

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

OPTICIS CO., LTD.,

Petitioner,

v.

INNEOS LLC,

Patent Owner.

U.S. Patent No. 7,198,416
Filing Date: January 27, 2005
Issue Date: April 3, 2007
Title: Optical combiner device

Inter Partes Review No.: (Unassigned)

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT 7,198,416**

Mail Stop "PATENT BOARD"
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

TABLE OF CONTENTS

TABLE OF AUTHORITIES	iv
PETITIONER’S EXHIBIT LIST	vi
CLAIM LISTING	viii
I. MANDATORY NOTICES	1
A. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))	1
B. Related Matters (37 C.F.R. § 42.8(b)(2)).....	1
C. Counsel and Service Information (37 C.F.R. § 42.8(b)(3) and (4)	2
II. STANDING (37 C.F.R. § 42.104(A)).....	2
III. GROUNDS (37 C.F.R. §§ 42.22 AND 42.104(B))	3
IV. U.S. PATENT NO. 7,198,416.....	5
A. Summary	5
B. The Challenged Claims (1, 2, 6, 7, and 9).....	6
C. Technology Background	7
D. Prosecution History	8
E. Claim Construction.....	10
1. Definition of a POSITA	10
2. The “focusing means” term requires construction.....	11
3. The preamble is not a limitation of the claims	12
4. The “stopped” term requires construction	13
5. No other terms require construction	14
V. GROUNDS OF UNPATENTABILITY.....	14
A. Ground 1 – The Challenged Claims would have been Obvious over Kurita	17
1. Summary of Kurita.....	17
2. Kurita discloses or suggests Claim Elements [1.0], [1.1], and [1.2].....	19

3.	Kurita discloses or suggests Claim Elements [1.3] and [1.4]	20
4.	Kurita discloses or suggests Claim Elements [1.5] and [1.6]	21
5.	Kurita discloses or suggests Claim 2	24
6.	Kurita discloses or suggests Claim 6	25
7.	Kurita discloses or suggests Claim 7	25
8.	Kurita discloses or suggests Claim 9	25
B.	Ground 2 – The Challenged Claims would have been Obvious over Kurita in view of LaMarche and/or Lemoff.....	26
1.	Summary of Kurita.....	26
2.	Summary of LaMarche	26
3.	Summary of Lemoff.....	27
4.	A POSITA would have been motivated to combine Kurita with LaMarche and/or Lemoff	28
5.	Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 1	31
6.	Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 2	33
7.	Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 6	34
8.	Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 7	34
9.	Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 9	35
C.	Grounds 3 and 4 – The Challenged Claims would have been Obvious over Lemoff and/or Lemoff in view of LaMarche	35
1.	Summary of Lemoff.....	35
2.	Summary of LaMarche	36
3.	A POSITA would have been motivated to combine Lemoff with LaMarche	36

4.	Lemoff and/or Lemoff in view of LaMarche discloses or suggests Claim Elements [1.0], [1.1], and [1.2]	39
5.	Lemoff and/or Lemoff in view of LaMarche discloses or suggests Claim Elements [1.3] and [1.4]	40
6.	Lemoff and/or Lemoff in view of LaMarche discloses or suggests Claim Elements [1.5] and [1.6]	44
7.	Lemoff and/or Lemoff in view of LaMarche discloses or suggests Claim 2	48
8.	Lemoff and/or Lemoff in view of LaMarche discloses or suggests Claim 6	49
9.	Lemoff and/or Lemoff in view of LaMarche discloses or suggests Claim 7	50
10.	Lemoff and/or Lemoff in view of LaMarche discloses or suggests Claim 9	50
D.	Ground 5 – The Challenged Claims would have been Obvious over Bhandarkar	50
1.	Summary of Bhandarkar	51
2.	Bhandarkar is prior art	52
3.	The Bhandarkar Provisional Application supports Bhandarkar	57
4.	Bhandarkar discloses or suggests Claim Elements [1.0], [1.1], and [1.2]	61
5.	Bhandarkar discloses or suggests Claim Elements [1.3] and [1.4]	62
6.	Bhandarkar discloses or suggests Claim Elements [1.5] and [1.6]	64
7.	Bhandarkar discloses or suggests Claim 2	66
8.	Bhandarkar discloses or suggests Claim 6	68
9.	Bhandarkar discloses or suggests Claim 7	69
10.	Bhandarkar discloses or suggests Claim 9	69
VI.	DISCRETIONARY FACTORS FAVOR INSTITUTION	70
A.	35 U.S.C. § 314(a)	70

B.	35 U.S.C. § 325(d).....	72
VII.	CONCLUSION.....	73

TABLE OF AUTHORITIES

Cases

<i>Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH,</i> IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020).....	72
<i>Amgen Inc. v. Sanofi,</i> 143 S. Ct. 1243 (2023)	57
<i>Apple Inc. v. Fintiv, Inc.,</i> IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020)	70
<i>ATI Techs. ULC v. Iancu,</i> 920 F.3d 1362 (Fed. Cir. 2019).....	53
<i>Becton, Dickinson & Co. v. B. Braun Melsungen AG,</i> IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017).	72
<i>Brown v. Barbacid,</i> 276 F.3d 1327 (Fed. Cir. 2002).....	53
<i>Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.,</i> 289 F.3d 801 (Fed. Cir. 2002).....	13, 19, 39, 61
<i>Commscope Techs. LLC v. Dali Wireless, Inc.,</i> IPR2022-01242, Paper 23 (PTAB Feb. 27, 2023).....	70, 71
<i>Cox Commc'ns, Inc. v. AT&T Intellectual Prop. I, L.P.,</i> IPR2015-01227, Paper 70 (PTAB Nov. 16, 2015).....	58
<i>Curt Manufacturing, LLC v. Horizon Global Americas Inc.,</i> IPR2019-00625, Paper 31 (PTAB Aug. 11, 2020).....	54
<i>Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.,</i> 800 F.3d 1375 (Fed. Cir. 2015).....	57
<i>Ex Parte Robert A. Mann & Eric Colaviti,</i> No. APPEAL 2015-003571, 2016 WL 7487271 (PTAB Dec. 21, 2016)	58
<i>Gen. Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha,</i> IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017).....	72

<i>Inneos LLC v. Opticis Co. Ltd. et al.</i> , No. 8-23-cv-00185 (C.D. Cal. Jan. 30, 2023).....	1
<i>Medichem, S.A. v. Rolabo, S.L.</i> , 437 F.3d 1157 (Fed. Cir. 2006).....	54
<i>Northern Stamping Co. v. Horizon Global Americas Inc.</i> , IPR2021-01411, Paper 10 (PTAB Feb. 22, 2022).....	73
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005).....	10
<i>Procter & Gamble Co. v. Teva Pharms. USA, Inc.</i> , 566 F.3d 989 (Fed. Cir. 2009).....	54
<i>Thorner v. Sony Comput. Entm’t Am. LLC</i> , 669 F.3d 1362 (Fed. Cir. 2012).....	14
<i>Williamson v. Citrix Online, LLC</i> , 792 F.3d 1339 (Fed. Cir. 2015).....	11
Statutes	
35 U.S.C. § 314(a)	70
35 U.S.C. § 325(d)	72
Rules	
37 C.F.R. § 42.100(b)	10
37 C.F.R. § 42.104	2
37 C.F.R. § 42.22	3
37 C.F.R. § 42.8	1, 2

PETITIONER’S EXHIBIT LIST

<i>Exhibit No.</i>	<i>Description</i>
1001	U.S. Patent No. 7,198,416 to Ray et al. (the “416 Patent”).
1002	File History of U.S. Patent No. 7,198,416.
1003	Declaration of Dr. Alan E. Willner, Ph.D.
1004	Certified Translation of Japanese Patent No. 2848279 to Kurita et al. (“Kurita”).
1005	U.S. Patent No. 5,078,499 to LaMarche (“LaMarche”).
1006	U.S. Patent No. 6,870,195 to Lemoff et al. (“Lemoff”).
1007	U.S. Patent No. 5,715,270 to Zediker et al. (“Zediker”).
1008	Kiniry, Joseph R. “Wavelength division multiplexing: ultra high speed fiber optics,” IEEE Internet Computing 2.2 (1998): 13-15.
1009	United States Provisional Application Ser. No. 60/541,573 filed Feb. 4, 2004 (“416 Patent’s Provisional Application”).
1010	Karstensen, H. “Laser diode to single-mode fiber coupling with ball lenses,” Journal of optical communications 9.2 (1988): 42-49.
1011	Chen, Hao-Lin, et al. “Collimating diode laser beams from a large-area VCSEL-array using microlens array,” IEEE Photonics Technology Letters 11.5 (1999): 506-508.
1012	Claim Chart attached to Complaint [Dkt. 1, Ex. B in <i>Inneos LLC v. Opticis Co. Ltd. et al.</i> , No. 8-23-cv-00185 (C.D. Cal. January 30, 2023)].
1013	U.S. Patent Publ. No. 2005/0069013 to Bhandarkar et al. (“Bhandarkar”).
1014	Complaint, Dkt. 1, <i>Inneos LLC v. Opticis Co. Ltd. et al.</i> , No. 8-23-cv-00185 (C.D. Cal. January 30, 2023) .

Petition for *Inter Partes* Review of
U.S. Patent No. 7,198,416

<i>Exhibit No.</i>	<i>Description</i>
1015	U.S. Provisional Patent Application Ser. No. 60/506,795 entitled “GSE Laser Enabled WDM Mux,” filed on Sep. 29, 2003 (“Bhandarkar Provisional Application”)

CLAIM LISTING

Claim 1

[1.0] An optical combiner

[1.1] usable in data communication systems for multiplexing the outputs of a plurality of n lasers wherein each of said n outputs has a different output wavelength,

[1.2] for transmission into and through a stopped single optical fiber, comprising:

[1.3] a plurality of n collimating lenses,

[1.4] said lenses being spaced apart and positioned to receive and collimate the output of said n laser output beams, said n laser output beams have n different output wavelengths, and

[1.5] focusing means for focusing said n collimated output beams onto a single spot at said stopped single optical fiber,

[1.6] said focusing means having n separate radial sectors on its surface, and each of said n collimated beams passes through a separate one of said n sectors of said focusing means whereby said n output beams having n different wavelengths are coupled into said single fiber.

Claim 2

The optical combiner of claim 1 wherein $n=4$ and wherein said four lasers and four collimating lenses are each formed in a two-dimensional, two by two array, wherein

said focusing means is a single focusing lens, and wherein each radial sector is a pie-shaped quadrant.

Claim 6

The optical combiner of claim 1 wherein said optical combiner does not require the use of dielectric filters or waveguides.

Claim 7

[7.0] An optical combiner

[7.1] usable in data communication systems for multiplexing the outputs of a plurality of lasers wherein each of said outputs has a different wavelength,

[7.2] for transmission into and through a stopped single optical fiber, comprising:

[7.3] an array of four lasers, formed in a two-dimensional, two by two array, each of said lasers having an output beam with a different wavelength,

[7.4] an array of four collimating lenses, said lenses being formed in a two-dimensional, two by two array and positioned to receive and collimate the output of said laser output beams, and

[7.5] focusing means for focusing said collimated output beams onto a single spot at said stopped single optical fiber,

[7.6] said focusing means having four separate quadrants on its surface, and each of said four collimated beams passes through a separate one of said quadrants of said

focusing means whereby said output beams of said four lasers are coupled into said single fiber.

Claim 9

The optical combiner of claim 7 wherein said optical combiner does not require the use of dielectric filters or waveguides.

Petitioner Opticis Co., Ltd. (“Opticis” or “Petitioner”) requests *inter partes* review (“IPR”) of claims 1, 2, 6, 7, and 9 (“Challenged Claims”) of U.S. Patent No. 7,198,416 (“’416 Patent”) (EX1001), assigned to Inneos LLC (“Patent Owner”).

I. MANDATORY NOTICES

A. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that Opticis is the sole real party-in-interest, and further certifies that no other party exercised control or could have exercised control over Opticis’ participation in this proceeding, the filing of this petition, or the conduct of any ensuing trial.

B. Related Matters (37 C.F.R. § 42.8(b)(2))

The ’416 Patent has been asserted in *Inneos LLC v. Opticis Co. Ltd. et al.*, No. 8-23-cv-00185 (C.D. Cal. Jan. 30, 2023). EX1014.

**C. Counsel and Service Information (37 C.F.R. § 42.8(b)(3)
and (4))**

Lead Counsel	Back-up Counsel
Michael H. Jones Rothwell, Figg, Ernst & Manbeck, P.C. 901 New York Ave NW Suite 900 Washington, DC 20001 Tel: (202) 783-6040 Fax: (202) 783-6031 Email: mjones@rfem.com USPTO Customer No. 06449 USPTO Reg. No. 76,120	Martin M. Zoltick USPTO Reg. No. 35,745 Rothwell, Figg, Ernst & Manbeck, P.C. 901 New York Ave NW Suite 900 Washington, DC 20001 Tel: (202) 783-6040 Fax: (202) 783-6031 Email: mzoltick@rfem.com Mark T. Rawls USPTO Reg. No. 76,376 Rothwell, Figg, Ernst & Manbeck, P.C. 901 New York Ave NW Suite 900 Washington, DC 20001 Tel: (202) 783-6040 Fax: (202) 783-6031 Email: mrawls@rfem.com

Please address all correspondence and service to Lead Counsel at the address provided above. Petitioner also consents to electronic service by electronic mail at mjones@rfem.com, litigationparalegals@rothwellfigg.com, mzoltick@rfem.com, and mrawls@rfem.com. A copy of this Petition, including exhibits, is being served on Patent Owner at the address of record at the Patent Office.

II. STANDING (37 C.F.R. § 42.104(a))

Petitioner certifies that the '416 Patent is available for IPR and Petitioner is not barred or estopped from requesting IPR of the Challenged Claims on the

Grounds identified in this Petition. Petitioner has not filed a civil action challenging the validity of the Challenged Claims.

