spreads light by randomizing rays of light passing through it to make the light passing through it more even. EX1004, pp. 116-117. To better define the diffuser, Petitioner proposes that the term “diffuser” means **“an optical component that spreads and randomizes rays of light passing through it to provide more even illumination than would be provided without the optical component.”**

4. “a diffuser positioned within at least some of the plurality of lamp receptacles” (claims 1 and 14)

Petitioner proposes that this term be construed as **“a diffuser positioned within at least some of the holes of the member that contain narrow-band light sources.”** This construction is based on the '516 patent’s teaching in the first embodiment (housing 14 of FIGS. 1, 5 and 6) that:

In a typical application, those lamp receptacles 18 that are provided with narrow band light sources 22 may also be provided with diffusers 26 and filters 28, whereas those **receptacles 18 that are provided with broad-band light**

sources 24 will not be provided with diffusers 26 and filters 28. Alternatively, other arrangements are possible, as will be described herein.

EX1001, 3:45-51 (emphasis added). Petitioner's expert, Dr. Talghader, studied the '516 patent for its discussion of broad-band light sources and diffusers, but did not find broad-band light sources discussed with respect to the second and third embodiments, nor did he find any examples of diffusers in receptacles having broad-band light sources in the '516 patent. EX1004, pp.117-119. Consequently, given the '516 patent's characterizations of broad-band light sources and diffusers, Petitioner proposes that the term "*a diffuser positioned within at least some of the plurality of lamp receptacles*" means: **"a diffuser positioned within at least some of the holes of the member that contain narrow-band light sources."**

B. Contested Terms in the Spectral Litigation

In the Spectral Litigation, Patent Owner Spectral asserts that all claim terms should be given their plain and ordinary meaning. EX1033, p.5. However, Spectral insists that the term "housing" in the phrase "housing defining a central opening therein and a plurality of lamp receptacles" is not a reference to "housing or main body member 14," and that "throughout the specification, the patentee referred to 'housing' and 'main body member' separately and distinctly—the latter was given the reference number '14' for the figures." EX1033, pp.15-16. Furthermore, Spectral asserted that the term "housing," as used in the claims should be mapped to the "main

enclosure 48 of the imaging system 12.” EX1033, pp.15-16. Spectral’s assertions are unsupported by the ’516 patent and the prosecution history.

The ’516 patent refers to “housing 14” eight times. EX1001, 4:33, 4:34, 6:44, 6:45, 7:37, 8:14, 8:21-22, and 10:19. The ’516 patent refers to “main body member 14” six times. EX1001, 6:46-47, 6:58, 6:61-62, 7:25, 7:34, 8:50. The ’516 patent refers to “housing or main body member 14” six times. EX1001, 3:25, 3:26-27, 4:22, 6:35-36, 7:10, 7:27-28. EX1033, pp.15-16. Thus, it is clear that the patentee used the terms “housing” and “main body member” interchangeably and that element 14 in the figures corresponds to the housing of the claims. Additionally, during prosecution, Patent Owner’s counsel argued that “housing” in the claims referred to “housing 14” and not as “main enclosure 48.” EX1002, p.829, line 10 (“Independent claim 1 requires that *housing 14* define a plurality of lamp receptacles.”).

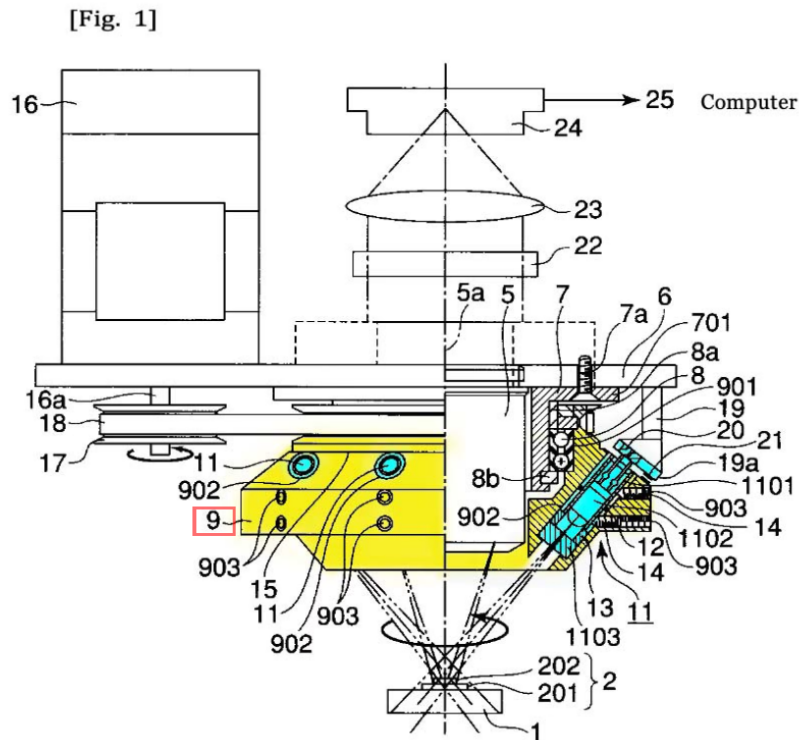
VIII. GROUNDS OF UNPATENTABILITY

A. Ground 1: Claims 1, 3, 4, 7, 9-11, 14-17, 23, and 25 are anticipated by Olympus

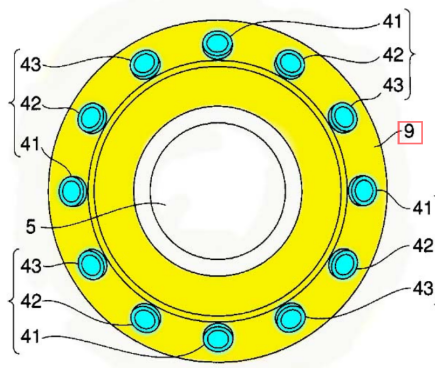
Olympus anticipates claims 1, 3, 4, 7, 9-11, 14-17, 23, and 25, as set forth herein.

1. Overview of Olympus

Olympus teaches a fluorescence detection system that uses a plurality of “LED light source units 11” housed in a “light source holding member 9 (highlighted yellow)” to illuminate a sample on a table 1 to generate fluorescence in the sample. The right side of FIG. 1 shows a cross section of the holding member to show how the LED light source units 11 are positioned in each of a plurality of “LED light source unit storage holes 902 (blue).” Light source holding member 9 includes a central opening or “hole portion 901 formed along the optical axis 5a.” An objective lens 5 is able to focus on the sample table 1 through the hole portion 901. EX1040, Abstract, p.1, ¶¶0050,0052-0053,0055-0056, FIG. 1.



[Fig. 13]



FIGS. 1, 13 of Olympus

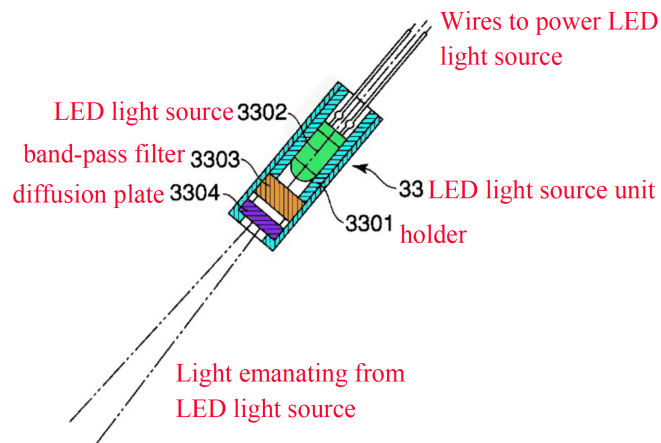
FIG. 13 shows a view of the light source holding member 9 from the top. *Id.*

¶¶0128-0133, FIG. 13. Olympus teaches embodiments having a rotatably supported light source holding member 9 (e.g., FIG. 1) and others that are fixed (e.g., FIG. 22). The LED light source unit in housing hole 902 includes an LED

light source 1102 and a band-pass filter 1103 that “mainly passes the vicinity of the wavelength region of the light emitted from the LED light source 1102.” *Id.*, p.1(Abtract), ¶¶0045,0058, 0200-0209, FIGS. 1, 22; EX1004, ¶¶65-66.

Olympus seeks to produce even and efficient irradiation excitation light for “performing highly reliable fluorescence,” and for “uniformly irradiat[ing] over the entire surface of the sample” to receive “stable and reproducible fluorescence.” EX1040, p.1(Abtract), ¶0116. Olympus describes an LED light source unit 33 comprising an LED light source 3302 and a diffuser (diffusion plate 3304) in the housing holes 902 of light source holding member 9 to provide “almost uniform irradiation” over a sample. EX1040, ¶¶0113-0116, FIG. 11.

[Fig. 11]



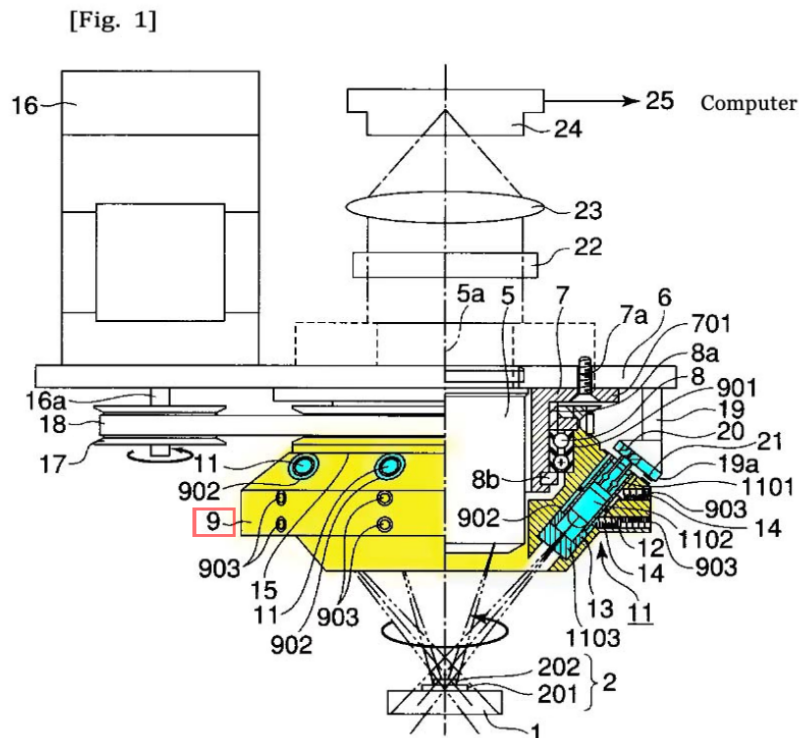
Olympus explicitly states that its disclosure is not limited to the example embodiments and that “various modifications can be made without changing the gist of the invention.” Olympus also states that its samples are not limited to DNA

microarrays, and that “the present invention is widely applicable not only to DNA but also to various other types of biological materials...” EX1040, ¶¶0209,0210.

2. Olympus Applied to Independent Claim 1

1. [Preamble] An excitation light source assembly, comprising:

To the extent the preamble is limiting, **Olympus** teaches an excitation light source assembly [e.g., “light source holding member 9” and “LED light source units”]. EX1040, Abstract, p.1, ¶¶0045,0058, 0200-0209, FIGS. 1, 13, 22 (fixed member 9).



[Fig. 13]

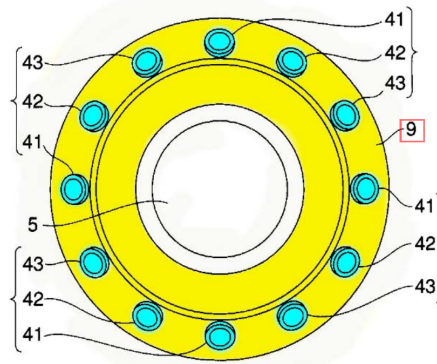


FIG. 33, Olympus, top view

[Element 1a] a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening, said housing being mountable to a support structure so that the central opening is aligned with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing;

In direct contradiction to what it represented in prosecution before the Office, that “claim 1 **requires** [] **housing 14** define a plurality of receptacles 18,” Patent Owner now asserts that the plain meaning of “housing” recited in all claims of the ’516 patent is not a “main body member or housing 14,” but instead is the “main enclosure 48.” Cf. EX1002, p.829, EX1033, pp.11-12 (citing the ’516 patent, 5:56-61 to make its “main enclosure 48” plain meaning construction). Petitioner denies that construction is correct, but if the Board were to adopt Patent Owner’s “main enclosure 48” interpretation of “housing,” Olympus teaches a “main enclosure,” placing its fluorescence detection unit in a “light shielding box [] and shielded from the outside.” EX1040, ¶0070. EX1004, ¶¶44-46.

In the event the Board decides that the recited “housing” is not main enclosure 48, the following analysis shows that Olympus teaches a “housing.”

Olympus teaches “*a housing defining a central opening and a plurality of lamp receptacles surrounding the central opening,*” which is light source holding member 9. EX1040, FIGS. 1, 13, 22, ¶¶0053, 0056, 0057. Light source holding member 9 is a main body member having an opening through its center (hole portion 901) and a plurality of holes in it that encircle the opening (unit storage holes 902). *Id.*, EX1004, ¶¶64-66.

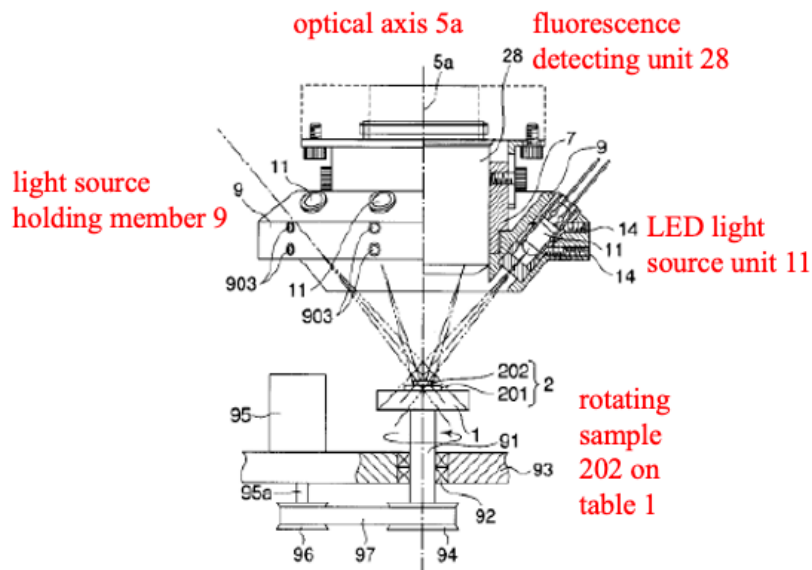
Light source holding member 9 is “*mountable to a support structure so that the central opening is aligned with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing.*” In the embodiment of FIG. 1, **Olympus** references base 6, shaft 7, bearing 8, C-ring 8b, and associated hardware to position the light source holding member 9 with respect to the camera and to maintain them above sample table 1. ¶¶0051, 0064, 0200-0209, FIGS. 1, 22; EX1004, ¶¶64-66.

In FIG. 1, light source holding member 9 is mounted “so that the central opening is aligned with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by the housing.” “[A]n optical axis 5a of the objective lens 5 [which is in the hollow portion of the shaft 7] coincides with a center of the sample tank 201” and “the light source holding member 9 has a hole portion

901 formed along the optical axis 5a.” EX1040, ¶¶0050, 0052, 0053. Lens 5, lens 23, and photodetector/CCD camera 24 are on optical axis 5a. *Id.*, ¶0066; EX1004, ¶¶64-66.

With respect to the embodiment of FIG. 22 (which uses the same reference numerals) light source holding member 9 is fixed and is mounted to a cylindrical fixed shaft 7 and associated hardware to position it with respect to the camera and to maintain them above sample table 1. The stationary light source holding member 9 of FIG. 22 has the same alignment of lens 5, sample tank 201, and light source holding member 9 along optical axis 5a. A fluorescent detection unit 28 is shown in the central portion of light source holding member 9 in the cutaway section. EX1040, ¶¶0201-0209, FIG. 22; EX1004, ¶65.

[Fig. 22]

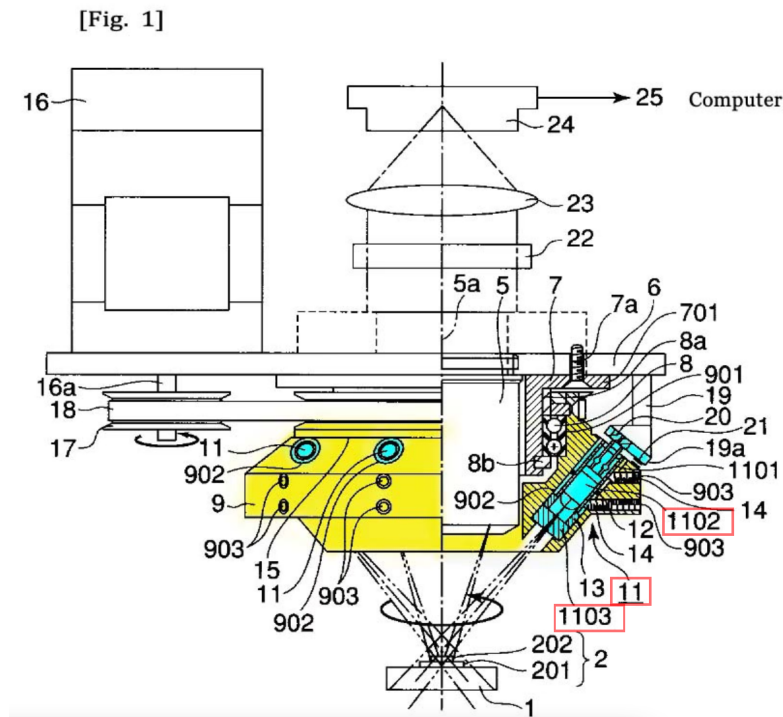


Olympus, FIG. 22 (annotated) Stationary Member 9

EX1040, ¶¶0200-0210, FIG. 22. Therefore, **Olympus** teaches **Element 1a**.

[Element 1b] a light source positioned within each of the plurality of lamp receptacles, wherein at least one of said light sources comprises a narrow-band light source; and

FIG. 1 shows a cross sectional drawing of an LED light source unit 11 in a LED light source unit housing hole 902 (blue):

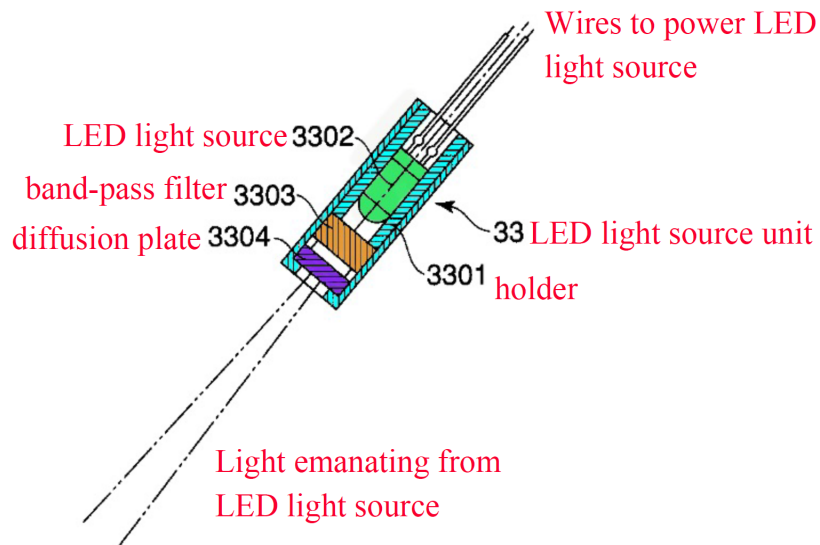


LED light source unit 11 includes a band-pass filter 1103 and a LED light source 1102. EX1040, ¶0058, FIG. 1. Olympus references light emitting diodes and “semiconductor light source means,” both of which are typically narrow-band light sources compared to the white light sources of the prior art. EX1004, ¶¶64, 90. Olympus further states “the band-pass filter 1103 mainly passes the vicinity of the wavelength region of the light emitted from the LED light source 1102.” *Id.* A POSA would understand this to mean the band-pass filter 1103 passes light from an LED light source 1102 which has a spectral peak mostly within the passband of the band-pass filter 1103. Olympus makes a similar band-pass filter reference to transmissions of “the vicinity of the peak wavelength of the emission of the LED light source” when discussing its three-wavelength embodiment. EX1040, ¶0133

(discussing band-pass filtering LEDs having passbands for its 490nm, 520nm, and 630nm narrow-band excitation emissions). A POSA would understand that the LED light sources and semiconductor light source means of Olympus are narrow-band light sources in the context of the claims of the '516 patent. EX1004, ¶¶53, 90, 99.

Olympus' LED light source unit 11 may be replaced with different LED light source units, such as LED light source units 31, 32, and 33. EX1040, FIGS 9-11, ¶¶0104-0117. LED light source unit 33 may include an LED (3302, highlighted green), filter (3303, orange), and diffuser (3304, purple). *Id.*, ¶¶0115-0116, FIG. 11.

[Fig. 11]



A POSA would appreciate that the LED light sources of Olympus are shown as through-hole LED packages and are therefore non-surface-mounted narrow-band

light sources. Section VII(A)(2); EX1004, ¶¶88-91. Thus, **Olympus** teaches **Element 1b**.

[Element 1c] a diffuser positioned within at least some of the plurality of lamp receptacles, each of said diffusers diffusing light produced by each of said light sources; and;

As set forth in the discussion of **Element 1b**, above, LED light source unit 33 of FIG. 11 includes a diffuser, which is diffusion plate 3304. A POSA would understand that diffusion plate 3304 is a “diffuser.” EX1004, ¶¶88-91.

Olympus teaches “*a diffuser positioned within at least some of the plurality of lamp receptacles.*”⁹ Diffusion plate 3304 of FIG. 11 is in LED light source unit 33, which is inside LED light source unit housing holes 902 of light source holding member 9.

Petitioner’s proposed claim construction is met in that Olympus teaches a diffuser [diffusion plate 3304] positioned within at least some of the holes [LED light source unit housing holes 902] of the member [light source holding member 9]

⁹ In Section VII(A)(4), Petitioner proposes that “a diffuser positioned within at least some of the plurality of lamp receptacles” be interpreted to mean “a diffuser positioned within at least some of the holes of the member that contain narrow-band light sources.”

that contain narrow-band light sources [Olympus advises that LED light source unit 33, which includes LED light source 3302 and band-pass filter 3303, can be used in place of LED light source unit 11]. EX1040, ¶¶0113-0117, FIGS. 11, 13.

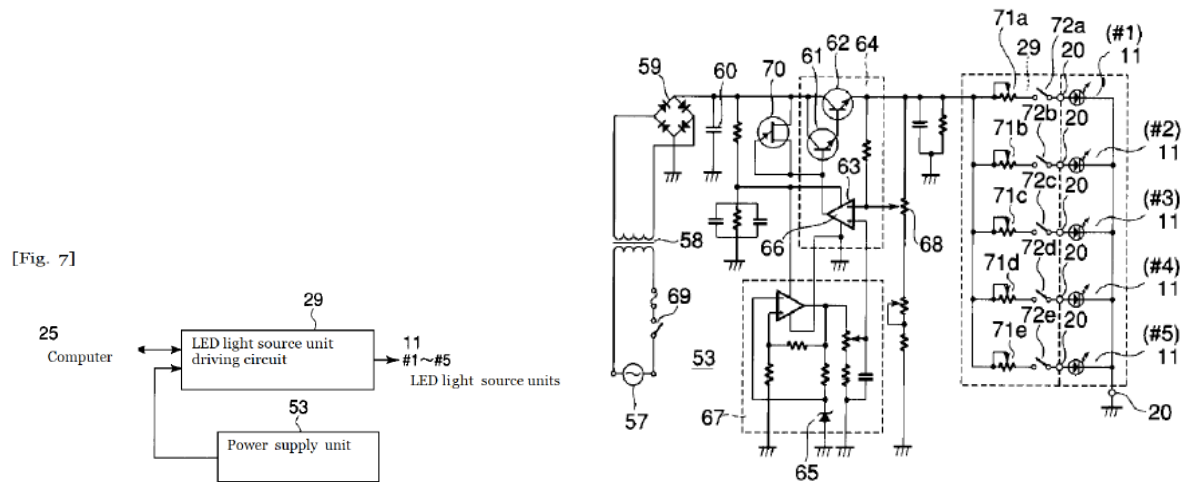
Thus, Olympus teaches **Element 1c**.