III. GROUNDS (37 C.F.R. §§ 42.22 and 42.104(b))

Petitioner requests IPR of the Challenged Claims based on the following grounds:

<u>Ground</u>	<u>Reference(s)</u>	<u>Basis</u>	<u>Claim(s)</u>
Ground 1	Kurita	§ 103	1, 2, 6, 7, and 9
Ground 2	Kurita in view of LaMarche and/or Lemoff	§ 103	1, 2, 6, 7, and 9
Ground 3	Lemoff	§ 103	1, 2, 6, 7, and 9
Ground 4	Lemoff in view of LaMarche	§ 103	1, 2, 6, 7, and 9
Ground 5	Bhandarkar	§ 103	1, 2, 6, 7, and 9

The Declaration of Dr. Alan E. Willner (EX1003) is submitted herewith in further support of this IPR challenge.

The '416 Patent claims priority to Provisional Appl. No. 60/541,573, filed February 4, 2004. However, during prosecution, the applicant argued that it was entitled to a priority date of July 17, 2003, based on an alleged earlier conception and diligent reduction to practice. *See* Section IV(D). Opticis does not agree that Patent Owner is entitled to this earlier date; however, the relied-upon references, except for Bhandarkar (Ground 5) are prior art using either priority date. The prior art status of Bhandarkar (Ground 5) is addressed below. *See* Section V(D)(2).

Japanese Patent No. 2848279 to Kurita et al. (EX1004) was published on January 20, 1999, and is prior art under at least §102(b).

U.S. Patent No. 5,078,499 to LaMarche (EX1005) issued January 7, 1992, and is prior art under at least §102(b).

U.S. Patent No. 6,870,195 to Lemoff et al. (“Lemoff”) (EX1006) issued March 22, 2005, and is prior art under at least § 102(e) based on its filing date of February 21, 2003.

U.S. Patent Publ. No. 2005/0069013 to Bhandarkar et al. (“Bhandarkar”) (EX1013) published on March 31, 2005, is based on an application filed September 28, 2004, and also claims priority to a provisional application which was filed on September 28, 2003. For the reasons explained in Section V(D)(2), Bhandarkar is prior art under at least § 102(e) based on its provisional application date and/or its application filing date.

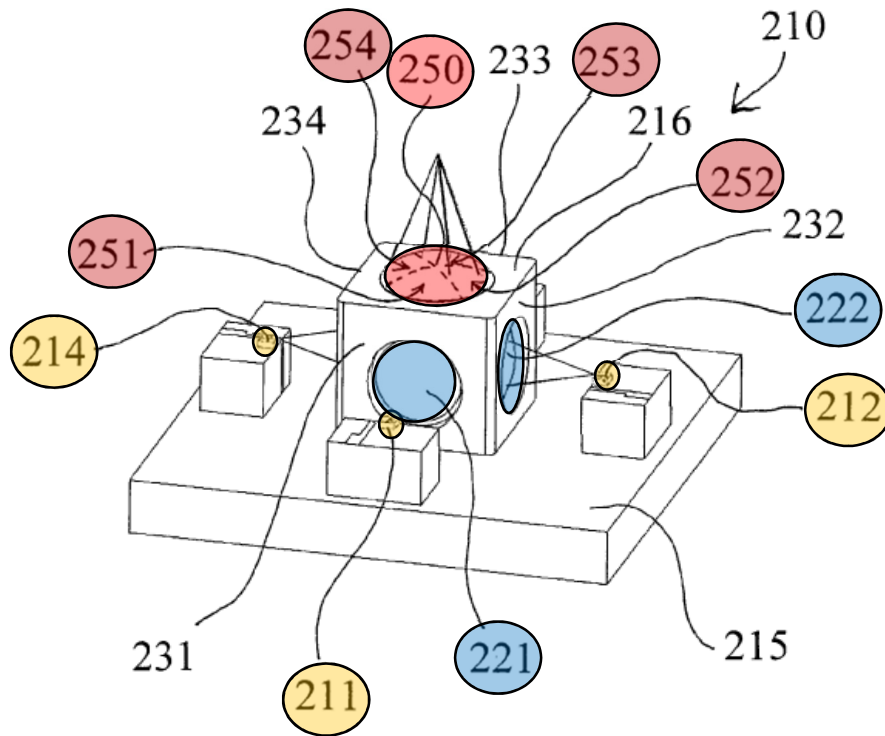
Each of the foregoing references is analogous art to the ’416 Patent, as each reference is directed to the same field of endeavor as the ’416 Patent (i.e., optical devices), and is reasonably pertinent to the particular problem the ’416 Patent was trying to solve (i.e., effective combination of light from a plurality of sources having different output wavelengths). *See* Sections V(A)(1), V(B)(1)-(2), V(C)(1)-(2), V(D)(1); EX1003 at §VIII(A).

IV. U.S. Patent No. 7,198,416

A. Summary

The '416 Patent is directed to an optical multiplexing device that spatially combines multi-wavelength light from a plurality of lasers into an optical fiber. EX1001, 1:13-16. This was not new – the '416 Patent admits that “wavelength division multiplexed optical communication systems” were known “[i]n [the] prior art,” and that it was known that “transmitting several channels at different optical wavelengths into a fiber (i.e., wavelength division multiplexing, or WDM)” allowed for “bandwidth” to “be more efficiently utilized.” EX1001, 1:21-34. Nor was the lens arrangement of the '416 Patent new. The '416 Patent admits “[t]he prior art ... includes an optical power combiner which utilizes collimators and a focusing lens to concentrate multiple output beams to increase power density,” referring to U.S. Pat. No. 5,377,287 to Lee et al. (“Lee”). EX1001, 1:56-59.

The '416 Patent distinguishes its device from that of Lee by noting that “[t]he present invention, in contrast [with the concentrically arranged optical fibers and collimating lenses of Lee], uses a separate radial sector of the focusing lens to focus each separate laser output.” EX1001, 1:65-67. A schematic diagram of the system is provided in FIG. 7:



EX1001, FIG. 7. In this example, four **lasers** 211-214 (three shown) direct their output beams towards corresponding **collimating lenses** 221, 222 (two shown), which in turn direct the output towards **focusing lens** 250 having four pie-shaped **radial quadrants** 251-254. EX1001, 5:14-6:4. The focused output of the lens can be directed, for example, into an optical fiber (not shown).

B. The Challenged Claims (1, 2, 6, 7, and 9)

A complete listing of the Challenged Claims is provided in the Claim Listing. Claims 1 and 7 have been annotated with numbered brackets to identify each claim element. Claims 1 and 7 are independent claims.

Independent claims 1 and 7 are similar in scope. *See* EX1003 at ¶¶93-95. The main difference is that, while claim 1 requires a plurality of *n* lasers, collimating

lenses and radial sectors on the surface of the focusing means, claim 7 specifies *four* lasers, collimating lenses and quadrants on the surface of the focusing means (*i.e.*, $n=4$).¹ Compare EX1001 at 5:23-40 with 6:19-38. This difference does not affect the invalidity grounds herein, as the relied-upon prior art teaches, or would have suggested, $n=4$. *E.g.*, Section V(A)(5), V(B)(5), V(C)(7), V(D)(7). Dependent claim 2 requires a two-by-two array of lasers (*i.e.*, $n=4$) with four pie-shaped quadrants on the focusing lens (similar to independent claim 7); and dependent claims 6 and 9 state that the “combiner does not require the use of dielectric filters or waveguides.” EX1001 at 6:6-18, 6:45-47.

C. Technology Background

Wavelength division multiplexing (WDM) refers to technologies in which multiple data-carrying optical carrier waves of different wavelengths are multiplexed into a single fiber. Such technologies improve capacity, and therefore became an increasingly important research and commercial priority in part because of the increased capacity needs for data communication brought on in part by the rise of the Internet in the mid-1990s to early 2000s. *See* EX1003, §VI(A).

When designing WDM devices, it was known to use lasers, collimating lenses, and a focusing lens arranged such that the collimated light would be focused

¹ There are also non-substantive grammatical differences in the claims. *See* EX1003 at ¶¶93-95.

by the focusing lens onto a single spot for passing through an optical fiber. EX1003, §VI(B). In particular, collimating lenses were used in conjunction with a focusing lens because, for example, it was known that such use promoted improved coupling efficiency, *i.e.*, increasing the amount of the input signal that reaches the optical fiber. *See* EX1003, §VI(C); *see also* EX1010 at 46, 48; EX1011 at 506, 508.

D. Prosecution History

The '416 Patent issued from Appl. No. 11/044,475 (the "'475 Application"), which was filed January 27, 2005, and claims priority to Provisional Appl. No. 60/541,573, which was filed February 4, 2004. The '416 Patent issued April 3, 2007. *See* EX1001 (face of patent).

A non-final Office Action was mailed October 5, 2005. EX1002, p. 137. The examiner rejected claims 1, 2, 6, 7, and 9 as being anticipated by 2005/0069013 to Bhandarkar, and indicated that claims 3-5 and 8 contained allowable subject matter. EX1002, pp. 139-141. Rather than address the merits of the rejection under Bhandarkar, Patent Owner submitted inventor declarations purporting to swear behind the reference, claiming conception as early as July 17, 2003. EX1002, pp. 71-73.²

² Patent Owner also amended the claims to add that the optical combiner is "*usable in data communication systems*" and that "*said n laser output beams have n different wavelengths.*" EX1002, pp. 68-71 ("[I]ndependent claims 1 and 7 are

However, a final Office Action was mailed July 5, 2005. EX1002, pp. 56. The examiner maintained the rejection and found the evidence of conception insufficient based on the limitations directed to lasers of different wavelengths, and each of the collimated beams being refracted at the same angle. EX1002, pp. 58-59. Patent Owner filed a response, amending the claims to remove the reference to each of the collimating beams being refracted at the same angle, and adding a requirement “*whereby said n output beams having n different wavelengths are coupled into said single fiber.*” EX1002, p. 32-34. Patent Owner further submitted supplemental inventor declarations. EX1002, pp. 35-39. Following this, a Notice of Allowance was mailed on April 9, 2007. EX1002, p. 18.

Petitioner respectfully submits that the Examiner erred by ceasing to search following acceptance of the inventor declarations. As demonstrated herein, numerous references – dated before July 17, 2003 – teach, or would have suggested, the subject matter of the Challenged Claims.

As already explained in the Technology Background, there was nothing new at this time about using lasers, collimating lenses, and a focusing lens to focus collimated light into an optical fiber for use in WDM devices for data

amended to clarify the distinctions over the prior art Kususawa et al reference, referred to, but not relied upon, in the Office action.”).

communication. *See* Section IV(C). Indeed, the patent largely admits that WDM optical communication was known, and that such devices included lasers, collimating lenses, and a focusing lens. *See* EX1003 at Section VIII(A)(i).

Moreover, the one basis on which the '416 Patent purports to be inventive – having light from multiple sources pass through separate radial sectors, as opposed to being linear or concentric – was also not new or inventive. *See* EX1003 at ¶¶27, 60, and Section VIII(B)-(E). The claim requirement that “*each of said n collimated beams passes through a separate one of said n sectors of said focusing means*” is a by-product of the arrangement of the laser source, collimating lenses, and the focusing lens. *See* EX1003, ¶¶84-91. Such an arrangement was commonplace by the 2003 timeframe, as demonstrated at least by the grounds of this Petition.

E. Claim Construction

Claim terms are construed using the *Phillips* standard. 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). A term is construed according to its plain and ordinary meaning as understood by a person of ordinary skill in the art (“POSITA”) in view of the specification.

1. Definition of a POSITA

A POSITA would have had at least a bachelor’s degree in electrical engineering, physics, or a related field, and at least two years of practical experience in optical technologies. EX1003, §VII(D)(i). These descriptions are approximate,

and a higher level of education or skill might make up for less experience, and vice-versa.

2. The “focusing means” term requires construction

Claim 1 requires “*focusing means for focusing said n collimated output beams onto a single spot at said stopped single optical fiber.*”³ Because the claim uses the word “means” there is a presumption that it should be interpreted as a means-plus-function term under 35 U.S.C. § 112, ¶6. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1349 (Fed. Cir. 2015) . Moreover, the claim does not recite any specific structure for achieving the claimed function. EX1003, ¶112. Accordingly, the “*focusing means*” must be interpreted according to the corresponding structure provided in the specification, and equivalents.

In the '416 Patent, the corresponding structure described in the specification for performing the function of “*focusing said n collimated output beams onto a single spot at said stopped single optical fiber*” is a focusing lens. EX1003, §VII(D)(iii)(1). A focusing lens (element 30, 130, 250, and 350) is shown in FIGS. 1, 4, and 6-11, and described in the associated text. EX1001, FIGS. 1-4, 3:7-49 (focusing lens 30); FIGS. 5-6, 3:50-60 (focusing lens 130); FIGS. 7-9, 3:61-4:34

³ Claim 7 has a similar requirement. EX1001, 6:33-34 (“focusing means for focusing said collimated output beams onto a single spot at said stopped single optical fiber”).

(focusing lens 250); FIGS. 10-11, 4:35-52 (focusing lens 350).⁴ This is consistent with dependent claim 2, which states that “*said focusing means is a single focusing lens.*”

The claim further requires that “*said focusing means hav[e] n separate radial sectors on its surface,*” but these radial sectors are a conceptual division of the surface of the focusing means, not a physical structure themselves. EX1003, ¶114; *see also* EX1001, FIG. 7 (dashed lines), 4:6-8 (“The surface of focusing lens 250 is smooth and includes four pie-shaped radial quadrants 251-254.”). The fact that the focusing means has a surface that can be divided into conceptual sectors also does not convey sufficient structure for performing the function. EX1003, ¶112.

3. The preamble is not a limitation of the claims

The preamble of independent claims 1 and 7 states a purpose or intended use for the invention, i.e., that the optical combiner be “*usable in data communication systems for multiplexing the outputs of a plurality of n lasers wherein each of said n outputs has a different output wavelength for transmission into and through a stopped single optical fiber.*” (Claim 7’s preamble is substantially the same.) Because the body of the claim otherwise provides a structurally complete device, the

⁴ In the corresponding district court case, Patent Owner agrees with this structure, to the extent § 112, ¶6 applies. *See* EX1014, Ex. B, p. 6 n.2.

preamble here is not limiting. *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (“[A] preamble is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.”) (quotation marks and citation omitted).

4. The “stopped” term requires construction

Claim 1 requires “*multiplexing the outputs of a plurality of n lasers ... for transmission into and through a **stopped** single optical fiber*” and “*focusing means for focusing said n collimated output beams onto a single spot at said **stopped** single optical fiber.*” Claim 7 refers to a “*stopped*” single optical fiber in a similar manner. The term “*stopped*” is not typically used to describe optical fibers in this field, and therefore it requires construction. EX1003, ¶117. Given its usage in the claims, and the description in the specification referencing “a single optical fiber (not shown)” that is “stopped by fiber stop or seat 60 formed in ferrule 80,” (EX1001, 3:13-15; *see also id.* at 3:23-24), the term “*stopped*” would have been understood by a POSITA to mean “fixed,” such that movement would be substantially limited. *See* EX1003, §VIII(D)(iii)(2) (*e.g.*, “A seat and ferrule arrangement is (and was in 2003 before the earliest possible priority date of the ’416 Patent) a common way to fix an optical fiber in place.”). As explained by Dr. Willner, with the claims requirements

of “transmission into/through and focusing onto a single spot – it would be clear to a POSITA that the single optical fiber would need to be fixed in place.” *Id.*

5. No other terms require construction

All other claim terms should be given their plain and ordinary meaning. No other term is re-defined in the patent or prosecution history, and each would have been readily understood by a POSITA in the context of the claims and specification. *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012); EX1003, §VII(D)(iii)(3).

V. GROUNDS OF UNPATENTABILITY

Petitioner requests an IPR on Grounds 1-5 and cancellation of the Challenged Claims. The basis for requested relief is set forth below.

The Petition is supported by the declaration of Dr. Willner (EX. 1003), who is an expert in the field of the ’416 Patent, and has more than three decades of experience dealing with optical technology such as at issue here. Having reviewed the ’416 Patent, the prior art, and other evidence noted in his report, Dr. Willner concluded the Challenged Claims would have been obvious to a POSITA, summarizing his opinions as follows:

It is my opinion that the Challenged Claims of the ’416 Patent would have been obvious to a POSITA as of the ’416 Patent’s earliest asserted priority date.

The optical combiner of the '416 Patent – including its particular combination of lasers, collimating lenses, focusing lens, and optical fiber – was well known in the field by July 2003. By this time, such devices were an important part of research and development for academics and industry, in particular, due to the increased communication needs – brought about in part by the growth of the Internet – in the mid-1990s and later. By this time, optical combiners using radial arrangements of lasers and collimating lenses, together with a focusing lens focusing the output onto an optical fiber, were well known.

As I understand the prosecution history, ... the Applicant swore behind the reference, alleging a priority date as early as July 17, 2003. There is nothing particularly special about this date.... [T]here remained prior art and background technology at that time, spurred in part by the increased communication needs brought about by the growth of the Internet in the mid-1990s and later, which, in my opinion, taught the optical combiner of the '416 Patent. The Challenged Claims recite a known arrangement of optical components (collimating lenses and a focusing lens) for

multiplexing light of different wavelengths from different sources onto an optical fiber.

Furthermore, having collimated light from the collimating lenses pass through separate radial sectors of a focusing lens (as opposed to, for example, a linear arrangement of collimating lenses) was also known. As I explain below, the requirement of separate radial sectors is a by-product of having the collimating lenses radially arranged about a center axis of the focusing lens, which was known in the art.

In sum, the various elements claimed by the '416 Patent, and shown in the references ... were well known and, at this time in the field, generally interchangeable such that a POSITA would have been motivated to combine them and have had a reasonable expectation of success.

EX1003, ¶¶23-28.

Ground 1 is based on Kurita, which discloses all claim elements. Ground 2 adds the teachings of LaMarche (regarding a radial arrangement of collimating lenses) and/or Lemoff (regarding a receptacle and ferrule arrangement for securing an optical fiber) with respect to claim element [1.6] (and claim element 7.6), as well as claim 2.

Ground 3 is based on Lemoff, which also discloses all claim elements. Ground 4 adds the teachings of LaMarche (regarding both its collimating lenses, and their radial arrangement) with respect to claim elements [1.3] – [1.6] (and claim elements [7.4]–[7.6]), as well as claim 2.

Ground 5 is based on Bhandarkar. This is the reference the applicant swore behind during prosecution. The inclusion of this ground is premised on the examiner having erred in determining that the '416 Patent was entitled to a priority date of July 17, 2003. *See* below, Section V(E)(2).

**A. Ground 1 – The Challenged Claims would have been
Obvious over Kurita**

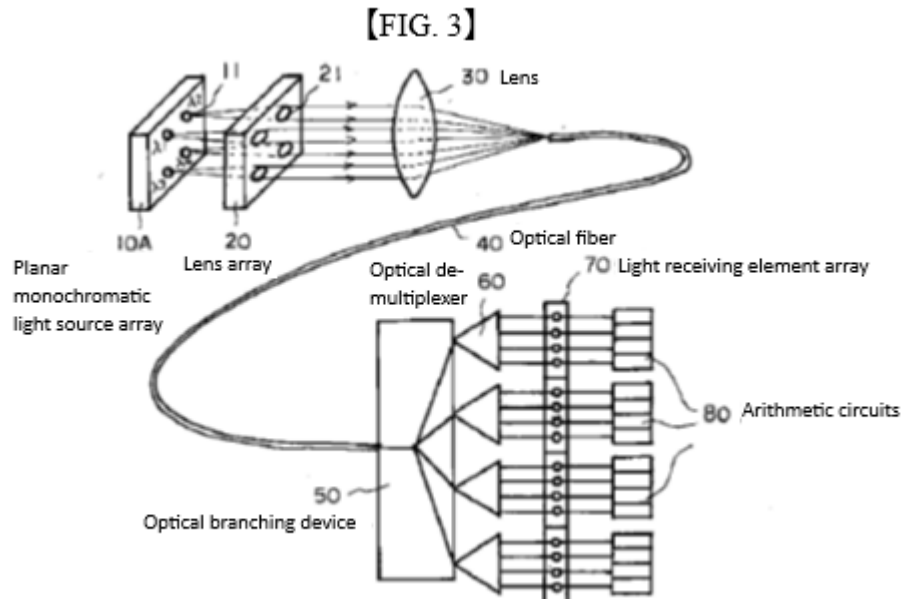
Kurita discloses all elements of the Challenged Claims. To the extent it is argued that Kurita does not literally disclose an element, it would have been obvious over its disclosure to a POSITA at the time of the purported invention, for at least the reasons set forth below. *See* EX1003, §VIII(B).

1. Summary of Kurita

Kurita (EX1004) is directed to an optical device (“light connection elements and light connection devices”) for multiplexing laser light into an optical fiber for optical communications. *See* EX1003, §VIII(A)(ii); EX1004, ¶¶[0001]–[0009]. Kurita’s optical device includes an array of light emitting portions (lasers) each with different wavelength; an array of collimating lenses arranged one-to-one with the

light emitting portions (lasers); and a focusing lens for converging the light into a single optical fiber. *Id.*

One of Kurita's embodiments (*i.e.*, FIG. 3, reproduced below) shows the light emitting portions 11 (lasers) and the collimating lenses 21 as each being formed in a two-by-two array, having respectively four light emitting portions 11 and four collimating lenses 21. These components are arranged such that the light emitting portions 11 are aligned with corresponding collimating lenses 21, and the collimating lenses 21 are radially arranged with respect to the center focal axis of the focusing lens 30, which focuses the collimated light into optical fiber 40. *Id.*



With this setup, Kurita discloses every element of the Challenged Claims. *See generally* EX1003, §VIII(B).

**2. Kurita discloses or suggests Claim Elements [1.0],
[1.1], and [1.2]**

The preamble of claim 1 is not a limitation. *See* Section IV(E)(3). However, to the extent that the preamble is considered a limitation, **Claim Elements [1.0], [1.1], and [1.2]** are disclosed or rendered obvious by Kurita. Kurita discloses “[1.0] *[a]n optical combiner [1.1] usable in data communication systems for multiplexing the outputs of a plurality of *n* lasers wherein each of said *n* outputs has a different output wavelength, [1.2] for transmission into and through a stopped single optical fiber.*” EX1004, FIGS. 1-3, ¶¶[0001], [0004], [0007]-[0011], [0013], [0015]; EX1003, §VIII(B)(i).

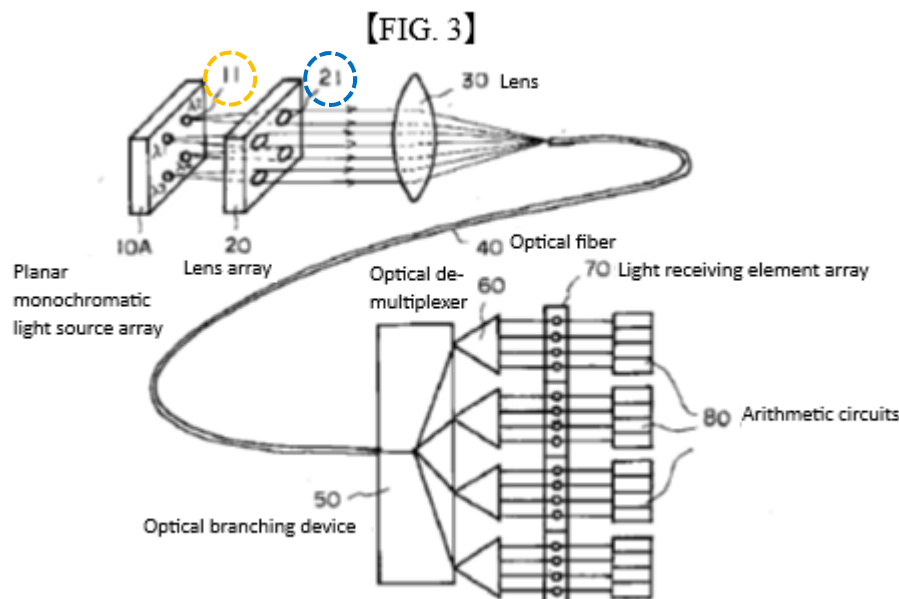
For example, the light connection device (“*optical combiner*”) taught in Kurita is usable in data communications (EX1004, ¶[0001] (device is “used ... with optical communications”)); it is for multiplexing laser outputs through an optical fiber (*id.*, ¶[0001] (device is “for inputting *laser lights* into and outputting them out of *optical fibers*”); ¶[0004] (“*the lights* from the individual *light emitting portions* entered are multiplexed to become integrated to be transmitted through the above-mentioned *single optical fiber*”)); and the laser outputs are of different wavelength (*id.*, ¶[0013] (“plural *light emitting portions 11* each of which is of a different wavelength”)). *See* EX1003, §VIII(B)(i).

3. Kurita discloses or suggests Claim Elements [1.3] and [1.4]

Claim Elements [1.3] and [1.4] are disclosed or rendered obvious by Kurita.

Kurita discloses “[1.3] *a plurality of n collimating lenses*, [1.4] *said lenses being spaced apart and positioned to receive and collimate the output of said n laser output beams, said n laser output beams have n different output wavelengths.*” EX1004, FIGS. 1-3, [0010], [0011], [0013], [0015]; EX1003, §VIII(B)(ii).

For example, *the individual lens portions 21*, of the lens array 20, are “*a plurality of n collimating lenses*” which are separated from each other (i.e., *spaced apart*) and they receive the “*laser output beams*” from the individual *light emitting portions 11*:

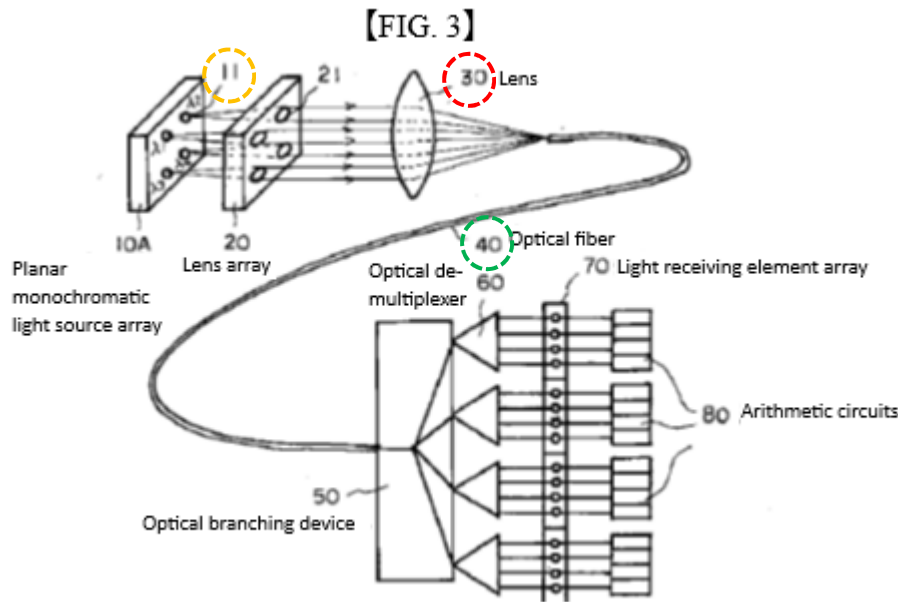


EX1004, FIG. 3 (annotated). As shown above, and described in Kurita, the lens portions 21 are placed at corresponding planar positions compared to the light emitting portions 11, and thus, the lens portions 21 *receive and collimate* the light from the light emitting portions 11, which each have a *different output wavelength* ($\lambda_1, \lambda_2, \lambda_3, \lambda_4,$). EX1004, ¶[0010] (“**Plural light emitting portions 11** ... and **plural lens portions 21** ... are placed at respectively corresponding planar positions.”); ¶[0011] (“[T]he **lights** from the individual **light emitting portions 11** are collimated with the **lens portions 21** of the **lens array 20** to be made into parallel **beams**....”); ¶[0013] (“This optical multiplexer is composed of ... plural **light emitting portions 11** each of which is of a different wavelength....”). See EX1003, §VIII(B)(ii).

4. Kurita discloses or suggests Claim Elements [1.5] and [1.6]

Claim Elements [1.5] and [1.6] are disclosed or rendered obvious by Kurita. Kurita discloses “[1.5] **focusing means** for focusing **said n collimated output beams** onto a single spot at **said stopped single optical fiber**, [1.6] **said focusing means** having **n separate radial sectors** on its surface, and each of **said n collimated beams** passes through a separate one of said **n sectors** of **said focusing means** whereby **said n output beams** having **n different wavelengths** are coupled into **said single fiber**.” EX. 1004, FIGS. 1-3, ¶¶[0009]-[0011], [0015], ¶[0013]; EX1003, §VIII(B)(iii).