[Element 1d] a control system operatively connected to each of said light sources said control system operating selected ones of said light sources to provide a desired excitation illumination to an object within the field of view of said camera, the object fluorescing in response to the excitation illumination provided by said light sources.

Olympus discloses a LED light source unit driving circuit 29 connected to a power supply 53 and various circuitry to control output light intensity of the LED light source units 11. EX1040, ¶¶0064, 0072-0081, 0087-0098, 0101, 0103-0153; FIGS. 1, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 22. The system can therefore independently turn on and off the LED light source units 41, 42, and 43, and such control can be performed manually or electronically with a computer. *Id.*, ¶¶0079-0080, 0087, 0147-0150. When light from selected light sources (for example, light from selected LED light source units) illuminates an object, fluorescence can be received by the camera (photodetector or CCD camera 24). *Id.*, ¶¶0081, 0087, 0091, 0092, 0116, 0151-0155.

A POSA would understand that Olympus provides circuitry such that power supply unit 53 may be used to selectively power one more of LED light source units 11 (e.g., labeled #1-#5).

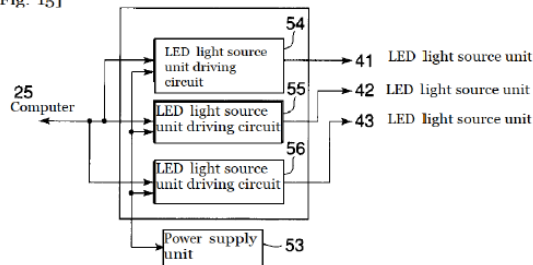
[Fig. 8]



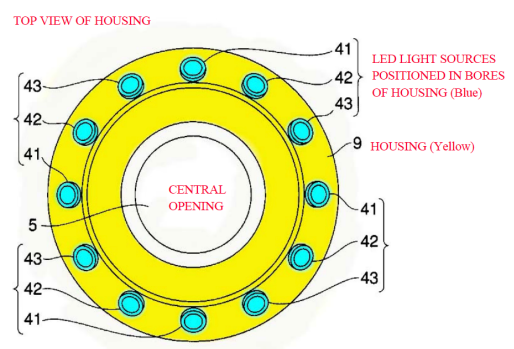
EX1040, ¶¶0074-0081, FIGS. 7, 8; EX1004, ¶¶92-97. Such control is applicable to several embodiments, including but not limited to the embodiments of FIG. 1 and FIG. 22.

A POSA would understand that the circuits of FIGS. 15 and 16 demonstrate that light sources 41, 42, and 43 (such as shown in FIG. 13) are individually controllable:

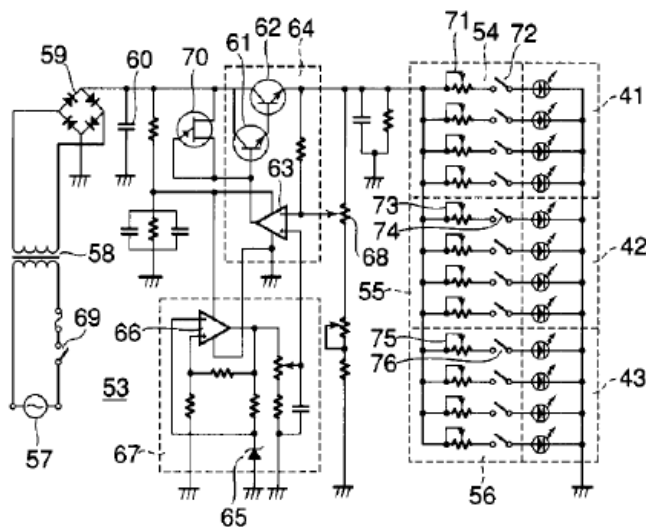
[Fig. 15]



[Fig. 13]



[Fig. 16]



EX1040, ¶¶0142-0144, 0146-0155, FIGS. 9, 15, 16; EX1004, ¶¶92-97.

This approach allows for independent excitation of 3 different wavelengths, such as for 3 different dyes; however, Olympus is not limited to a particular number of fluorescent dyes, images, or light source wavelengths. EX1040, ¶¶0154-0155;

Olympus explicitly states that its disclosure is not limited to the example embodiments and that “various modifications can be made without changing the gist of the invention.” Olympus also states that its samples are not limited to DNA

microarrays, and that “the present invention is widely applicable not only to DNA but also to various other types of biological materials...” EX1040, ¶¶0209,0210.

Thus, a POSA would understand that Olympus demonstrates a control system operatively connected to each of the light sources to operate them individually or in groups to provide desired excitation illumination to an object within the field of view of the camera to capture light from the object fluorescing in response to light provided by the light sources. EX1004, ¶¶92-97.

Based on the foregoing, Olympus anticipates **claim 1**.

3. Claim 3

The excitation light source assembly of claim 2 wherein said at least one narrow-band light source comprises a light emitting diode.

Olympus teaches the use of light emitting diodes in its LED light sources generally. *E.g.*, EX1040, ¶¶0011, 0013, 0014, 0024, 0026-0043, 0168.

Thus, Olympus anticipates claim 2.

4. Claim 4

The excitation light source assembly of claim 1, further comprising at least one filter positioned adjacent at least one diffuser in at least one of the lamp receptacles defined by said housing.

As set forth in the analysis of **Elements 1b and 1c**, above, Olympus teaches the use of variations of the LED light source units 11, such as LED light source unit 33 (FIG. 11), which includes at least one filter [band-pass filter 3303] positioned adjacent at least one diffuser [diffusion plate 3304] in at least one of the lamp

receptacles defined by said housing [LED light source unit storage holes 902 of light source holding member 9]. EX1040, ¶¶0113-0117, 0128-0133, FIGS. 1, 11, 13, 22.

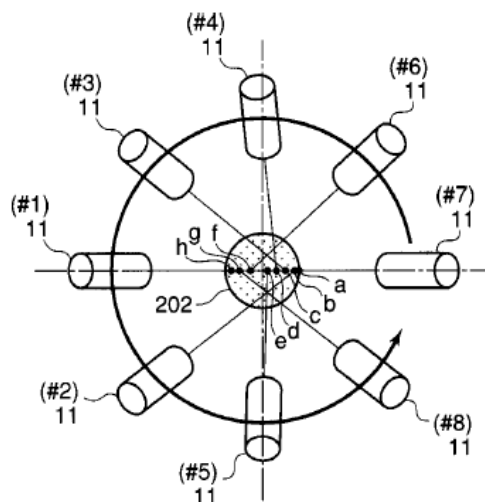
Thus, Olympus anticipates claim 4.

5. Claim 7

The excitation light source assembly of claim 1, wherein at least some of said plurality of lamp receptacles comprise opposed pairs of lamp receptacles on opposite sides of said central opening, each opposed pair of lamp receptacles producing light of the same color.

Olympus shows embodiments with light sources in receptacles as opposed pairs of lamp receptacles on opposite sides of the central opening, each opposed pair of lamp receptacles producing light of the same color. For example, FIG. 5 shows opposed pairs of LED light sources 11 in opposed pairs of lamp receptacles [LED light source unit storage holes 902 of light source holding member 9] on opposite sides of said central opening [hole portion 901], the LED light sources 11 in the lamp receptacles producing light of the same color:

[Fig. 5]

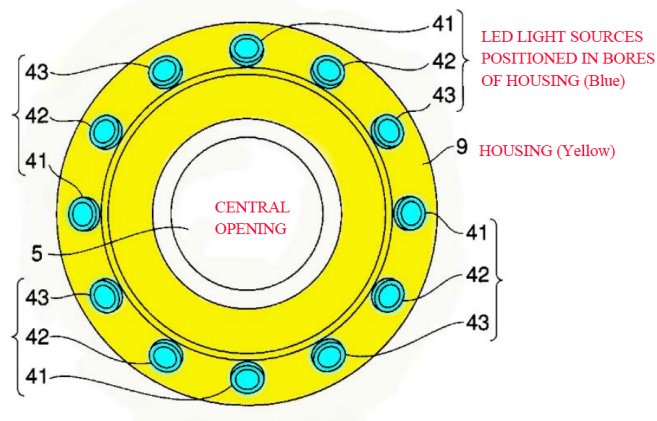


EX1040, ¶¶0067, 0069, FIG. 5.

Olympus states: “the number of LED light source units is not particularly limited, and a plurality of LED light source units can be individually controlled by a plurality of drive circuits.” EX1040, ¶¶0142-0143, 0146-0155, FIGS. 15, 16.

FIG. 13 shows a plurality of lamp receptacles for a plurality of LED light sources (41, 42, and 43) having three different peak emission wavelengths. EX.1040, ¶¶0129-0133, FIG. 13.

[Fig. 13] TOP VIEW OF HOUSING



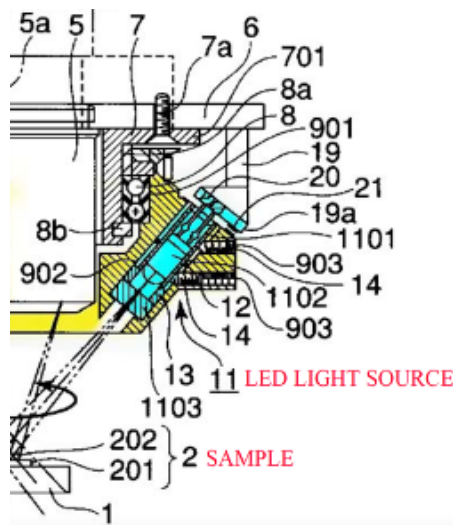
It also shows that at least some of the plurality of lamp receptacles comprise opposed pairs of lamp receptacles on opposite sides of said central opening (compare the light sources 41, 42, and 43 in the upper right-hand corner of FIG. 13 with those on the lower left-hand corner, or the light sources in the upper left-hand corner with the light sources on the lower right-hand corner).

Based on the foregoing, Olympus anticipates the subject matter of **claim 7**.

6. Claim 9

The excitation light source assembly of claim 1, wherein the light source positioned within each of the plurality of lamp receptacles does not extend beyond the lamp receptacle.

Olympus FIGS. 1 and 22 show the light source [LED light source unit 11 (alternatively, LED light source unit 33)] positioned within each of the plurality of lamp receptacles [LED light source unit storage holes 902 of light source holding member 9]. The light source does not extend beyond the lamp receptacle:



Excerpt of FIG. 1 (annotated)

[Fig. 11]

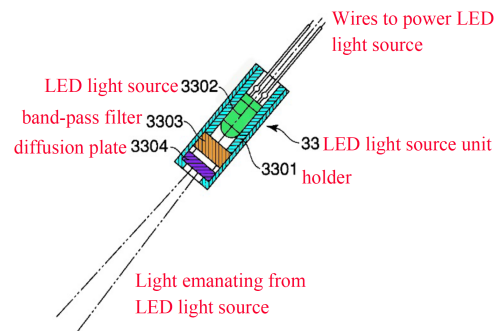


FIG. 11 (annotated)

EX1040, ¶¶0055-0070, 0113-0117, FIGS. 1, 11, 13, 22.

Based on the foregoing, Olympus anticipates the subject matter of **claim 9**.

7. Claim 10

The excitation light source assembly of claim 1, further comprising a plurality of light sources positioned within at least some of the lamp receptacles so that the plurality of light sources do not extend beyond the lamp receptacles.

Claim 10 is unpatentable for at least the same reasons set forth for claim 9, above. For example, FIG. 1 of Olympus demonstrates a light source positioned *in each of* a plurality of five lamp receptacles. EX1040, ¶¶0055-0070, 0113-0117, FIGS. 1, 5, 11, 13, 22. A plurality of light sources positioned within at least some of the receptacles includes the case where the plurality of light sources are the five light sources and the “at least some of the lamp receptacles” are all five receptacles. That is, it shows a plurality of light sources positioned within *at least some* of the lamp receptacles so that the plurality of light sources do not extend beyond the lamp receptacles. *Id.* Therefore, Olympus anticipates the subject matter of **claim 10**.

8. Claim 11

The excitation light source assembly of claim 10, wherein said plurality of light sources is three light sources.

The subject matter of claim 11 is anticipated by Olympus, because “the number of LED light source units is not particularly limited.” EX1040, ¶0155. Therefore, a POSA would understand that Olympus is not limited to the number of light sources and provides disclosure to make a light source holding member with three housing holes and three LED light source units so that the three light sources do not extend beyond the housing holes. Therefore, Olympus anticipates the subject matter of **claim 11**.

9. Independent Claim 14

14. [Preamble] An assembly, comprising:

To the extent the preamble is limiting, Olympus teaches an assembly. *E.g.*, FIGS. 1, 22.

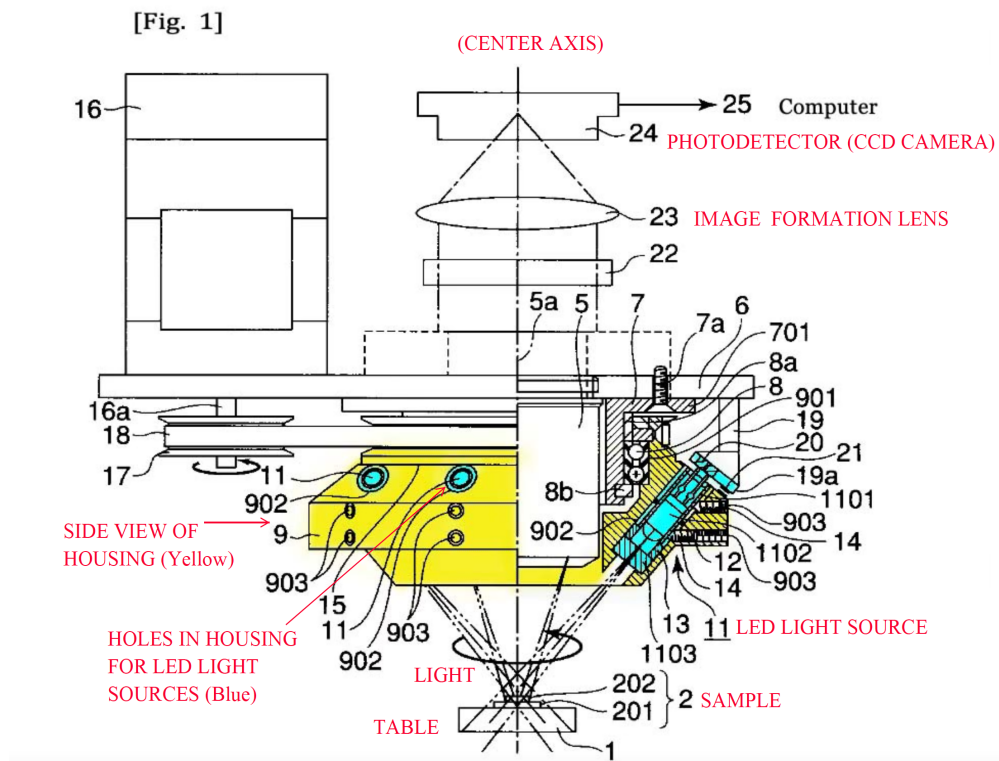
[Elements 14a-c]

a support structure;

a camera mounted to said support structure;

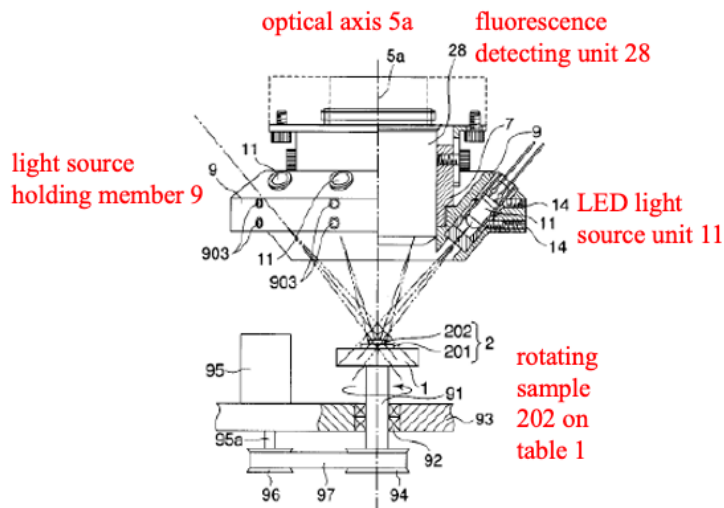
an excitation light source assembly mounted to said support structure,

As set forth in the **Element 1a** analysis, above, regarding the embodiment of FIG. 1, the support structure [e.g., base 6, shaft 7, bearing 8, C-ring 8b, and associated hardware] has mounted to it the camera [e.g., photodetector/CCD camera 24 and associated lenses] and the excitation light source assembly [e.g., light source holding member 9, and recited at least one narrow-band light source and at least one diffuser].



With respect to the embodiment of FIG. 22, Olympus teaches a support structure [a cylindrical fixed shaft 7 and associated hardware], and a camera [fluorescence detecting unit 28 and lenses] mounted to the support structure [the support structure holds the objective lens 5 and the fluorescence detecting unit 28 is connected to it]. EX1040, FIG. 22, ¶0203.

[Fig. 22]



The excitation light source assembly [e.g., light source holding member 9, and recited at least one narrow-band light source and at least one diffuser] is also mounted to said support structure [“is integrally provided on the peripheral surface portion of cylindrical fixed shaft 7”]. EX1004, ¶101.

Thus, Olympus teaches **Elements 14a-c**.

[Element 14c1] said excitation light source assembly comprising: a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening, said housing being mounted to said support structure so that the central opening is aligned with said camera and so that a field of view of said camera is substantially unobstructed by said housing;

See the analysis of **Element 1a**. Olympus teaches **Element 14c1**.

[Element 14c2] at least one narrow-band light source positioned within at least one of the plurality of lamp receptacles; and

See the analysis of **Element 1b**, which demonstrates a plurality of narrow-band light sources positioned within all lamp receptacles, thereby showing “at least

one narrow-band light source ...” as recited in **Element 14c2**. Olympus teaches **Element 14c2**.

[Element 14c3] a diffuser positioned within at least some of the plurality of lamp receptacles, each of said diffusers diffusing light produced by each of said narrow-band light sources; and

See the analysis of **Element 1c**. Olympus teaches **Element 14c3**.

[Element 14d] a control system operatively connected to each of said narrow-band light sources, said control system operating selected ones of said narrow-band light sources to provide a desired excitation illumination to a fluorescent material within the field of view of said camera, the fluorescent material fluorescing in response to the excitation illumination.

See the analysis of **Element 1d**, which demonstrates a plurality of narrow-band light sources, therefore Olympus teaches **Element 14d**.

Based on the foregoing, Olympus anticipates the subject matter of **claim 14** for substantially the same reasons as set forth for **claim 1**.

10.Claim 15

The assembly of claim 14, further comprising a light filter positioned adjacent each of the diffusers.

See the analysis of **claim 4**. Olympus provides for a number of LED light source units 33 instead of LED light source units 11 in the embodiments of FIG. 1 and FIG. 22. LED light source units 33 comprise a light filter [band-pass filter 3303] positioned adjacent diffuser [diffuser plate 3304]. EX1040, ¶¶0113-0117, 0128-0133, FIGS. 1, 11, 13, 22.

Based on the foregoing, Olympus anticipates the subject matter of **claim 15** for substantially the same reasons as set forth for **claim 4**.

11.Claim 16

The assembly of claim 14, wherein each of the lamp receptacles defined by said housing are angled with respect to a central axis of said housing so that light emitted from each of said narrow-band light sources is directed to a desired area within the field of view of said camera.

Olympus shows the subject matter of claim 16. The lamp receptacles defined by said housing [light source unit storage holes 902 of light source holding member 9] are angled with respect to a central axis [optical axis 5a] of said housing so that the light emitted from each of said narrow-band light sources [LED light source units 33] is directed to a desired area within the field of view of said camera [photodetector/CCD camera 24 or fluorescence detecting unit 28 and respective associated lenses]. EX1040, ¶¶0060, 0067, 0102, FIGS. 1, 4, 5, 11, 13, 22. EX1004, ¶104. Olympus anticipates the subject matter of **Claim 16**.

12.Claim 17

The assembly of claim 14, wherein each of said narrow-band light sources is selected to provide desired number of illumination bands over a desired spectral range.

Selection of components to provide desired results is inherent in any design. Olympus describes embodiments providing three illumination bands. It specifies that the types of fluorescent dyes and number of excitation light sources are not limited. EX1040, ¶¶0128-0133, 0154-0155. A POSA can select a number of

different light sources and filters to achieve a desired spectral range. Once the system is operational, a user may individually control each light source and thereby choose which wavelengths to excite or not for any desired spectral range. The system can therefore independently turn on and off the LED light source units 41, 42, and 43, and such control can be performed manually or electronically with a computer. EX1040, ¶¶0079-0080, 0087, 0147-0150; EX1004, ¶106. See the analysis of claim 1, **Element 1c**, above.

Olympus allows a user to control that range and select fewer or more bands over various different dyes and wavelengths to cover a desired range. Thus, Olympus anticipates the subject matter of **Claim 17**.

13.Claim 23

The assembly of claim 14, wherein each of said narrow-band light sources comprises a light emitting diode.

Claim 23 is anticipated by Olympus for at least the reasons set forth in the analysis of **claim 3**.

14.Independent Claim 25

25. [Preamble] *An excitation light source assembly, comprising:*

See the analysis of the **Preamble of claim 1**.

[Element 25a] a housing defining a central opening therein and a plurality of lamp receptacles therein surrounding the central opening, said housing being mountable to a support structure so that the central opening is aligned with a

camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing;

Patent Owner has asserted that **Element 25a** is different than **Element 1a** because it recites an additional “therein” after “lamp receptacles,” and therefore by “claim differentiation” it must be different. EX1033, pp.16-17. Patent Owner contradicts its own characterization of the lamp receptacles as “therein” (that is, inside the housing 14) in prosecution. EX1002, p.830 (bolding added). Section VII(A)(1)(b). Patent Owner now argues that the “housing” recited by the claims refers to “main enclosure 48” and not to “main body member or housing 14.” EX1033, pp.11-12. However, Olympus teaches this construction and therefore provides **Element 25a** for at least the same reasons as set forth for **Element 1a**. See the analysis of **Element 1a**. Petitioner’s proposed construction does not accord any special significance of the “therein” following the word “receptacles.” Section VII(A)(1).

[Element 25b] a light source positioned within each of the plurality of lamp receptacles so that said light sources do not extend beyond the lamp receptacles, wherein at least one of said light sources comprises a narrow-band light source; and

See the analysis of **Element 1b**, in which each light source does not extend beyond the lamp receptacles and each light source is a narrow-band light source.

[Element 25c] a control system operatively connected to each of said light sources, said control system operating selected ones of said light sources to provide a desired excitation illumination to an object within the field of view of the camera,

th excitation illumination causing fluorescent materials in the object to fluoresce, the camera capturing an image of the fluorescing material in the object.

See the analysis of **Element 1d**.

Based on the foregoing, Olympus anticipates the subject matter of **claim 25**.

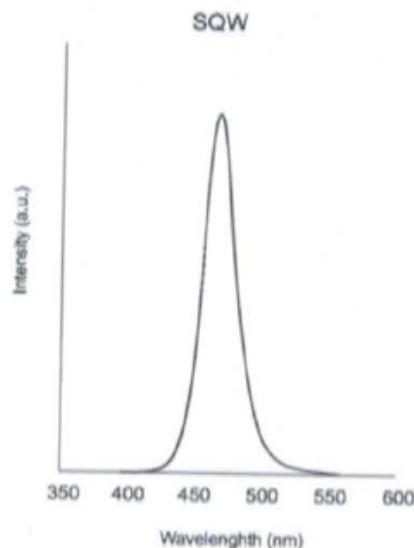
B. Ground 2: Claims 2, 5, and 20 are obvious in view of Olympus

1. Claim 2

The excitation light source assembly of claim 1 wherein said narrow-band light source emits light having a bandwidth of about 35 nm.

As discussed in Ground 1, Olympus discloses each and every element of claim 1, from which claim 2 depends.