For example, **lens 30** is the “*focusing means*,” which receives the “*output beams*” from the individual **light emitting portions 11** after they have been collimated by collimating lenses 21, and then focuses the **beams** into **optical fiber 40**, which is the “*stopped single optical fiber*”:



EX1004, FIG. 3 (annotated); *see also id.*, ¶[0009] (“As the **lights** emitted at the **light emitting portions** ... are each collimated at the lens portions ... to be made into **parallel beams**, and as the **individual beams** are converged on one point with the **lens** to be entered into one end portion of a **single optical fiber** ... [the **lights** are] to be transmitted through the above-mentioned **single optical fiber**.”) *See* EX1003, §VIII(B)(iii). A POSITA would understand that the single optical fiber 40 of Kurita would be “*stopped*” (*i.e.*, “fixed”), or it would have been obvious to a POSITA to modify it to a *stopped* single optical fiber, because Kurita explains the beams are

focused “at one point,” and because stopping (fixing) the fiber would ensure the focused beams enter into the fiber and would improve coupling efficiency. *See* EX1003, ¶¶172-173.

The focusing lens 30 of Kurita meets the “focusing means” claim element because the corresponding structure described by the ’416 Patent for the “focusing means” is a focusing lens. *See* above, Section IV(E)(2). Specifically, the focusing lens 30 of Kurita corresponds to the focusing lenses 30, 130, 250, and 350 disclosed in the ’416 Patent, or equivalents thereof. *See* EX1003, ¶181.⁵

The collimated light “*passes through a separate one of said n sectors of **said focusing means***” because the two-by-two array of lens portions 21 results in radially arranged lenses that will each pass their respective collimated light to a separate radial portion (or sector) of the lens 30. EX1004, FIGS. 1-3, ¶¶[0009]-[0013]; EX1003, ¶182. Additionally, a POSITA would have understood from Kurita’s disclosure, and it would have been obvious, that the lens portions 21 are aligned with the center axis of the focusing lens 30 in such a way that the collimated light passes through separate radial sectors because doing so would have resulted in better coupling efficiency. *See* EX1003, ¶¶183-184; *see also* EX1003, §VIII(B)(iii).

⁵ If this term is not construed according §112, ¶6, the prior art of Grounds 1-5 still teaches, or would have suggested, the claimed focusing means. Because the prior art uses a single focusing lens – the same means described in the ’416 Patent – this limitation is disclosed under any reasonable construction. EX1003, p. 69, n.3.

5. Kurita discloses or suggests Claim 2

Claim 2 is disclosed or rendered obvious by Kurita. Kurita discloses “*The optical combiner of claim 1 wherein $n=4$ and wherein said four lasers and four collimating lenses are each formed in a two-dimensional, two by two array, wherein said focusing means is a single focusing lens, and wherein each radial sector is a pie-shaped quadrant.*” EX. 1004, FIG. 3, ¶¶[0015]; EX1003, §VIII(B)(iv).

For example, FIG. 3 (reproduced below) shows a two-by-two array of four light emitting portions 11 (lasers) and four lens portions 21 (collimating lenses) feeding into a single focusing lens 30.

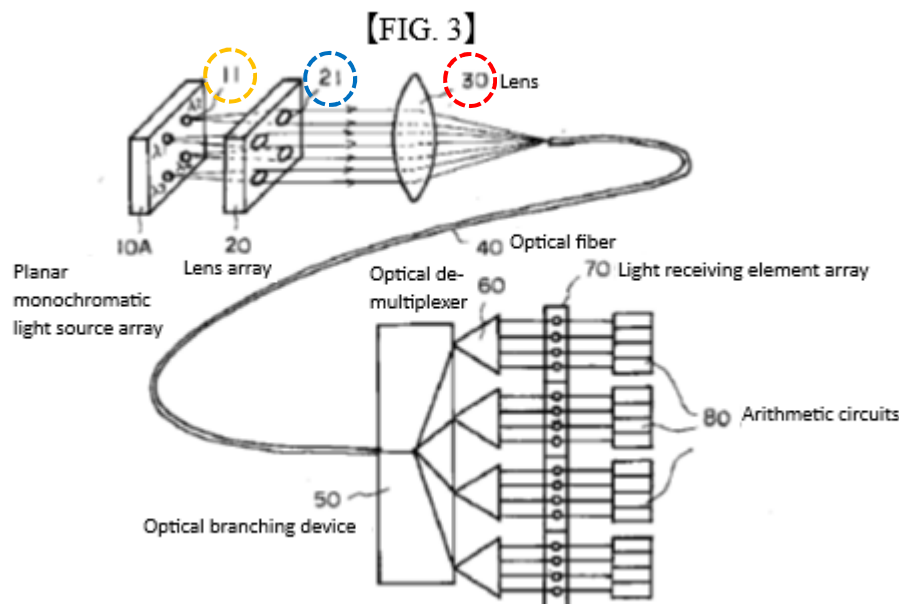


FIG. 3 (annotated). See EX1003, §VIII(B)(iv).

Furthermore, the lens 30 has four pie-shaped quadrants because the light emitting portions 11 and lens portions 21 are arranged radially around the lens 30,

equally spaced, and centered on the focal axis of **lens 30**. EX. 1004, FIG. 3, ¶[0015]; *see also* EX1003, §VIII(B)(iv).

6. Kurita discloses or suggests Claim 6

Claim 6 is disclosed or rendered obvious by Kurita. Kurita discloses “*The optical combiner of claim 1 wherein said optical combiner does not require the use of dielectric filters or waveguides.*” EX. 1004, FIGS. 1-3, ¶¶[0004]-[0005]; EX1003, §VIII(B)(v).

For example, the figures in Kurita do not show, and the text does not describe, dielectric filters or waveguides. Kurita also explains that one object of its invention is “to reduce the number of component parts...” EX1004, ¶[0005]; *see also* EX1003, §VIII(B)(v).

7. Kurita discloses or suggests Claim 7

Claim 7 is disclosed or rendered obvious by Kurita. As explained above, claim 7 is substantially the same in scope as claim 2. *See* above, Section IV(B); EX1003 at ¶¶93-95. Accordingly, the analysis above for claims 1-2 applies equally here. *See* EX1003, §VIII(B)(vi).

8. Kurita discloses or suggests Claim 9

Claim 9 is disclosed or rendered obvious by Kurita. Claim 9 differs from claim 6 only in that it depends from claim 7 instead of claim 1. Accordingly, the analysis above for claim 6 applies equally here. *See* EX1003, §VIII(B)(vii).

**B. Ground 2 – The Challenged Claims would have been
Obvious over Kurita in view of LaMarche and/or Lemoff**

Kurita in view of LaMarche and/or Lemoff discloses all elements of the Challenged Claims. To the extent it is argued that this combination does not literally disclose an element, it would have been obvious over its disclosure to a POSITA at the time of the purported invention, for at least the reasons set forth below. EX1003, §VIII(C).

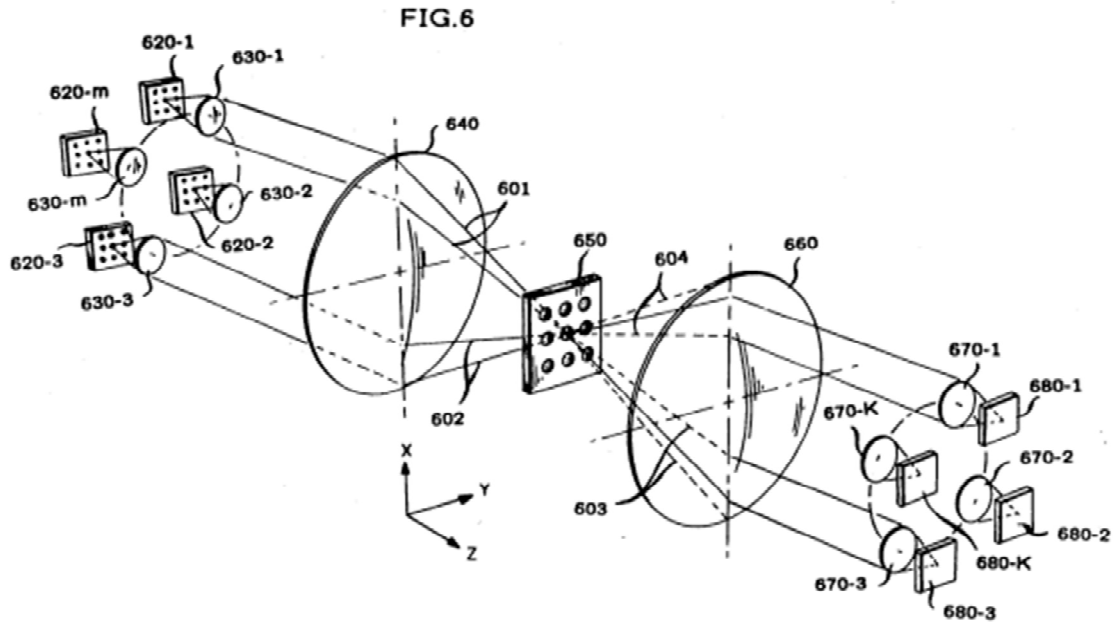
1. Summary of Kurita

As described above, Kurita teaches an optical device having light emitting portions 11 (lasers), lens portions 21 (collimating lenses), and a lens 30 (focusing lens) that feeds into an optical fiber 40. *See* above, Section V(A)(1).

2. Summary of LaMarche

LaMarche (EX1005) is directed to an optical device (an “optical interconnection arrangement”) for interconnecting light emitting devices with light detecting devices. *See* EX1003, §VIII(A)(iii); EX1005, 1:5-8, 2:13-48. The optical signals may be wavelength division multiplexed. EX1003, §VIII(A)(iii); EX1005, 5:20-23. For each of M light sources (620-1 through 620-M), LaMarche teaches a radial array of collimating lenses (630-1 through 630-M), each the same radial distance from a center of the pupil lens 640, which focusses the collimated light. EX1003, §VIII(A)(iii); EX1005, FIG. 6, 4:43-60, 6:26-7:7.

One of LaMarche's embodiments (*i.e.*, FIG. 6, reproduced below) shows the radial arrangement of collimating lenses (630-1 through 630-M):



LaMarche teaches that this radial arrangement of collimating lenses results in improved coupling efficiency, reduced physical complexity, as well as having other advantages such as being able to achieve high-bandwidth connections. *See* EX1005, 1:11-2:20 (Background of the Invention), 2:17-23 (Summary of the Invention); EX1003, §VIII(A)(iii).

3. Summary of Lemoff

Lemoff (EX1006) is directed to an optical device (an “optical signal emitter”) for multiplexing laser light into an optical fiber for optical communications. *See* EX1003, §VIII(A)(iv); EX1006, Abstract, 1:52-56. One of Lemoff's embodiments (*i.e.*, FIG. 2, reproduced below) shows a receptacle 260 and ferrule 255 that

constitute a connector that secures the optical fiber 250 in place. EX1003, §VIII(A)(iv); EX1006, FIG. 2, 5:55-6:2.

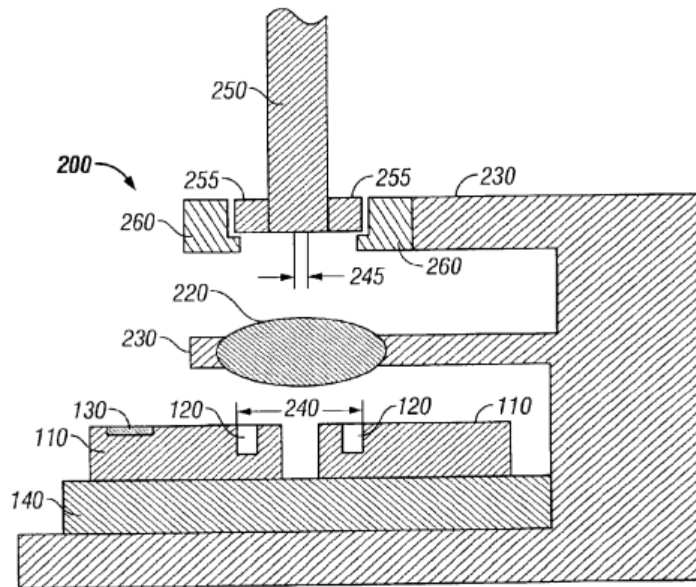


FIG. 2

Lemoff is further described below, with respect to Grounds 3 and 4. *See* Section V(C)(1).

4. A POSITA would have been motivated to combine Kurita with LaMarche and/or Lemoff

A POSITA would have been motivated to combine Kurita with LaMarche and/or Lemoff. *See* EX1003, §VIII(C)(i)-(ii).

In particular, a POSITA would have been motivated to use LaMarche's teachings of a radial arrangement of collimating lenses, in the light connection

element of Kurita, such that the collimated light from each of the collimating lenses passes through a separate radial sector of a focusing lens. The embodiment shown in FIG. 3 of Kurita includes a two-by-two array of four radially arranged collimating lens portions 21, and it would be a natural extension to apply LaMarche's teaching of a radial arrangement for an arbitrary number M of collimating lenses. LaMarche further teaches that the radial (or non-collinear) arrangement it describes results in improved coupling efficiency, reduced physical complexity, and has other advantages such as being able to achieve high-bandwidth connections. *See* EX1005, 1:11-2:20 (Background of the Invention), 2:17-23 (Summary of the Invention); EX1003, §VIII(C)(i).

A POSITA would also have been motivated to use Lemoff's teachings of a receptacle and ferrule arrangement for securing an optical fiber, in the light connection element of Kurita, such that the optical fiber in Kurita would be secured by the receptacle and ferrule arrangement for receiving the focused output beams. In particular, the embodiment shown in FIG. 3 of Kurita includes an optical fiber 40, and it would be a natural extension to apply Lemoff's teaching of a receptacle and ferrule arrangement for securing an optical fiber. EX1006, 5:63-6:2; EX1003, §VIII(C)(ii).

Each of Kurita, LaMarche, and Lemoff are in the same field (i.e., optical technologies); they each teach optical devices utilizing similar components, such as

light sources, collimating lenses, and a focusing lens; and are each analogous art to the '416 Patent. *See, e.g.*, EX1004, FIGS. 1-3, ¶¶[0010]-[0018]; EX1005, FIG. 6, 4:43-6:2; EX1006, FIGS. 1A, 2, 2:54-6:36; *see also* EX1003, §VIII(C)(i)-(ii).

At least three rationales support applying LaMarche's and/or Lemoff's teachings to the light connection element of Kurita.

One rationale is applying a known technique ((i) LaMarche's radial arrangement of collimating lenses, such that the collimated light from each of the collimating lenses passes through a separate radial sector of a focusing lens; and/or (ii) Lemoff's teaching of a receptacle and ferrule arrangement for securing an optical fiber) to a known device (Kurita's light connection element) ready for improvement, to yield predictable results (e.g., a functioning optical device). *See* EX1003, §VIII(C)(i)-(ii).

Another rationale is combining prior art elements ((i) LaMarche's radial arrangement of collimating lenses, such that the collimated light from each of the collimating lenses passes through a separate radial sector of a focusing lens, with Kurita's light connection element; and/or (ii) Lemoff's teaching of a receptacle and ferrule arrangement for securing an optical fiber) according to known methods (arranging elements of an optical device) to yield predictable results (e.g., a functioning optical device). *See* EX1003, §VIII(C)(i)-(ii).

Another rationale is some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. In particular, LaMarche teaches that its radial arrangement of collimating lenses, such that the collimated light from each of the collimating lenses passes through a separate radial sector of a focusing lens, will result in improved coupling efficiency, reduced physical complexity, as well as having other advantages such as being able to achieve high-bandwidth connections. *See* EX1005, 1:11-2:20 (Background of the Invention), 2:17-23 (Summary of the Invention); EX1003, §VIII(C)(i). Likewise, Lemoff teaches that the receptacle and ferrule arrangement form a connector that supports improved installation and maintenance of the optical device and allows optical fibers to be plugged into or out of the optical device based on changing circumstances. EX1006, 5:63-6:2; EX1003, §VIII(C)(ii).

5. Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 1

As explained above, Kurita discloses claim 1. With respect to Ground 2, LaMarche and/or Lemoff are additionally relied on to further teach aspects of claim element [1.6]. *See* EX1003, §VIII(C)(iii).

For example, LaMarche expressly teaches a radial arrangement of collimating lenses. This is similar to the radial, two-by-two arrangement of FIG. 3 of Kurita.

Moreover, LaMarche teaches this radial arrangement for an arbitrary number of M input probe lenses 630-1 through 630-M. EX1005, FIG. 6, 2:13-18, 5:27-37, 5:49-53, 6:56-61. As can be seen by FIG. 6, the collimated light from each of input probe lenses 630-1 through 630-M will pass through a separate radial section of the pupil lens 640, owing to the radial arrangement of the input probe lenses 630-1 through 630-M. *See* EX1005, 5:23-53 (explaining symmetry of light detecting and light emitting devices, and that optical axis of each input probe lens is the same radial distance r away from the optical axis of the pupil lens); *see also* EX1003, §VIII(C)(iii).

Thus, it is obvious in view of Kurita that light from each of the four lens portions 21 (which collimate light) formed in a two-by-two array (such as shown in FIG. 3) will pass through a separate radial sector of the lens 30. This is due to the radial arrangement of the lens portions 21. EX1003, ¶222. This fact is further confirmed by LaMarche, which shows a radial arrangement of input probe lenses 630-1 through 630-M (which collimate light), and shows visually in FIG. 6 that the collimated light from the input probe lenses 630-1 through 630-M will pass through a separate radial sector of the pupil lens 640. Moreover, a POSITA would have been motivated to modify Kurita in view of LaMarche to have a radial arrangement of lens portions 21 for an arbitrarily sized lens array 20, such that the collimated light

from each of the collimating lenses passes through a separate radial sector of a focusing lens. *See* above, Section V(B)(3); *see also* EX1003, §VIII(C)(iii).

Additionally, to the extent that it is argued that Kurita does not teach or suggest a stopped optical fiber, it would have been obvious to a POSITA based on the teachings of Lemoff. Lemoff teaches a receptacle 260 and ferrule 255 (as shown in FIG. 2 of Lemoff), for securing an optical fiber. EX1006, 5:63-6:2. A POSITA would have been motivated to use the receptacle and ferrule arrangement of Lemoff in the light connection element of Kurita for purposes of securing the optical fiber 40. This would improve the coupling efficiency, as it would help ensure the light would be focused into the optical fiber 40. *See* above, Section V(B)(3); *see also* EX1003, §VIII(C)(iii).

6. Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 2

Claim 2 is disclosed or rendered obvious by Kurita in view of LaMarche and/or Lemoff. As explained above, Kurita discloses claim 2. With respect to Ground 2, LaMarche is additionally relied on to further teach aspects of claim 2. *See* EX1003, §VIII(C)(iv).

LaMarche teaches that the input probe lenses 630-1 through 630-M (*i.e.*, the collimating lenses) are each the same radial distance r from the optical axis of pupil lens 640. EX1005, 5:49-53. For the case where $M=4$, which is the case in the

combination (as shown in FIG. 3 of Kurita), that results in a two-by-two array of input probe lenses 630-1 through 630-4. These are equally spaced around the optical axis of pupil lens 640. Accordingly, in view of this teaching, it would have been obvious to a POSITA at the time of the invention to arrange the light emitting portions 11 and lens portions 21 in Kurita radially around the lens 30, in a two-by-two array, centered on the focal axis of lens 30, such that the resulting four radial sections on the surface of the focusing lens are each a pie-shaped quadrant. *See* EX1003, §VIII(C)(iv).

7. Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 6

Claim 6 is disclosed or rendered obvious by Kurita in view of LaMarche and/or Lemoff. As explained above, Kurita discloses claim 6. With respect to Ground 2, nothing in LaMarche, Lemoff, or the combination of LaMarche and/or Lemoff with Kurita, requires the use of dielectric filters or waveguides. *See* EX1003, §VIII(C)(v).

8. Kurita in view of LaMarche and/or Lemoff discloses or suggests Claim 7

Claim 7 is disclosed or rendered obvious by Kurita in view of LaMarche and/or Lemoff. As explained above, claim 7 is substantially the same in scope as claim 2. *See* above, Section IV(B); *see also* EX1003 at ¶¶93-95. Accordingly, the analysis above for claims 1-2 applies equally here. *See* EX1003, §VIII(C)(vi).

**9. Kurita in view of LaMarche and/or Lemoff discloses
or suggests Claim 9**

Claim 9 is disclosed or rendered obvious by Kurita in view of LaMarche and/or Lemoff. Claim 9 differs from claim 6 only in that it depends from claim 7 instead of claim 1. Accordingly, the analysis above for claim 6 applies equally here. *See* EX1003, §VIII(C)(vii).

**C. Grounds 3 and 4 – The Challenged Claims would have been
Obvious over Lemoff and/or Lemoff in view of LaMarche**

Lemoff (Ground 3) and/or Lemoff in view of LaMarche (Ground 4) disclose all elements of the Challenged Claims. To the extent it is argued that Lemoff and/or Lemoff in view of LaMarche does not literally disclose an element, it would have been obvious over its disclosure to a POSITA at the time of the purported invention, for at least the reasons set forth below. *See* EX1003, §VIII(D).

1. Summary of Lemoff

Lemoff (EX1006) is directed to an optical device (an “optical signal emitter”) for multiplexing laser light into an optical fiber for optical communications. *See* EX1003, §VIII(A)(iv); EX1006, Abstract, 1:52-56. One of Lemoff’s embodiments (*i.e.*, FIGS. 1A and 2, reproduced below) shows five radially arranged light emission apertures 120 (lasers), an optical imaging element 220, and an optical fiber 250 onto which the optical imaging element 220 focuses light from the light emission

apertures 120. EX1003, §VIII(A)(iv); EX1006, FIGS. 1A, 2, 2:54-58; 4:66-5:2, 5:58-60; 6:3-6, 6:16-23.

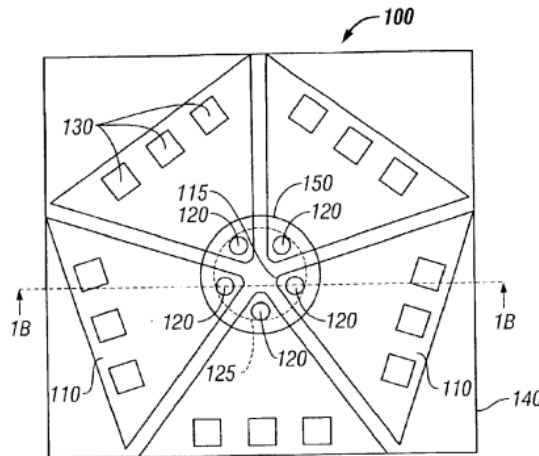


FIG. 1A

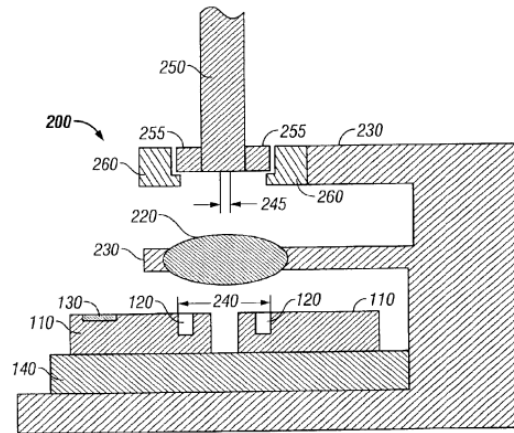


FIG. 2

Lemoff further teaches that the optical imaging element 220 may include “any arrangement of one or more optical components functioning to image the optical signal components from the signal-emitting area onto the signal-receiving area.” EX1006, 6:16-23. That is, element 220 may be one or more lenses. EX1003, ¶155.

2. Summary of LaMarche

As described above, LaMarche teaches a radial arrangement of collimating lenses. *See above*, Section V(B)(2).

3. A POSITA would have been motivated to combine Lemoff with LaMarche

With respect to Ground 4, a POSITA would have been motivated to combine Lemoff with LaMarche. *See* EX1003, §VIII(D)(i).

In particular, Lemoff teaches that the optical imaging element 220 may include “any arrangement of one or more optical components functioning to image the optical signal components from the signal-emitting area onto the signal-receiving area.” EX1006, 6:16-23. It would be a natural extension to apply LaMarche’s teaching of a radial arrangement for an arbitrary number M of collimating lenses (input probe lenses 630-1 through 630-M in LaMarche) coupled to the focusing lens (pupil lens 640) to the optical imaging element 220 of Lemoff. LaMarche further teaches that the radial (or non-collinear) arrangement it provides for results in improved coupling efficiency, reduced physical complexity, as well as having other advantages such as being able to achieve high-bandwidth connections. *See* EX1005, 1:11-2:20 (Background of the Invention), 2:17-23 (Summary of the Invention); *see also* EX1003, §VIII(D)(i).

Both Lemoff and LaMarche are in the same field (i.e., optical technologies); they each teach optical devices utilizing similar components, such as light sources, collimating lenses, and a focusing lens; and they are analogous art to the ’416 Patent. *See, e.g.*, EX1006, FIGS. 1A, 2, 3:19-22, 4:59-62, 6:7-11; EX1005, FIG. 6, 4:43-6:2; *see also* EX1003, §VIII(D)(i).

At least three rationales support applying LaMarche’s teachings to the optical signal emitter 200 of Lemoff.

One rationale is applying a known technique (LaMarche's radial arrangement of collimating lenses) to a known device (Lemoff's optical signal emitter) ready for improvement, to yield predictable results (e.g., a functioning optical device). *See* EX1003, §VIII(D)(i).

Another rationale is combining prior art elements (LaMarche's radial arrangement of collimating lenses with Lemoff's optical signal emitter) according to known methods (arranging elements of an optical device) to yield predictable results (e.g., a functioning optical device). *See* EX1003, §VIII(D)(i).

Another rationale is some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. In particular, LaMarche teaches that its radial arrangement of collimating lenses will result in improved coupling efficiency, reduced physical complexity, as well as having other advantages such as being able to achieve high-bandwidth connections. *See* EX1005, 1:11-2:20 (Background of the Invention), 2:17-23 (Summary of the Invention). Additionally, Lemoff teaches that you would want efficient coupling. EX1006, 4:66-5:2. LaMarche also teaches that it improves coupling loss by using a radial arrangement of collimating lenses. EX1005, 2:13-17; *see also* EX1003, §VIII(D)(i).

**4. Lemoff and/or Lemoff in view of LaMarche
discloses or suggests Claim Elements [1.0], [1.1], and
[1.2]**

The preamble of claim 1 is not a limitation. *See* above, Section IV(E)(3). However, to the extent that the preamble is considered a limitation, **Claim Elements [1.0], [1.1], and [1.2]** are disclosed or rendered obvious by Lemoff and/or Lemoff in view of LaMarche. Lemoff and/or Lemoff in view of LaMarche discloses “[1.0] *[a]n optical combiner [1.1] usable in data communication systems for multiplexing the outputs of a plurality of *n* lasers wherein each of said *n* outputs has a different output wavelength, [1.2] for transmission into and through a stopped single optical fiber.*” EX1006, FIGS. 1A, 2, Abstract, 1:52-56, 2:54-58, 4:39-47, 4:59-63, 5:58-60, 6:3-6; EX1003, §VIII(D)(ii).

For example, the optical signal emitter (“*optical combiner*”) taught in Lemoff is usable in data communications (EX1006, 1:52-56 (“The invention provides a multi-channel optical signal emitter for a wavelength division multiplexed (WDM) communication system...”)); it is for multiplexing laser outputs through an optical fiber (*id.*, 1:52-56 (“The invention provides a multi-channel optical signal emitter ... that combines multiple **signal components** into a multi-channel **optical signal**...”), *id.*, 2:54-58 (“Optical signal emitter 100 emits a multi-channel **optical signal** with five independent components into an **optical fiber**.”)); and the laser outputs are of different wavelength (*id.*, 4:59-63 (“In some embodiments of the invention, the

optical signal component that is emitted by each die has a wavelength different from that of the optical signal component emitted by any other die.”)). See EX1003, §VIII(D)(ii).