A popular and available blue diode for fluorescent detection was the Blue-SQW-LED made by Nichia and used by FujiFilm in its LAS-1000 fluorescent detectors. EX1075, p.3. This blue LED has a full-width at half-maximum (FWHM) bandwidth of about 35 nm, as shown from this emission spectra:



Olympus further discloses “LED light source units having different spectral characteristics of the emission wavelength” and that different numbers and light sources with different peak emission wavelengths may be used. EX1040, ¶¶0032, 0132, 0172, 0198, claim 7, 0129, 0131, 0152, 0155. Thus, a POSA would have had the option of using this blue LED in an imaging system like Olympus and would have known that it provided about a 35 nm bandwidth. Thus, claim 2 is obvious in view of Olympus and common knowledge in the art, such as the FujiFilm Application Note. EX1075, p.3.

A POSA would also appreciate that LEDs of different bandwidths, including “about 35 nm,” were readily available and in use in fluorescence imaging—even at the time Olympus was filed—nearly 10 years before the filing date of the ’516 patent. *See*, “Light emitting diode excitation emission matrix fluorescence spectroscopy,” EX1050, p.1694 (LED bandwidths have “typical full width half maximums between 10 nm and 50 nm or more”). Where claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists.” *In re Wertheim*, 541 F.2d 257 (CCPA 1976); M.P.E.P. § 2144.05(I) (June 2020 revision). The ’516 patent does not state any specific imaging applications and therefore this range cannot be a critical range.

Claim 2 is obvious in view of Olympus.

2. Claim 5

The excitation light source assembly of claim 4, wherein said at least one filter comprises a notch filter having a wavelength bandpass range of about 30 nm.

As set forth in Claim 2 above, a POSA in fluorescence imaging would know one commonly available blue diode for fluorescent detection was the Blue-SQW-LED made by Nichia. EX1075, p.3.

Olympus states “band-pass filter 1103 mainly passes the vicinity of the wavelength region of the light emitted from the LED light source 1102” which indicates to a POSA that the filter passband is approximately the width of the peak. EX1040, 0058. For LED light sources of approximately 35 nm emission bandwidth, a notch filter of about 30 nm is consistent with passing wavelengths in the vicinity of the peak and is consistent with the excitation wavelengths stated in Olympus. EX1004, ¶110.

Claim 5 is obvious in view of Olympus.

3. Claim 20

The assembly of claim 17, wherein each desired illumination band has a bandwidth ranging from about 30 nm to about 35 nm.

As set forth in the analysis of claim 17 in Ground 1, Olympus provides a system than is not limited by wavelengths or numbers of light sources. EX1040, ¶¶0128-0133, 0154-0155. As noted in the '516 patent, “Light emitting diodes having such narrow bandwidths (e.g., about 30-35 nm) along the desired wavelength

range (e.g., 430 nm to about 745 nm) are readily commercially available and can be used as the narrow-band sources.” EX1001, 9:2-6. Accordingly, a POSA would have been aware of such light sources and be able to use them for Olympus’s LEDs with 490 nm, 520 nm, and 630nm peak illumination. EX1040, ¶131; EX1004, ¶108. Claim 20 is obvious in view of Olympus.

C. Ground 3: Claims 6, 10-12, 18, 21, 22, and 26 are obvious in view of Olympus and Frangioni

1. Claim 6

The excitation light source assembly of claim 1, wherein at least one of the light sources comprises a broad-band light source.

Olympus states: “the number of LED light source units is not particularly limited” and “the output wavelengths of the plurality of LED light source units may be [] different.” EX1040, ¶0155. A POSA seeking to integrate various kinds of light sources would look at known light source options, such as International Publication No. WO 2009/009671 A2 (“Frangioni,” EX1064), “LED Lighting Modules,” which published January 15, 2009 (over a year before the filing date of the Provisional Application and the ’516 patent) and is 102(b) prior art.

Frangioni teaches a plurality of LEDs in a system for “a wide range of lighting and imaging applications,” including an imaging system that illuminates a field with visible white light and an excitation light source while capturing a corresponding visible light image and a diagnostic image from a fluorescent dye or the like.

EX1064, ¶0019. Thus, Frangioni is in the same field of endeavor as Olympus—lighting systems and their components and applications—and is therefore analogous art to Olympus. A POSA designing a lighting system for use in Olympus’s imaging system would be motivated to include Frangioni’s white light source for capturing visible light images and diagnostic images. EX1004, ¶112. Thus, the subject matter of **Claim 6** is obvious over Olympus in view of Frangioni.

2. Claim 10

The excitation light source assembly of claim 1, further comprising a plurality of light sources positioned within at least some of the lamp receptacles so that the plurality of light sources do not extend beyond the lamp receptacles.

To the extent claim 10 is interpreted to require a plurality of light sources positioned within a single receptacle (which construction Petitioner denies is correct), the subject matter of claim 10 would be obvious.

Olympus teaches “to set 2 or more LEDs as a bundle” to provide sufficient excitation light to a fluorescent substance. EX1040, ¶0022; *see also*, EX1040, ¶0194, FIG. 21 (a plurality of LED light source units 81 as semiconductor light source means are arranged in multiple (2 in the illustrated example) around the objective lens 5 and held by light source holding member 9). A POSA seeking more uniform and sufficient illumination would group 2 or more LEDs for fluorescent imaging applications and would have access to prior art that provides multiple LEDs for imaging illumination applications, such as Frangioni. EX1004, ¶114.

A POSA designing a lighting system to more efficiently irradiate excitation light would be motivated to combine the multiple LED lighting systems of Frangioni with the excitation light source of Olympus. A POSA would have understood that the light source holding member 9 of Olympus could hold a group of LEDs in a design that is less expensive, more compact, spatially efficient, and easier to assemble. EX1004, ¶¶116-117; *Dystar Textilfarben GmbH v. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006) (a motivation to combine exists when the combination results in a product that “is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient”).

First, bundled LEDs would provide more excitation light using a simpler light source holding member (housing) made with fewer holes to increase illumination and reduce product cost. EX1004, ¶¶118, 121; *Dystar*, 464 F.3d at 1368.

Second, bundled LED modules in a receptacle would be more spatially efficient and easier to assemble than separate LED light source units. EX1004, ¶¶119-120. For example, the LED light sources of Olympus’ FIGS. 1, 13, and 22 could be made using 2 or more LEDs 404, circuit board 402, associated heat sinks and power electronics, such as shown in Frangioni, FIG. 4 (e.g., two or more LEDs 508, circuit board 506, and associated heat sinks and power electronics, such as shown in Frangioni FIG. 5). EX1064, Abstract, ¶¶0005-0009, 0022-0035, FIGS. 4,5. However, to be clear, Petitioner does not argue that the features of any “reference

[should] be bodily incorporated into the structure of the primary reference,” as this is not the test for obviousness. *In re Keller*, F.2d 413, 425 (CCPA 1981). Petitioner’s arguments are to convey “what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *Id.*; see also *In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012).

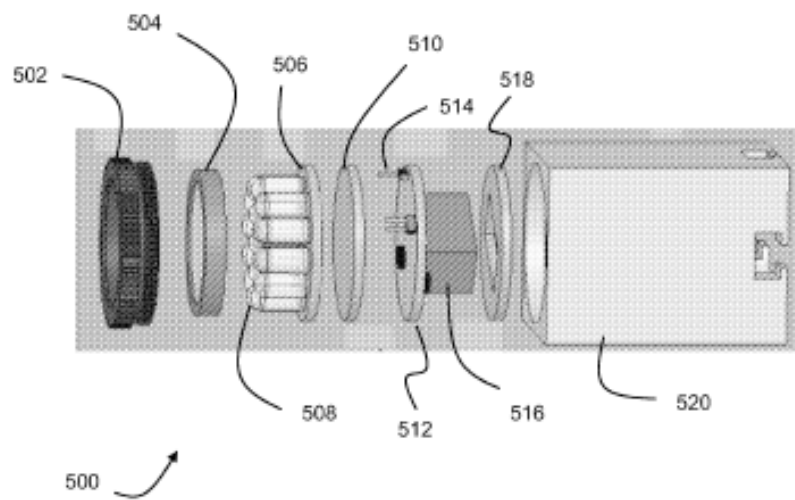


Fig. 5

EX1064, FIG. 5.

Third, a POSA would have appreciated that Frangioni’s modules used in lighting and fluorescence imaging were a well-known option from prior art illumination designs that yielded nothing more than predictable results—a multiple LED design for higher intensity excitation illumination. EX1004, ¶¶116-117; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007) (“any need or problem known in

the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.”)

Thus, a POSA would be motivated to use Frangioni’s multiple LED module in the housing holes 902 of light source holding member 9 of Olympus. Such multiple LED designs would not extend beyond housing hole 902. EX1004, ¶116.

Based on the foregoing, Olympus in view of Frangioni renders the subject matter of **Claim 10** obvious.

3. Claim 11

The excitation light source assembly of claim 10, wherein said plurality of light sources is three light sources.

Olympus states “the number of LED light source units is not particularly limited.” EX1040, ¶0155. Therefore, a POSA would understand that Olympus is not limited to any one number of light sources and a POSA would know how to make a light source holding member with a plurality of light sources having three LED light source and make them so that they do not extend beyond the housing holes. EX1004, ¶123.

The subject matter of **Claim 11** is rendered obvious over Olympus in view of Frangioni for at least the same reasons set forth for claim 10.

4. Claim 12

The excitation light source assembly of claim 1, wherein the plurality of light receptacles defined by said housing comprise a plurality of large diameter receptacles and a plurality of small diameter receptacles.

Claim 12 does not state a size or proportion of the large and small diameter receptacles. The '516 patent states that large diameter receptacles “may be sized to receive one or more narrow-band light sources 22” and the small diameter receptacles “may be sized to receive a single broad-band light source 24.” EX1001, 6:52-53, 6:54-55, 7:46-47. However, something that “may be sized to receive one or more narrow-band light sources 22” may be sized to receive only one, which does not differentiate from the single broad-band light source 24. EX1004, ¶125.

A POSA would understand that LED light source units of Olympus could employ different numbers of LEDs to provide adequate illumination and would benefit from housings with a plurality of holes of various diameters. It would be obvious to a POSA to use some hole diameters that were larger to accommodate larger light sources (for example, Frangioni’s multiple LED light modules) compared to a single LED light source. Moreover, a POSA would know that some LEDs have a different package size and may fit within larger and smaller holes. Thus, it would be a matter of ordinary skill and common sense to make the holes different diameters if the light sources were different in number or in diameter. EX1004, ¶126; *KSR*, 550 U.S. at 402 (“When there is design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a [POSA] has good reason to pursue the known options within his or her technical grasp.”).

Moreover, Olympus states “the present invention is not limited to the above embodiment and various modifications can be made without changing the gist of the present invention.” EX1040, ¶0209. A POSA would therefore understand that the diameter of the Olympus housing holes 902 is a matter of design choice, and that the housing holes 902 of Olympus can be sized to accommodate the various light sources positioned within them without changing the gist of the invention. EX1004, ¶127.

The housing and light sources of Olympus would not operate differently than a design with large and small diameters. EX1004, ¶128. Therefore, the claimed subject matter is not patentably distinct from Olympus and is therefore not patentable. *Gardner v. Tech Syst., Inc.*, 725 F.2d 1338 (Fed. Cir. 1984), *cert. denied*, 469 US 830 (1984) (where the only difference between the prior art device and the claimed device was a recitation of relative dimensions of the claimed device, it is not patentably distinct from the prior art device); M.P.E.P. 2144.04(IV)(A).

Based on the foregoing, the subject matter of **Claim 12** is rendered obvious over Olympus in view of Frangioni.

5. Claim 18

The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 745 nm.

Frangioni states: “[s]ingle wavelength LEDs may operate within the visible light spectrum or any suitable adjacent spectrum.” The visible light spectrum is typically associated with about 380nm to about 800nm and the adjacent spectrum (the infrared spectrum) is about 800nm to 1000nm. A POSA would therefore understand that different LEDs and filters can be used to provide a desired number of illumination bands over a desired spectral range. EX1004, ¶130. The range of about 430 nm to about 745 nm is within the range of spectral light disclosed by Frangioni and therefore is obvious. Where claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists.” *In re Wertheim*, 541 F.2d 257 (CCPA 1976); M.P.E.P. § 2144.05(I) (June 2020 revision). The ’516 patent does not state any specific imaging applications and therefore this range cannot be a critical range.

Based on the foregoing, the subject matter of **Claim 18** is rendered obvious over Olympus in view of Frangioni.

6. Claim 21

The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 900 nm.

The range of about 430 nm to about 900 nm is within the ranges of spectral and adjacent infrared light disclosed by Frangioni (see the analysis of **claim 18**)

and therefore is not patentable. Where claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists.” *In re Wertheim*, 541 F.2d 257 (CCPA 1976); M.P.E.P. § 2144.05(I) (June 2020 revision). The ’516 patent does not state any specific imaging applications and therefore this range cannot be a critical range.

Based on the foregoing, the subject matter of **Claim 21** is rendered obvious over Olympus in view of Frangioni.

7. Claim 22

The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 800 nm.

Claim 22 is not patentable for at least the reasons set forth in the analysis of **claim 21**.

8. Claim 26

The excitation light source assembly of claim 25, wherein said plurality of lamp receptacles defined by said housing comprise a plurality of large diameter lamp receptacles and a plurality of small diameter lamp receptacles, said large diameter lamp receptacles receiving a plurality of said light sources, said small diameter receptacles receiving a single light source.

Claim 26 is substantially the same as claim 12, adding the limitation that the large diameter light sources receive a plurality of the light sources and the small light sources receiving one. See the analysis of claim 12, above. It would be a matter of

ordinary skill and common sense to place plural sources in larger diameter holes of the housing if the light sources were greater in number or in diameter. EX1004, ¶133; *KSR*, 550 U.S. at 402. Based on the analysis of claim 12 and the foregoing, the subject matter of **Claim 26** is obvious over Olympus in view of Frangioni.

D. Ground 4: Claims 8, 13, 19, and 27 are Obvious in view of Olympus and Hansen and/or Malmros

1. Overview of Hansen

Hansen is directed to “an apparatus and a method for detecting the fluorescence of a sample, wherein the apparatus comprises [an] excitation light source located on the same side of the sample as the detecting means.” EX1060, p.1. Thus Hansen is in the same field of endeavor of lighting systems and their components and applications as the ’516 patent and Olympus.

2. Overview of Malmros

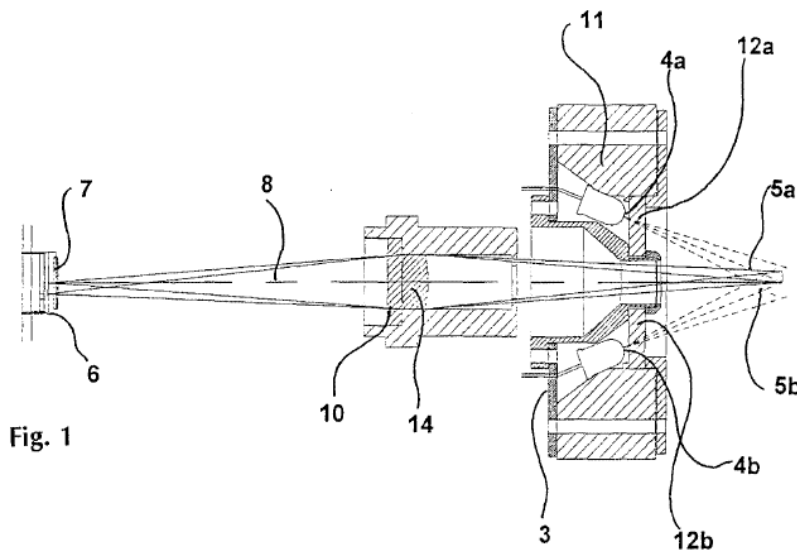
Malmros discusses an “imaging system” that includes an “LED assembly” and “camera lens.” EX1074 ¶¶2, 51-53, FIGS. 28-30. The light sources used may be “broad-spectrum high intensity light sources, a filtered high intensity light source, specific wavelength lasers, or other light sources known to the skilled artisan.” *Id.* ¶94. Accordingly, Malmros is in the same field of endeavor as Olympus and the ’516 patent: lighting systems and their components and applications.

3. Claims 13 and 27

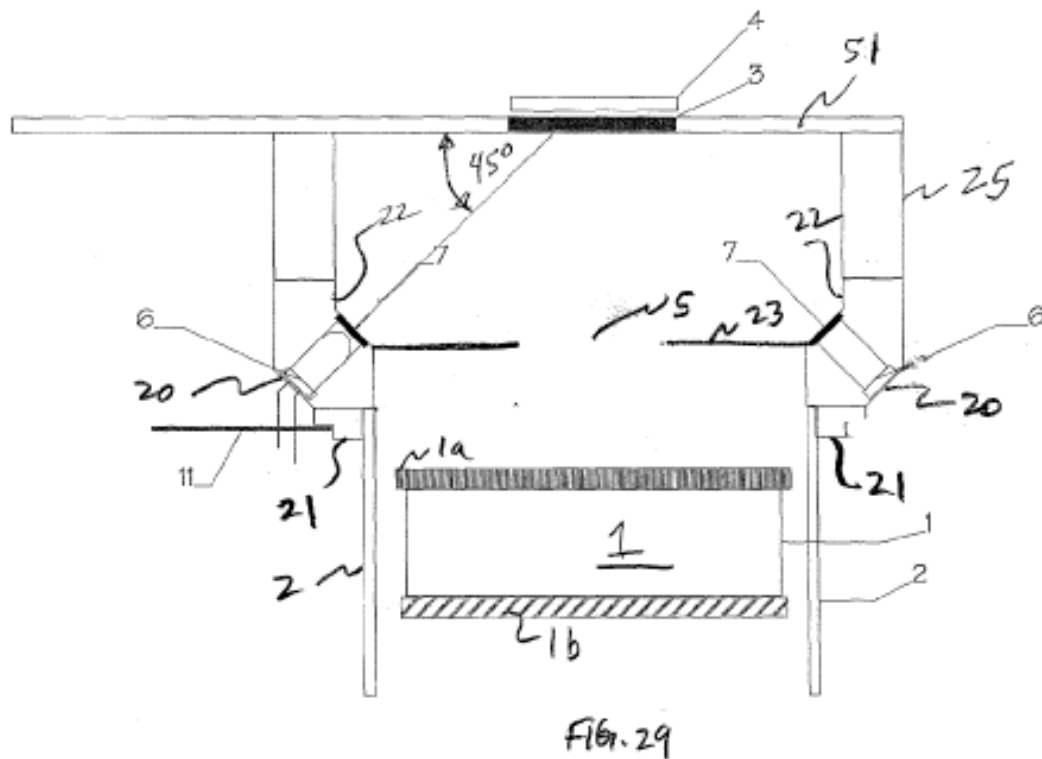
The excitation light source assembly of claim 1/25, wherein the plurality of light receptacles defined by said housing comprise generally cylindrically shaped openings having first and second open ends, said excitation light source assembly further comprising a circuit board mounted to a first side of said housing, said light sources being mounted to said circuit board so that said light sources extend through the first open ends of the generally cylindrically-shaped light receptacles.

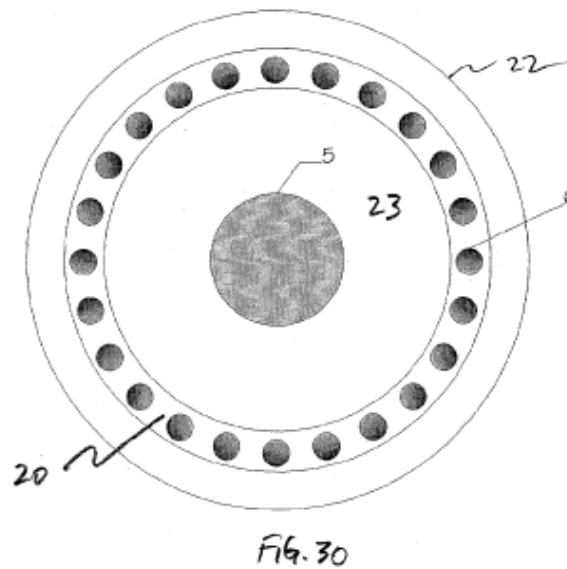
Claims 13 and 27 are identical except for their independent claims, which are anticipated by Olympus, as discussed in Ground 1. Furthermore, as discussed in Ground 1, the light receptacles of Olympus are generally cylindrically shaped and have first and second open ends.

For example, Hansen obtained electrical and mechanical connection using board mounted LEDs 4a, 4b to form an assembly 3 that holds the LEDs in place in their openings behind excitation light filters 12a, 12b. EX1060, p.29, lines 6-25, FIG. 1.



A POSA would also see that Malmros took a similar approach to mounting twenty-four LEDs 6 and diffusers 11 in a plurality of cylindrical lamp receptacles in an assembly with a central aperture 5. EX1074, ¶¶0110-0111, FIGS. 29, 30; EX1004, ¶136.





The LED assembly is for a bio-spectral imaging system with a camera 28. *Id.*, FIG. 28. Each LED is connected to circuit board 11, which may have, for example, a conventional computer connection that interfaces to a computer running software. *Id.*, ¶0111. A POSA would be motivated to use either of these board mounted LED approaches with the system of Olympus to achieve better connections with fewer loose wires and easier assembly. EX1004, ¶138; *KSR*, 550 U.S. at 402. Olympus, in view of Hansen and/or Malmros renders the subject matter of claims 13 and 27 obvious.

4. Claim 8

The excitation light source assembly of claim 7, further comprising ten opposed pairs of lamp receptacles on opposite sides of said central opening.

As discussed above with respect to Ground 1, Olympus discloses each and every element of claims 1 and 7, from which claim 8 depends. FIG. 13 of Olympus shows six opposed pairs of lamp receptacles. Olympus states: “the number of LED light source units is not particularly limited” and “the output wavelengths of the plurality of LED light source units may be [] different.” EX1040, ¶0155. Olympus also states that its invention is not limited to three dyes, and lists six different dyes as non-limiting examples. *Id.*, ¶0154. Therefore, a POSA studying Olympus would understand that the example of six opposed pairs of lamp receptacles for three wavelengths and three dyes would easily be modified to any reasonable number of opposed pairs of lamp receptacles different wavelengths, including 10 opposed pairs as recited in Claim 8. *Id.*, EX1004, ¶140.

A POSA seeking to increase the number of light sources on a system like Olympus would also look for known methods by others in the field. For example, a POSA reviewing Hansen (discussed with respect to claims 13 and 27, above) would appreciate that Hansen, like Olympus, teaches there is no upper limit to the number of LEDs used, and the light source may provide light of any suitable wavelength. EX1060, p.6. Malmros (also referenced above for claims 13 and 27) provides an system with 24 LEDs and teaches that they may be used singly, in pairs, or in other multiples. EX1074, ¶¶0112-0113. EX1004, ¶141;

Based on the foregoing, Olympus in view of Hansen and/or Malmros, renders obvious the subject matter of **claim 8**.

5. Claim 19

The assembly of claim 17, wherein the desired number of illumination bands is 10.

As discussed above for Ground 1, Olympus teaches each and every element of claim 17. Olympus further states that “a plurality of types of fluorescent dyes are excited using 2 or more LED light sources having different peak emission wavelengths so that a fluorescent signal can be detected.” EX1040, ¶¶0129. Selecting the specific value of 10 different peak emission wavelengths is a mere design choice. Accordingly, a POSA who read and understood Olympus would know how configure Olympus to establish ten illumination bands. Moreover, the analysis of claim 8, above, shows that pairing 10 LEDs was known in the art from other prior art such as Hansen or Malmros. EX1004, ¶¶143-145.

Claim 19 is rendered obvious by Olympus in view of Hansen and/or Malmros.

E. Ground 5: Claim 24 is obvious over Olympus and Brydegaard

1. Claim 24

The assembly of claim 14, wherein said housing comprises a polyoxymethylene thermoplastic material.

As discussed above in Ground 1, claim 14 from which claim 24 depends is anticipated by Olympus. Olympus does not list polyoxymethylene (e.g., Delrin). EX1001, 7:28-29, 12:1-2, and 13:14-15. However, it is well known in the art to use Delrin in the construction of optical systems as set forth in Brydegaard. EX1043, p.4. A POSA would use the black Delrin of Brydegaard for light assemblies in the system of Olympus as it is a known material for holding light sources in an optical system. *Id.* p.4, Fig. 2; EX1004, ¶147.