**5. Lemoff and/or Lemoff in view of LaMarche
discloses or suggests Claim Elements [1.3] and [1.4]**

Claim Elements [1.3] and [1.4] are disclosed or rendered obvious by Lemoff and/or Lemoff in view of LaMarche. Lemoff and/or Lemoff in view of LaMarche discloses “[1.3] *a plurality of n collimating lenses*, [1.4] *said lenses being spaced apart and positioned to receive and collimate the output of said n laser output beams, said n laser output beams have n different output wavelengths.*” EX1006, FIGS. 1A, 2, 2:62-65, 4:12-15, 4:39-47, 4:59-62, 4:66-5:2, 6:16-23; EX1005, FIG. 6, 5:27-37; EX1003, §VIII(D)(iii).

Ground 3: Lemoff discloses or suggests claim elements [1.3] and [1.4]

Lemoff describes an optical imaging element 220, which is “configured to image the optical signal components emitted from the signal-emitting area into the signal-receiving area, that is, from emission apertures 120 into the core of optical fiber [2]50.” EX1006, 6:7-11. The optical imaging element 220 may include “any arrangement of one or more optical components functioning to image the optical signal components from the signal-emitting area onto the signal-receiving area.” EX1006, 6:16-23. A POSITA would have been motivated to include as part of the

“one or more optical components” of optical imaging element 220 “*a plurality of n collimating lenses.*” EX1003, ¶¶256-261.

The use of collimating lenses in conjunction with a focusing lens was well known to a POSITA, and in particular, was known to be advantageous, e.g., in terms of coupling efficiency. EX1003, ¶257; *see also id.*, Section VI(C) (describing background technology) and above, Section IV(C) (same). A POSITA therefore would have been motivated, at least in order to improve coupling efficiency, to have the optical imaging element 220 of Lemoff include “*a plurality of n collimating lenses*” (i.e., one for each of the light emitting apertures 120), which work in conjunction with a focusing lens to image the optical signal components into the fiber 250. *See* EX1003, §VIII(D)(iii).

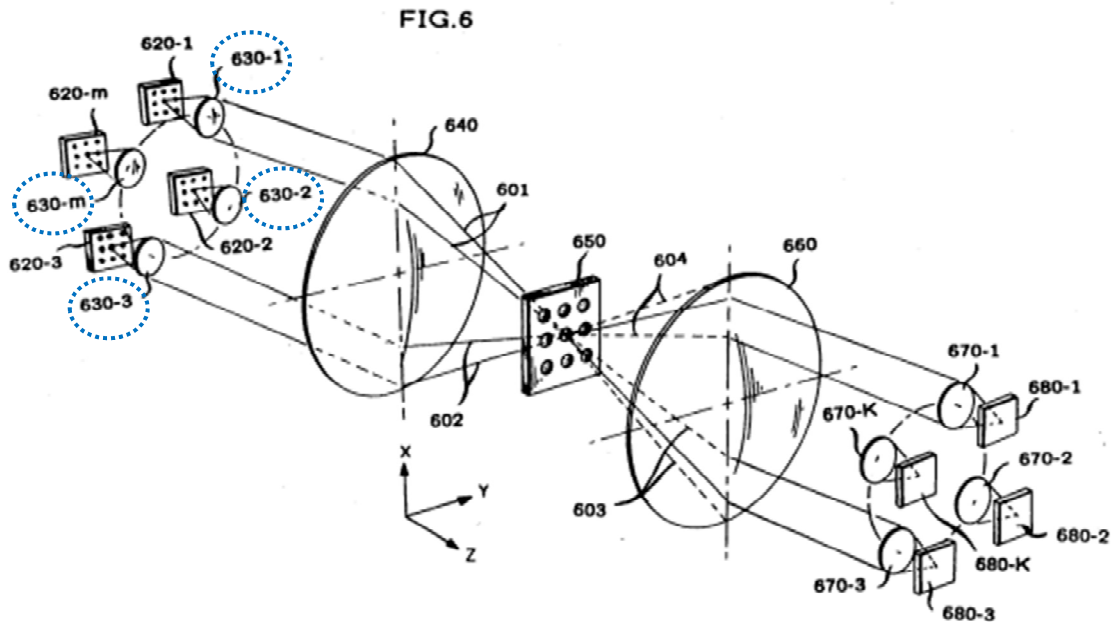
In making this design choice, a POSITA would make the collimating lenses spaced apart and positioned to receive and collimate light so that they would be aligned appropriately with the light emitting apertures 120. This would improve the coupling efficiency, and maximize efficiency as specifically noted in Lemoff as being desirable. *See* EX1006, 6:23-25, 5:15-59; *see also* EX1003, ¶¶257-259.

Also, as already noted, Lemoff teaches that the laser beam outputs each have a different wavelength. *See* above, Section V(C)(4).

Ground 4: Lemoff in view of LaMarche discloses or suggests claim elements [1.3]
and [1.4]

As explained with respect to Ground 3, Lemoff teaches that the optical imaging element 220 may include “any arrangement of one or more optical components functioning to image the optical signal components from the signal-emitting area onto the signal-receiving area.” EX1006, 6:16-23. A POSITA would have been motivated, in view of LaMarche, to include LaMarche’s input probe lenses 630-1 through 630-M, which are the “*plurality of n collimating lenses*,” as part of the optical imaging element 220. EX1003, ¶263; *see id.*, Section VIII(D)(iii).

LaMarche discloses the concept of placing *a collimating lens (630-1 through 630-m)* in front of each of a plurality of light sources (620-1 through 620-m). *See, e.g.*, EX1005, 5:27-37. This is seen in FIG. 6 of LaMarche, reproduced below:



At the time of the invention a POSITA would have been motivated to modify the optical combiner taught by Lemoff to include a collimating lens above for each of the emission apertures 120 in FIG. 2 of Lemoff, in order to achieve the predictable result of ensuring that the light from the emission apertures 120 reach the optical imaging element 220 in the same direction such that the optical imaging element 220 focuses the light at the same point. *See, e.g.*, EX1005, 5:60-62 (“All collimated beamlets propagating through pupil lens 640 having the same propagation direction are focused to the same spatial coordinates.”); *see also* EX1003, ¶263.

In making this modification, a POSITA would make the collimating lenses spaced apart and positioned to receive and collimate light (as they are in LaMarche, *e.g.*, as shown in FIG. 6) so that they would be aligned appropriately with the light

emitting apertures 120. This would improve the coupling efficiency, and maximize efficiency as specifically noted in Lemoff as being desirable. *See* EX1006, 6:23-25, 5:15-59; *see also* EX1003, ¶¶263; EX1003, §VIII(D)(iii).

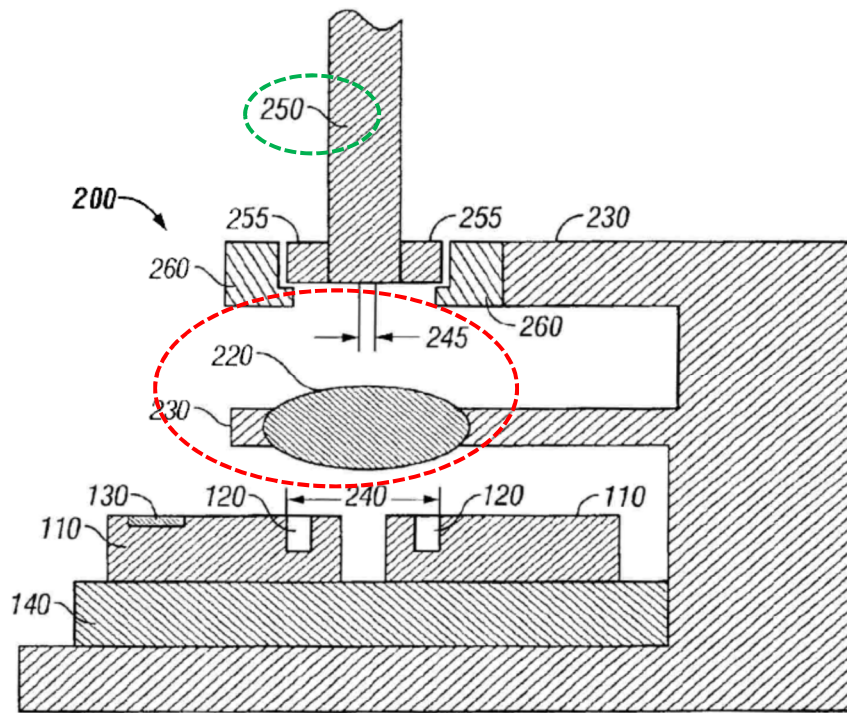
**6. Lemoff and/or Lemoff in view of LaMarche
discloses or suggests Claim Elements [1.5] and [1.6]**

Claim Elements [1.5] and [1.6] are disclosed or rendered obvious by Lemoff and/or Lemoff in view of LaMarche. Lemoff and/or Lemoff in view of LaMarche discloses “[1.5] *focusing means* for focusing *said n collimated output beams* onto a single spot at *said stopped single optical fiber*, [1.6] *said focusing means* having *n* separate radial sectors on its surface, and each of *said n collimated beams* passes through a separate one of said *n* sectors of *said focusing means* whereby *said n output beams* having *n* different wavelengths are coupled into *said single fiber*.” EX. 1006, FIGS. 1A, 2, 2:20-23, 3:19-22, 4:59-62, 6:7-11; EX1005, FIG. 6, 2:13-18, 5:27-37, 5:49-53, 6:56-61; EX1003, §VIII(D)(iv).

Ground 3: Lemoff discloses or suggests claim elements [1.5] and [1.6]

As explained above, Lemoff describes an optical imaging element 220, which is “configured to image the optical signal components emitted from the signal-emitting area into the signal-receiving area, that is, from emission apertures 120 into the core of optical fiber [2]50.” EX1006, 6:7-11. Even when designed to include collimating lenses among the “one or more optical components,” the components of

the optical imaging element 220 still “function[] to image the optical signal components from the signal-emitting area onto the signal-receiving area,” which is an end of optical fiber 250. EX1006, 6:16-23. That is, the optical imaging element 220 is the “*focusing means for focusing said n collimated output beams onto a single spot at said stopped single optical fiber.*” See EX1003, §VIII(D)(iv). This is illustrated by FIG. 2, reproduced below:



The **optical imaging element 220** of Lemoff meets the “focusing means” claim element because the corresponding structure described by the ’416 Patent for the “focusing means” is a focusing lens. See above, Section IV(E)(2). Specifically, the optical imaging element 220 of Lemoff is substantially similar to the focusing lenses 30, 130, 250, and 350 disclosed in the ’416 Patent. See EX1003, ¶267.

The collimated light “*passes through a separate one of said n sectors of said focusing means*” because the radial array of collimating lenses will each pass their respective collimated light to a separate radial portion (or sector) of the focusing lens part of optical imaging element 220. EX1006, FIGS. 1A, 2, 3:19-22, 4:59-62, 6:7-11; *see also* EX1003, ¶269; EX1003, §VIII(D)(iv). FIG. 1A is reproduced below, which shows the radial arrangement of the light sources (emission apertures 120) in top view. Due to the radial arrangement of the n light sources, the resulting light will likewise, after being collimated, pass through n separate radial sectors of the focusing lens part of the optical imaging element 220 above the sources. *See* EX1003, ¶269; EX1003, §VIII(D)(iv).

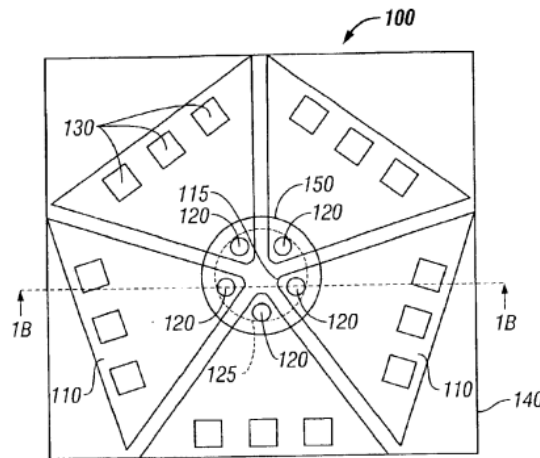


FIG. 1A

Ground 4: Lemoff in view of LaMarche discloses or suggest claim elements [1.5]
and [1.6]

In addition, LaMarche expressly teaches a radial arrangement of collimating lenses. EX1005, FIG. 6, 2:13-18, 5:27-37, 5:49-53, 6:56-61; EX1003, ¶¶270-271. This is similar to the radial arrangement of emission apertures 120 taught by Lemoff. As with Ground 3, the collimated light passes through separate radial sectors of the focusing lens. This is confirmed by LaMarche, which shows a radial arrangement of input probe lenses 630-1 through 630-M (which collimate light), and shows visually in FIG. 6 that the collimated light from the input probe lenses 630-1 through 630-M passes through a separate radial sector of the pupil lens 640. *Id.*

Moreover, a POSITA would have been motivated to modify Lemoff in view of LaMarche to have a radial arrangement of collimating lenses, such that the collimated light from each light source passes through a separate radial sector of the focusing lens (optical imaging element 220). EX1003, ¶273. For example, doing so may result in improved coupling efficiency, reduced physical complexity, as well as having other advantages such as being able to achieve high-bandwidth connections. Cf. EX1005, 1:11-2:20 (Background of the Invention), 2:17-23 (Summary of the Invention). EX1003, ¶273; *see also id.*, §VIII(D)(iv).

**7. Lemoff and/or Lemoff in view of LaMarche
discloses or suggests Claim 2**

Claim 2 is disclosed or rendered obvious by Lemoff and/or Lemoff in view of LaMarche. Lemoff and/or Lemoff in view of LaMarche discloses “*The optical combiner of claim 1 wherein $n=4$ and wherein said *four lasers* and *four collimating lenses* are each formed in a two-dimensional, two by two array, wherein said focusing means is a single focusing lens, and wherein each radial sector is a pie-shaped quadrant.*” EX. 1006, FIG. 1A, 3:20-22, 3:66-4:2; EX1005, FIG. 6, 5:27-37; EX1003, §VIII(D)(v).