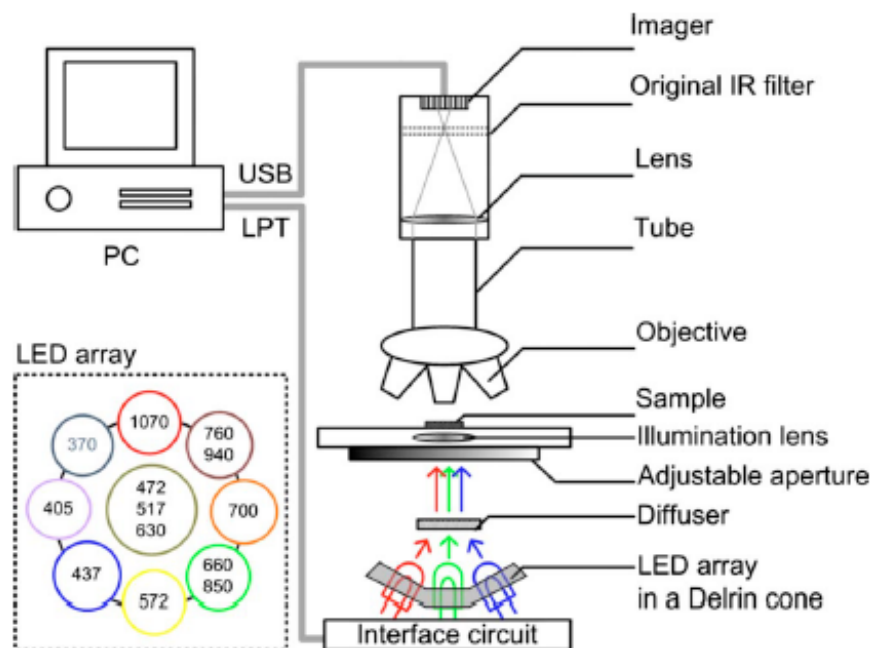


Fig. 2. Arrangement for multispectral transmission microscopy employing multiple LED illumination. Different wavelengths are emitted from a computer controlled LED array and the rays are combined by a diffuser. The light interacts with the sample differently for each wavelength, resulting in a unique picture for each wavelength.

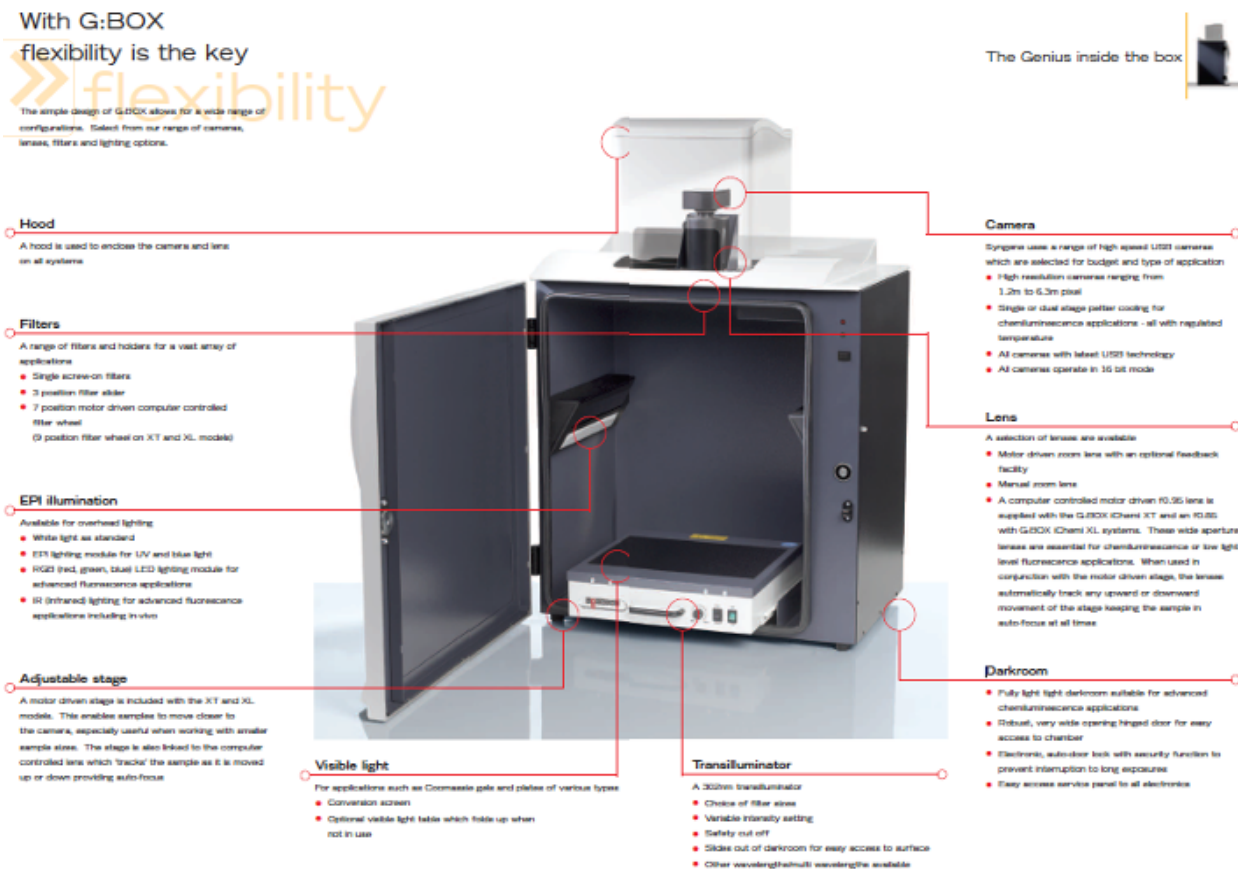
“The nine LEDs are mounted in a machined compact circular arrangement ... made of Delrin ...”. EX1043, p.4.

The subject matter of **Claim 24** is obvious over Olympus in view of Brydegaard.

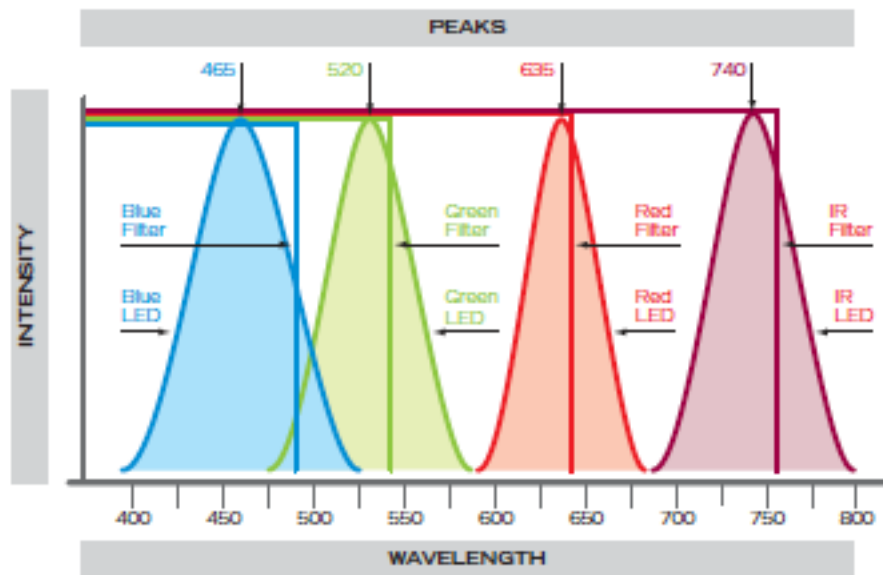
F. Ground 6: Claims 1-23 and 25-27 are obvious in view of GBox and Olympus

1. Overview of GBox

The GBox Brochure (“GBox”) publication was stored by Archive.org as of Aug. 24, 2009, which is over a year prior to the filing date of the Provisional Application and is therefore 102(b) prior art. EX1044, https://web.archive.org/web/20090824075803/http://www.syngene.com/2009_GB_OX2.pdf. GBox states that it can be used for “all fluorescence [] applications” and the user can tailor its system specifically to its needs from a selection of cameras, lenses, filters and lighting options. *Id.*, p.2.



The GBox is designed to work with a computer to “control the camera/lenses, lighting and darkroom functions.” *Id.*, p.5. GBox offers users lighting modules for UV, IR, and red, green, and blue LED lighting applications. GBox provides an LED lighting module for “advanced fluorescence applications,” including in-vivo fluorescence applications. *Id.*, 4. GBox includes lenses that are “essential for low light level fluorescence applications” in a rectangular “fully light tight darkroom.” *Id.*, p.5. GBox also includes overhead white lighting with optional 254nm and 365nm UV light options. *Id.*, 7.

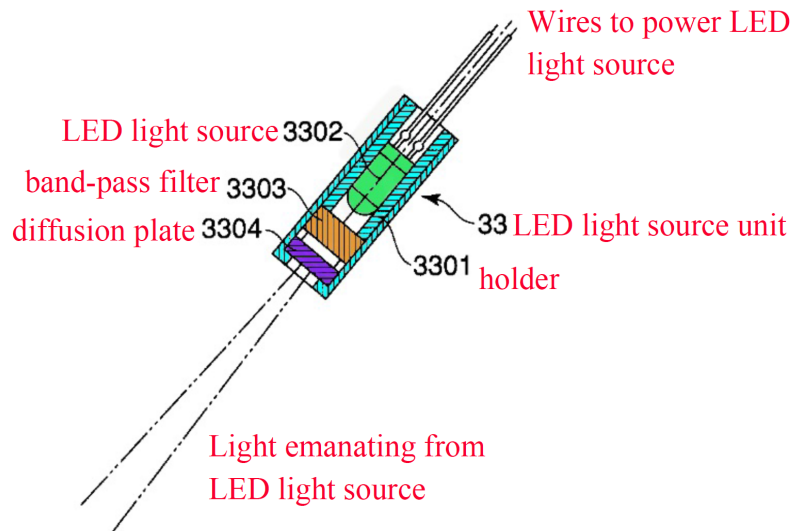


A POSA would understand that GBox covers 400 to 800 nanometer light sources and has an additional 780-940 nm option with a special filter. *Id.*

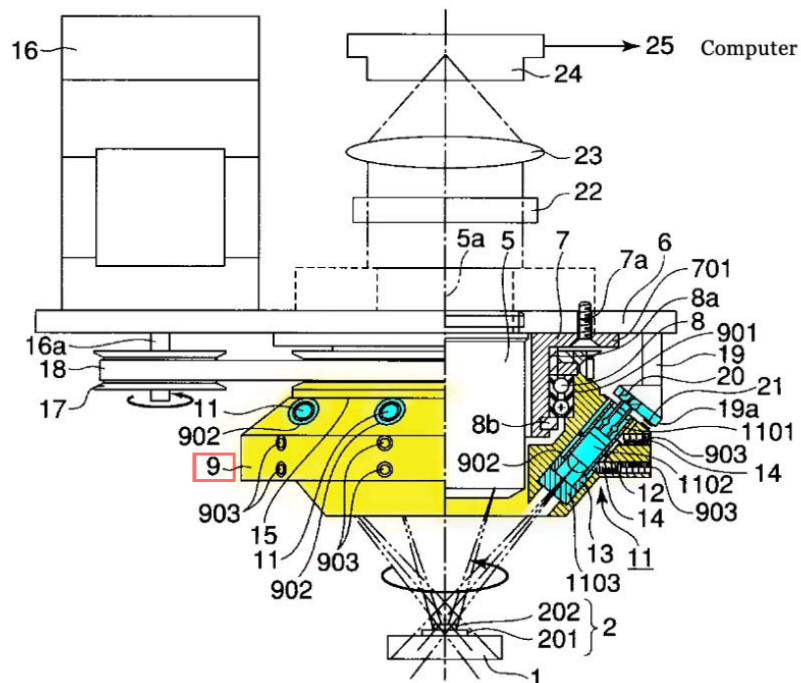
2. Motivation to Combine Olympus and GBox

A POSA would understand that Olympus is designed to produce even and efficient irradiation excitation light for “performing highly reliable fluorescence,” and for “uniformly irradiat[ing] over the entire surface of the sample” to receive “stable and reproducible fluorescence.” EX1040, p.1(Abstract), ¶0116. Olympus describes an LED light source unit 33 comprising an LED light source 3302 and a diffuser (diffusion plate 3304) in the housing holes 902 of light source holding member 9 to provide “almost uniform irradiation” over a sample. EX1040, ¶¶0113-0116, FIG. 11.