For example, while FIG. 1A of Lemoff shows five emission apertures 120 (lasers), Lemoff teaches that there may be “various numbers” of die, and their corresponding emission apertures 120. EX1006, 3:66-4:2. Such emission apertures 120 are also equally spaced around a circumference of a circle. EX1006, 3:20-22. Moreover, four emission apertures 120 would be an obvious choice to try – it is suggested, for example, by a rectangular-shaped die that Lemoff discloses, and four was a common number to use for WDM systems at the time of the invention. EX1003, ¶277. Arranging four emission apertures equally around a circumference of a circle would result in a two-by-two array of emission apertures. Further, given the alignment of the collimating lenses with the emission apertures, this would also result in a two-by-two array of collimating lenses. *See* EX1003, §VIII(D)(v).

Additionally, four lasers and collimating lenses would be an obvious choice when considering the teachings of LaMarche. FIG. 6 of LaMarche shows four light sources, and four collimating lenses. Further, LaMarche teaches that the number M of each may be arbitrary, i.e., may be any given number M. Because of the advantages of using a four wavelength WDM system, selecting M=4 would have been obvious to a POSITA at the time of the invention. EX1003, ¶¶276-277.

Moreover, the focusing lens in each of Lemoff (optical imaging element 220) and LaMarche (pupil lens 640) is a single lens. And the radial sectors become four pie-shaped quadrants because the light emission apertures and collimating lenses are equally spaced around a circumference of a circle, centered on the focal axis of the focusing lens. See EX1003, §VIII(D)(v).

**8. Lemoff and/or Lemoff in view of LaMarche
discloses or suggests Claim 6**

Claim 6 is disclosed or rendered obvious by Lemoff and/or Lemoff in view of LaMarche. Lemoff and/or Lemoff in view of LaMarche discloses “*The optical combiner of claim 1 wherein said optical combiner does not require the use of dielectric filters or waveguides.*” EX. 1006, FIGs. 1A, 2, 1:52-56; EX1003, §VIII(B)(vi).

For example, the figures in Lemoff and LaMarche do not show, and the text does not describe, dielectric filters or waveguides. Lemoff also explains that “[t]he

invention provides a multi-channel optical signal emitter for a wavelength division multiplexed (WDM) communication system that combines multiple signal components into a multi-channel optical signal without using an optical multiplexer or other device external to the emitter.” EX1006, 1:52-56; *see also* EX1003, §VIII(D)(vi).

**9. Lemoff and/or Lemoff in view of LaMarche
discloses or suggests Claim 7**

Claim 7 is disclosed or rendered obvious by Lemoff and/or Lemoff in view of LaMarche. As explained above, claim 7 is substantially the same in scope as claim 2. *See* above, Section IV(B); EX1003 at ¶¶93-95. Accordingly, the analysis above for claims 1-2 applies equally here. *See* EX1003, §VIII(D)(vii).

**10. Lemoff and/or Lemoff in view of LaMarche
discloses or suggests Claim 9**

Claim 9 is disclosed or rendered obvious by Lemoff and/or Lemoff in view of LaMarche. Claim 9 differs from claim 6 only in that it depends from claim 7 instead of claim 1. Accordingly, the analysis above for claim 6 applies equally here. *See* EX1003, §VIII(D)(viii).

**D. Ground 5 – The Challenged Claims would have been
Obvious over Bhandarkar**

Bhandarkar disclose all elements of the Challenged Claims. To the extent it is argued that Bhandarkar does not literally disclose an element, it would have been

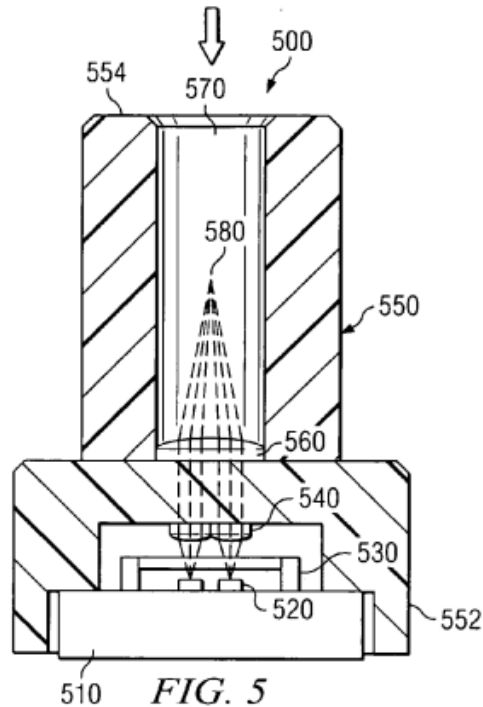
obvious over its disclosure to a POSITA at the time of the purported invention, for at least the reasons set forth below. *See* EX1003, §VIII(E).

1. Summary of Bhandarkar

Bhandarkar (EX1013) is directed to an optical device (a “WDM multiplexer”) for multiplexing laser light into an optical fiber for optical communications. *See* EX1003, §VIII(A)(v); EX1013, Abstract, ¶¶[0038]-[0043]. Bhandarkar’s optical device includes an array of GSE lasers each with different wavelength, an array of collimating lenses formed one-to-one with the lasers, and a focusing lens for focusing the light into a single optical fiber. *Id.*

One of Bhandarkar’s embodiments (*i.e.*, FIG. 5, reproduced below) shows the GSE lasers 520 and the collimating lenses 540 as each being formed in a two-by-two array, having respectively four GSE lasers 520 and four collimating lenses 540. These components are arranged such that the GSE lasers 520 are aligned with corresponding collimating lenses 540, and the collimating lenses 540 are radially arranged with respect to the center focal axis of the focusing lens 560, which focuses the collimated light into optical fiber 40. *Id.*; *see also* EX1013, ¶[0038] (“In one exemplary embodiment, the array of GSE lasers 520 is a 2×2 array in which four GSE lasers 520 are provided for generating light beam signals at four different wavelengths that are to be multiplexed together.”); ¶[0040] (“Thus, in an exemplary embodiment, the collimating lens array 540 is a 2×2 array of collimating lenses that

are positioned such that each lens in the collimating lens array 540 is aligned with a respective one of the GSE lasers in the 2x2 array of GSE lasers 520.”).



With this setup, Bhandarkar discloses every element of the Challenged Claims. *See generally* EX1003, §VIII(E).

2. Bhandarkar is prior art

First, the '416 Patent is not entitled to priority based on a conception date of July 17, 2003, followed by a diligent constructive reduction to practice. Therefore, Bhandarkar's provisional application filing date (September 29, 2003) is before the '416 Patent's priority date (at earliest, February 4, 2004, the date of its provisional application).

During prosecution, the examiner rejected the Challenged Claims as being anticipated by Bhandarkar. Instead of arguing the merits of this rejection, the applicant swore behind the Bhandarkar reference, asserting a July 17, 2003 conception date, followed by a constructive reduction to practice. *See above*, Section IV(D). In doing so, the applicant submitted declarations from each of the inventors. *E.g.*, EX1002 at 74-130. The examiner accepted the submitted evidence as establishing diligence. EX1002 at 22. However, the examiner materially erred; the applicant failed to, and Patent Owner cannot now, establish an earlier conception and diligence in reducing the invention to practice.

There is just over four months between September 29, 2003 (when the Bhandarkar Provisional Application was filed), and February 4, 2004 (when the '416 Patent's provisional application was filed). To successfully swear behind, Patent Owner must show diligence for this entire period. *ATI Techs. ULC v. Iancu*, 920 F.3d 1362, 1370 (Fed. Cir. 2019). Where inventor testimony is used, it must be corroborated by evidence. *Id.* And such evidence cannot come solely from the inventor. In particular, unwitnessed laboratory notebook, alone, cannot corroborate an inventor's testimony. *Brown v. Barbacid*, 276 F.3d 1327, 1335 (Fed. Cir 2002) ("The Board did not err in holding that an inventor's own unwitnessed documentation does not corroborate an inventor's testimony about inventive facts."); *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 998-99 (Fed. Cir.

2009) (laboratory notebook that “was unwitnessed and was not corroborated by any other evidence” could not corroborate inventor testimony); *see also Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1170 (Fed. Cir. 2006) (“The requirement of independent knowledge remains key to the corroboration inquiry.”); *Curt Manufacturing, LLC v. Horizon Global Americas Inc.*, IPR2019-00625, Paper 31, 13–18 (PTAB Aug. 11, 2020) (“One consequence of the independence requirement is that testimony of one co-inventor cannot be used to help corroborate the testimony of another.”).

Here, the only evidence of conception outside of the inventor declarations is that of inventor notebooks. There is no corroborating evidence to support the dates of those notebooks, other than that from the inventors themselves. EX1002, p. 71. Moreover, the main source of diligence comes from the inventor declarations, and is likewise uncorroborated by non-inventors. Either of these reasons alone is sufficient for establishing that the applicant’s swear-behind during prosecution was legally improper.

Further, there are considerable gaps in the evidence, even besides the serious issue of a lack of corroboration. From July 17, 2003 (the asserted conception) until October 7, 2003 (preparation of the first invention disclosure begins), the only evidence of diligence is inventor testimony that eight iterations of modeling were being worked on for over six months from conception to the third and final invention

disclosure that was sent to counsel – but for which any corroborating metadata is admittedly unavailable. EX1002, 75-76 (para. 6 of Ray declaration), 120 (para. 7 of Grann declaration). Also, from November 10, 2003 until January 15, 2004, the only evidence of diligence is inventor testimony of the inventors performing a *second* prior art search for over two months, after a *first* prior art search also taking two months. EX1002, 121 (paras. 8 and 10 of Grann declaration). Even if an inventor's prior art searching could count toward diligence – which Petitioner does not acquiesce – it is not reasonably continuous diligence for inventors to spend this amount of time on prior art searching, particularly where there is no corroborating evidence of the search, the results (if any) do not appear in the provisional application (the asserted constructive reduction to practice), and no technical development was being done at the time. Indeed, the applicant failed to even file an information disclosure statement with the resulting non-provisional application.

Second, the '416 Patent is not entitled to priority based on its provisional application. Therefore, Bhandarkar's non-provisional application filing date (September 28, 2004) is before the '416 Patent's priority date (January 27, 2005, the date of its non-provisional application).⁶

⁶ The deficiencies of the provisional likewise defeat the swear-behind.

The '416 Patent claims “*focusing means ... having n separate radial sectors on its surface,*” where “*each of said n collimated beams passes through a **separate one of said n sectors** of said focusing means whereby said n output beams having n different wavelengths are coupled into said single fiber.*” See claim 1 (emphasis added). The provisional application (EX1009) on which the '416 Patent is based, however, does not mention “radial sectors,” let alone the requirement that each of the n collimated beams passes through a *separate* radial sector. This language was not added until the non-provisional application (*see* EX1002, 152-173), and in particular with respect to the embodiments disclosed in FIGS. 7-9 (which are new to the non-provisional application over the provisional application).

Even if Patent Owner were to argue that the arrangement shown in the provisional application would necessarily result in the “separate radial sector” limitation being met, that by itself is not enough to show written description or enablement. See 35 U.S.C. § 120 (to claim benefit of an earlier application, must satisfy § 112(a), except for the requirement to show the “best mode”). First, a POSITA could not reasonably conclude that the inventors had possession of the “separate radial sector” limitation as of the time of the provisional application, as nothing in the specification describes or otherwise even hints at this limitation. In short, the written description does not suggest the inventors understood that the “separate radial sectors” limitation was met by any embodiment, or that they had

any appreciation for its importance. A POSITA would not have thought they regarded it as their invention. Second, at most the provisional application contains a device with *four* lasers and collimating lenses that may meet the “separate radial sector” limitation. But claim 1 is broader, claiming an arbitrary number n of lasers and collimating lenses, and the provisional application fails to enable a POSITA to make or use the full scope of the claim. *See Amgen Inc. v. Sanofi*, 143 S. Ct. 1243, 1254 (2023) (holding that “the specification must enable the full scope of the invention as defined by its claims” and “[t]he more one claims, the more one must enable”). Nothing in the provisional application would enable a POSITA to make a device meeting the “separate sector” limitation where $n > 4$.

3. The Bhandarkar Provisional Application supports Bhandarkar

As explained above, Bhandarkar is prior art under 35 U.S.C. § 102(e) based either on its provisional application filing date, or its non-provisional application filing date. To the extent the provisional application filing date is relied on, then “the disclosure of the provisional application [must] provide[] support for the claims in the reference patent in compliance with § 112, ¶ 1.” *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1381 (Fed. Cir. 2015). Also, the provisional application must have the subject matter being relied on for invalidating another patent. *Cox Commc’ns, Inc. v. AT&T Intellectual Prop. I, L.P.*, IPR2015-01227,

Paper 70 at 29 (PTAB Nov. 16, 2015) (“[T]he material relied upon as teaching the subject matter of the challenged claims must be carried through from that earlier filed application to the reference patent being used against the claim.”).

The Bhandarkar Provisional Application (EX1015) supports at least one claim (and in fact, all the claims) of the Bhandarkar publication. *Ex Parte Robert A. Mann & Eric Colaviti*, No. APPEAL 2015-003571, 2016 WL 7487271, at *6 (PTAB. Dec. 21, 2016) (holding that *Dynamic Drinkware* requires support for at least one claim). Indeed, the Bhandarkar Provisional Application includes claims that are very close to those of the Bhandarkar publication. *Compare* EX1015 at pp. 19-23 (claims 1-28) *with* EX1013 at claims 1-24; *see also* EX1003, ¶¶162-165. The figures are also similar. *Compare* EX1015 at pp. 3-17 *with* EX1013 at FIGS. 1-13; *see also* EX1003, ¶¶162-165. Further, the disclosure is also similar. *Compare* EX1015 at p. 18 *with* EX1013 at ¶¶[0038]–[0043]; *see also* EX1003, ¶¶162-165.