[Fig. 11]



[Fig. 1]



A POSA would be motivated to combine the uniform illumination advantages of Olympus' circular light source housing member and LED light source units with the advanced fluorescence applications that GBox provides. A POSA would know

that the Olympus housing member would be mountable in alignment with the GBox camera to provide light on a sample below and allow for imaging. A POSA would also know how to integrate the control functions of the Olympus housing so it would integrate with the advanced fluorescence imaging of the GBox. EX1004, ¶¶149-151.

3. Claims Analysis for Ground 6

a) Independent Claims 1, 14, and 25

The GBox and Olympus ground renders independent claims 1, 14, and 25 unpatentable for much the same reasons provided in Section VIII(A); however, should the Board adopt Patent Owner’s “main enclosure 48” argument, then Petitioner points to the light tight darkroom of the GBox for extra support in finding unpatentability over GBox in combination with Olympus.

b) Claims 2-5, 7, 9-11, 15-17, 20, and 23

Claims 2-5, 7, 9-11, 15-17, 20, and 23 are anticipated or rendered obvious by Olympus, as discussed in Ground 1 and Ground 2. However, should the Board adopt Patent Owner’s “main enclosure 48” argument, then Petitioner points to the light tight darkroom of the GBox for extra support in finding unpatentability over GBox in combination with Olympus.

GBox further shows the obviousness of the claims by its teachings. For example, the spectra on page 7 shows about a 35 nm bandwidth (claim 2) and the

Syngene GBox lighting module provides “a bank of 84 LEDs with corresponding emission filters” rendering claims 3, 17, 19, 20 and 23 unpatentable. EX1044, p.7. GBox shows opposing pairs of lights as recited by claim 7. EX1044, p.7. GBox’s transilluminators create a number of new lighting combinations applicable to claims 9-11.

c) Claims 6, 8, 12, 13, 18, 19, 21, 22, 26, and 27

The subject matter added by dependent claims 6, 8, 12, 13, 18, 19, 21, 22, 26, and 27 is taught by GBox.

Claim 6 is shown by the white light sources of the combination of the GBox and Olympus. Claims 8 and 19 are rendered obvious by the increased number of lighting options created from the combination. Also, in addition to what was argued above in Section VIII(A), the GBox/Olympus combination covers the 430nm to - 745nm, -900nm, and -800nm, ranges of claims 18, 21, and 22 based on this chart the spectrum and discussion on page 7, EX1044. Furthermore, transilluminators create a number of new lighting combinations where light sources do not extend, LEDs are mounted to circuit boards, and different size holes are employed, rendering claims 12, 13, 26, and 27 unpatentable.

**G. Ground 7: Claim 24 is obvious in view of GBox, Olympus, and
Brydegaard**

1. Claim 24

The assembly of claim 14, wherein said housing comprises a polyoxymethylene thermoplastic material.

Claim 14 is rendered obvious by GBox in view of Olympus as discussed in Ground 6. GBox may use, but does not list, polyoxymethylene (e.g., Delrin). EX1001, 7:28-29, 12:1-2, and 13:14-15. However, it is well known in the art to use Delrin in the construction of optical systems as set forth in Brydegaard. EX1043, p.4. A POSA would use the black Delrin of Brydegaard for light assemblies in the system of GBox as it is a known material for holding light sources in an optical system. *Id.* p.4, Fig. 2; EX1004, ¶156.

IX. SECONDARY CONSIDERATIONS

Petitioner is not aware of any indicia of nonobviousness, including purported skepticism in the industry, long-felt need, unexpected results, commercial success and copying by others, supported the patentability of the '516 patent claims.

X. DISCRETIONARY DENIAL IS NOT WARRANTED

The analysis in the instant Petition has never been presented to or considered by the Office, nor have similar arguments been made. New and

compelling evidence of unpatentability is presented in this Petition. For example, the majority of the prior art references cited during prosecution related to broadband white light sources that were filtered to produce narrow-band light. *E.g.*, EX1012. By contrast, the majority of the prior art references cited in this petition refer to narrow-band light sources, for example, light emitting diodes. Moreover, the prior art cited here such as Olympus and GBox, provides embodiments that apply multiple wavelengths for fluorescent imaging applications. The fact that Olympus was found to be an anticipatory reference by the EPO demonstrates that new and compelling evidence of unpatentability is presented. *See, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings With Parallel District Court Litigation*, June 21, 2022.

Moreover, the Petition should not be denied under the discretionary factors set out in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, at 6 (PTAB March 20, 2020). Petitioner is not a party the Spectral Litigation relating to the '516 patent and Patent Owner has not asserted the '516 patent against Petitioner. Accordingly, the Board should not exercise its discretion and deny institution of this Petition under §314(a).

XI. CONCLUSION

Petitioner asks that the Office institute an *inter partes* review of claims 1-27 and cancel these claims as unpatentable.

Petition for *Inter Partes* Review
Patent No. 8,901,516 B2

Respectfully submitted,

Date: January 6, 2023

/Timothy E. Bianchi/

Reg. No. 39,610

Counsel for Petitioner SAS Imaging d/b/a
Vilber

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned attorney for the Petitioner, Bio Imaging SAS d/b/a Vilber, declares that the argument section of this Petition has 13,466 words, according to the word count tool in Microsoft Word™.

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APPENDIX A – CLAIM LISTING

U.S. Patent No. 8,901,516

Claim or Element #	Claim Language
Claim 1	
[Preamble]	An excitation light source assembly, comprising:
[1a]	a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening,
[1b]	said housing being mountable to a support structure so that the central opening is aligned with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing;
[1c]	a light source positioned within each of the plurality of lamp receptacles, wherein at least one of said light sources comprises a narrow-band light source; and
[1d]	a diffuser positioned within at least some of the plurality of lamp receptacles, each of said diffusers diffusing light produced by each of said light sources; and
[1e]	a control system operatively connected to each of said light sources said control system operating selected ones of said light sources to provide a desired excitation illumination to an object within the field of view of said camera, the object fluorescing in response to the excitation illumination provided by said light sources.
Claim 2	The excitation light source assembly of claim 1 wherein said narrow-band light source emits light having a bandwidth of about 35 nm.
Claim 3	The excitation light source assembly of claim 2 wherein said at least one narrow-band light source comprises a light emitting diode.

Claim 4	The excitation light source assembly of claim 1, further comprising at least one filter positioned adjacent at least one diffuser in at least one of the lamp receptacles defined by said housing.
Claim 5	The excitation light source assembly of claim 4, wherein said at least one filter comprises a notch filter having a wavelength bandpass range of about 30 nm.
Claim 6	The excitation light source assembly of claim 1, wherein at least one of the light sources comprises a broad-band light source.
Claim 7	The excitation light source assembly of claim 1, wherein at least some of said plurality of lamp receptacles comprise opposed pairs of lamp receptacles on opposite sides of said central opening, each opposed pair of lamp receptacles producing light of the same color.
Claim 8	The excitation light source assembly of claim 7, further comprising ten opposed pairs of lamp receptacles on opposite sides of said central opening.
Claim 9	The excitation light source assembly of claim 1, wherein the light source positioned within each of the plurality of lamp receptacles does not extend beyond the lamp receptacle.
Claim 10	The excitation light source assembly of claim 1, further comprising a plurality of light sources positioned within at least some of the lamp receptacles so that the plurality of light sources do not extend beyond the lamp receptacles.
Claim 11	The excitation light source assembly of claim 10, wherein said plurality of light sources is three light sources.

Claim 12	The excitation light source assembly of claim 1, wherein the plurality of light receptacles defined by said housing comprise a plurality of large diameter receptacles and a plurality of small diameter receptacles.
Claim 13	The excitation light source assembly of claim 1, wherein the plurality of light receptacles defined by said housing comprise generally cylindrically shaped openings having first and second open ends, said excitation light source assembly further comprising a circuit board mounted to a first side of said housing, said light sources being mounted to said circuit board so that said light sources extend through the first open ends of the generally cylindrically-shaped light receptacles.
Claim 14	
[Preamble]	An assembly, comprising:
[14a]	a support structure;
[14b]	a camera mounted to said support structure;
[14c]	an excitation light source assembly mounted to said support structure, said excitation light source assembly comprising:
[14c1]	a housing defining a central opening therein and a plurality of lamp receptacles surrounding the central opening, said housing being mounted to said support structure so that the central opening is aligned with said camera and so that a field of view of said camera is substantially unobstructed by said housing;
[14c2]	at least one narrow-band light source positioned within at least one of the plurality of lamp receptacles; and
[14c3]	a diffuser positioned within at least some of the plurality of lamp receptacles, each of said diffusers diffusing light produced by each of said narrow-band light sources; and

[14d]	a control system operatively connected to each of said narrow-band light sources, said control system operating selected ones of said narrow-band light sources to provide a desired excitation illumination to a fluorescent material within the field of view of said camera, the fluorescent material fluorescing in response to the excitation illumination.
Claim 15	The assembly of claim 14, further comprising a light filter positioned adjacent each of the diffusers.
Claim 16	The assembly of claim 14, wherein each of the lamp receptacles defined by said housing are angled with respect to a central axis of said housing so that light emitted from each of said narrow-band light sources is directed to a desired area within the field of view of said camera.
Claim 17	The assembly of claim 14, wherein each of said narrow-band light sources is selected to provide desired number of illumination bands over a desired spectral range.
Claim 18	The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 745 nm.
Claim 19	The assembly of claim 17, wherein the desired number of illumination bands is 10.
Claim 20	The assembly of claim 17, wherein each desired illumination band has a bandwidth ranging from about 30 nm to about 35 nm.
Claim 21	The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 900 nm.
Claim 22	The assembly of claim 17, wherein the desired spectral range is from about 430 nm to about 800 nm.

Claim 23	The assembly of claim 14, wherein each of said narrow-band light sources comprises a light emitting diode.
Claim 24	The assembly of claim 14, wherein said housing comprises a polyoxymethylene thermoplastic material.
Claim 25	
[Preamble]	An excitation light source assembly, comprising:
[25a]	a housing defining a central opening therein and a plurality of lamp receptacles therein surrounding the central opening, said housing being mountable to a support structure so that the central opening is aligned with a camera also mounted to the support structure so that a field of view of the camera is unobstructed by said housing;
[25b]	a light source positioned within each of the plurality of lamp receptacles so that said light sources do not extend beyond the lamp receptacles, wherein at least one of said light sources comprises a narrow-band light source; and
[25c]	a control system operatively connected to each of said light sources, said control system operating selected ones of said light sources to provide a desired excitation illumination to an object within the field of view of the camera, the excitation illumination causing fluorescent materials in the object to fluoresce, the camera capturing an image of the fluorescing material in the object.
Claim 26	The excitation light source assembly of claim 25, wherein said plurality of lamp receptacles defined by said housing comprise a plurality of large diameter lamp receptacles and a plurality of small diameter lamp receptacles, said large diameter lamp receptacles receiving a plurality of said light sources, said small diameter receptacles receiving a single light source.

Claim 27	The excitation light source assembly of claim 25, wherein the plurality of light receptacles defined by said housing comprise generally cylindrically shaped openings having first and second open ends, said excitation light source assembly further comprising a circuit board mounted to a first side of said housing, said light sources being mounted to said circuit board so that said light sources extend through the first open ends of the generally cylindrically shaped light receptacles.

CERTIFICATE OF SERVICE

The undersigned certifies, in accordance with 37 C.F.R. §§ 42.105 and 42.6, that service was made on the Patent Owner of this Petition and exhibits at the address of the attorney of record with the U.S. Patent Office at the time this Petition was served upon Patent Owner.

Date of service January 6, 2023

Manner of service PRIORITY MAIL EXPRESS

Documents served Petition for *Inter Partes* Review, including Exhibit List; Exhibits 1001 through 1076; Certificate of Word Count; and Certificate of Service

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