Taking claim 1 of Bhandarkar as an example, consider the following support:

Bhandarkar (EX1013), claim 1	Bhandarkar Provisional Application (EX1015)
1. A laser-enabled multiplexing system, comprising:	Claim 1 (“a laser-enabled multiplexing system”); Title (“GSE Laser Enabled WDM Mux”); pp. 1-17 (providing further details); p. 18 (“The WDM Mux proposed in this disclosure....”).

a plurality of grating-outcoupled surface emitting (GSE) lasers;	Claim 1 (“a first plurality of lasers”); Claim 3 (“wherein said first plurality of lasers comprises a plurality of Grating-outcoupled Surface Emitting (GSE) lasers”); Title (“GSE Laser Enabled WDM Mux”); pp. 1-17 (providing further details); p. 18 (“The WDM Mux proposed in this disclosure consists of an array of GSE lasers....”).
a plurality of lenses, each lens of the plurality of lenses being positioned so as to collimate a beam of light emitted by a GSE laser of the plurality of GSE lasers; and	Claim 1 (“a second plurality of lenses, each lens of said plurality of lenses positioned so as to collimate a beam of light emitted by a laser of said first plurality of lasers”); Claim 3 (“wherein said first plurality of lasers comprises a plurality of Grating-outcoupled Surface Emitting (GSE) lasers”); pp. 1-17 (providing further details); p. 18 (“The WDM Mux proposed in this disclosure consists of an array of GSE lasers attached to a substrate, a matching array of collimating lenses, and a single focusing lens. The divergent laser beam emitted by each laser is collimated by the corresponding collimating lens. The multiple collimated beams are then focused by the single focusing lens into a single spot that is suitable for coupling into an optical fiber.”).
a focusing lens positioned to focus a plurality of collimated beams of light	Claim 1 (“a third lens, said third lens positioned to focus a plurality of collimated beams of light received from

received from the plurality of lenses into substantially a point of light.	the second plurality of lenses into substantially a point of light”); pp. 1-17 (providing further details); p. 18 (“The WDM Mux proposed in this disclosure consists of an array of GSE lasers attached to a substrate, a matching array of collimating lenses, and a single focusing lens. The divergent laser beam emitted by each laser is collimated by the corresponding collimating lens. The multiple collimated beams are then focused by the single focusing lens into a single spot that is suitable for coupling into an optical fiber.”).
--	---

Furthermore, the material relied upon as teaching the subject matter of the challenged claims was carried through from the earlier provisional application to the Bhandarkar publication being used against the Challenged Claims. *See* EX1003, ¶288. The primary disclosure relied on in Bhandarkar is FIG. 5 and its corresponding description. The Bhandarkar Provisional Application contains substantially the same figure. *See* EX1015, p. 9. The Bhandarkar Provisional Application also describes the figure in substantially the same terms: “The WDM Mux proposed in this disclosure consists of an array of GSE lasers attached to a substrate, a matching array of collimating lenses, and a single focusing lens. The divergent laser beam emitted by each laser is collimated by the corresponding collimating lens. The multiple collimated beams are then focused by the single

focusing lens into a single spot that is suitable for coupling into an optical fiber....

A preferred embodiment shown in the accompanying figure, consists of a 2x2 rectangular array of GSE lasers, each laser at a different wavelength, to yield a four λ mux.” EX1015, p. 18; *see also id.*, p. 8 (similar); EX1003, §VIII(E).

4. Bhandarkar discloses or suggests Claim Elements [1.0], [1.1], and [1.2]

The preamble of claim 1 is not a limitation. *See* Section IV(E)(3). However, to the extent that the preamble is considered a limitation, **Claim Elements [1.0], [1.1], and [1.2]** are disclosed or rendered obvious by Bhandarkar. Bhandarkar discloses “[1.0] *[a]n optical combiner [1.1] usable in data communication systems for multiplexing the outputs of a plurality of n lasers wherein each of said n outputs has a different output wavelength, [1.2] for transmission into and through a stopped single optical fiber.*” EX1013, FIG. 5, ¶¶[0013], [0038], [0042], [0043]; EX1015, pp. 9, 18, claims 1, 17; EX1003, §VIII(E)(i).

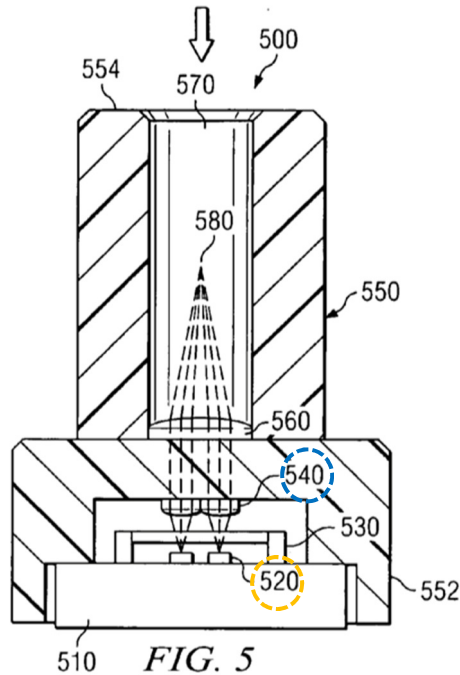
For example, the WDM multiplexer (“*optical combiner*”) taught in Bhandarkar is usable in data communications (EX1013, ¶[0043] (device “may be utilized to provide ... data communication”)); it is for multiplexing laser outputs through an optical fiber (*id.*, ¶[0043] (device has focusing lens for “causing the light beam signals to be combined and multiplexed into a single light beam signal” and this signal “travels down the channel 570 ... for transmission through a fiber optic

medium or the like”)); and the laser outputs are of different wavelength (*id.*, ¶[0038] (“four GSE lasers 520 are provided for generating light beam signals at four different wavelengths”)). *See also* EX1015, pp. 9, 18, claims 1, 5, 9, 10; EX1003, §VIII(E)(i).

5. Bhandarkar discloses or suggests Claim Elements [1.3] and [1.4]

Claim Elements [1.3] and [1.4] are disclosed or rendered obvious by Bhandarkar. Bhandarkar discloses “[1.3] *a plurality of n collimating lenses*, [1.4] *said lenses being spaced apart and positioned to receive and collimate the output of said n laser output beams, said n laser output beams have n different output wavelengths.*” EX1013, FIG. 5, [0038]-[0043]; EX1015, pp. 9, 18, claims 1, 17; EX1003, §VIII(E)(ii).

For example, the collimating lenses 520 are “*a plurality of n collimating lenses*” which are separated from each other (i.e., *spaced apart*), and they receive the “*laser output beams*” from the individual GSE lasers 520:



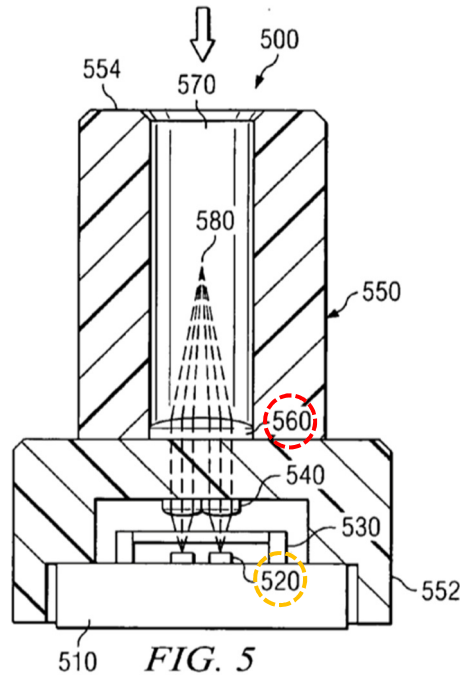
EX1013, FIG. 5 (annotated). As shown above, and described in Bhandarkar, the collimating lenses 540 are placed at corresponding planar positions compared to the GSE lasers 520, and the collimating lenses 540 receive and collimate the light from the GSE lasers 520, which each has a different wavelength. EX1013, ¶[0038] (“[F]our GSE lasers 520 are provided for generating light beam signals at four different wavelengths that are to be multiplexed together.”); *id.*, ¶[0040] (“[T]here is one collimating lens in the collimating lens array 540 for each GSE laser in the array of GSE lasers 520. Thus, ... the collimating lens array 540 is a 2x2 array of collimating lenses that are positioned such that each lens ... is aligned with a respective one of the GSE lasers....”); *id.*, ¶[0042] (“In operation, the GSE lasers ... emit light beam signals [that] are captured by the collimating lenses of the

collimating lens array 540. Since there is a one to one correspondence between GSE lasers and collimating lenses in the arrays 520 and 540, each collimating lens captures the light beam signal from its corresponding GSE laser.”). See also EX1015, pp. 9, 18, claims 1, 5, 9, 10; EX1003, §VIII(E)(ii).

6. Bhandarkar discloses or suggests Claim Elements [1.5] and [1.6]

Claim Elements [1.5] and [1.6] are disclosed or rendered obvious by Bhandarkar. Bhandarkar discloses “[1.5] *focusing means for focusing said n collimated output beams onto a single spot at said stopped single optical fiber*, [1.6] *said focusing means having n separate radial sectors on its surface, and each of said n collimated beams passes through a separate one of said n sectors of said focusing means whereby said n output beams having n different wavelengths are coupled into said single fiber*.” EX1013, FIG. 5, [0038]-[0043]; EX1015, pp. 9, 18, claims 1, 17; EX1003, §VIII(E)(iii).

For example, **focusing lens 560** is the “*focusing means*,” which receives the “*output beams*” from the individual GSE lasers 520 after they have been collimated by collimating lenses 540, and then focuses the beams into an optical fiber at focal point 580, which is the “*stopped single optical fiber*”:



EX1013, FIG. 5 (annotated); *see also id.*, ¶[0043] (“The **focusing lens 560** receives the **light beam signals** from all of the collimating lenses in the collimating lens array 540 and multiplexes them into a single **light beam signal**. Essentially, the **focusing lens 560** focuses each of the **light beam signals** to a focal point 580.... This single **light beam signal** generated by the **focusing lens 560** travels down the channel 570 so that it may pass to a fiber optic connector (not shown) for transmission through a **fiber optic medium** or the like.”); EX1003, §VIII(E)(iii). A POSITA would understand that the optical fiber of Bhandarkar would be “*stopped*” (*i.e.*, “fixed”), or it would have been obvious to a POSITA to modify it to a *stopped* single optical fiber, because Bhandarkar explains the beams are focused onto focal point 580, and

because stopping (fixing) the fiber would ensure the focused beams enter into the fiber and would improve coupling efficiency. *See* EX1003, ¶¶291-292.

The focusing lens 560 of Bhandarkar meets the “focusing means” claim element because the corresponding structure described by the ’416 Patent for the “focusing means” is a focusing lens. *See* above, Section IV(E)(2). Specifically, the focusing lens 560 of Bhandarkar is substantially similar to the focusing lenses 30, 130, 250, and 350 disclosed in the ’416 Patent. *See* EX1003, ¶300.

The collimated light “*passes through a separate one of said n sectors of **said focusing means***” because the two-by-two array of collimating lenses 540 results in radially arranged lenses that will each pass their respective collimated light to a separate radial portion (or sector) of the focusing lens 560. EX1013, FIG. 5, ¶¶[0038]-[0043]; EX1003, ¶301. Additionally, a POSITA would have understood from Bhandarkar’s disclosure, and it would have been obvious, that the collimating lenses 540 are aligned with the center axis of the focusing lens 560 in such a way that the collimated light passes through separate radial sectors because doing so would have results in better coupling efficiency. EX1003, ¶¶302-303; *see also* EX1015, pp. 9, 18, claims 1, 5, 9, 10; EX1003, §VIII(E)(iii).

7. Bhandarkar discloses or suggests Claim 2

Claim 2 is disclosed or rendered obvious by Bhandarkar. Bhandarkar discloses “*The optical combiner of claim 1 wherein $n=4$ and wherein said **four lasers***”

and *four collimating lenses* are each formed in a two-dimensional, two by two array, wherein said focusing means is a single focusing lens, and wherein each radial sector is a pie-shaped quadrant.” EX1013, FIG. 5, [0038]-[0043]; EX1015, pp. 9, 18, claims 1, 17; EX1003, §VIII(E)(iv).

For example, FIG. 5 (reproduced below) shows a two-by-two array of four GSE lasers 520 (lasers) and four collimating lenses 540 (collimating lenses) feeding into a single focusing lens 560.

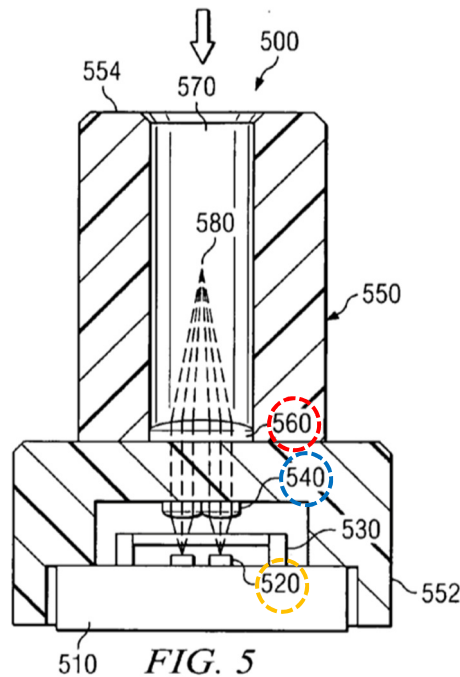


FIG. 5 (annotated); EX1003, §VIII(E)(iv); *see also* EX1013, ¶[0038] (“In one exemplary embodiment, the array of GSE lasers 520 is a 2x2 array in which four GSE lasers 520 are provided for generating light beam signals at four different wavelengths that are to be multiplexed together.”); *id.*, ¶[0040] (“Thus, in an

exemplary embodiment, the collimating lens array 540 is a 2x2 array of collimating lenses that are positioned such that each lens in the collimating lens array 540 is aligned with a respective one of the GSE lasers in the 2x2 array of GSE lasers 520.”).

Furthermore, the focusing lens 560 has four pie-shaped quadrants because the GSE lasers 520 and collimating lenses 540 are arranged radially around the focusing lens 560, equally spaced, and centered on the focal axis of focusing lens 560. EX. 1013, FIG. 5, ¶¶[0038]-[0043]; EX1003, §VIII(E)(iv); *see also* EX1015, pp. 9, 18, claims 1, 5, 9, 10; EX1003, §VIII(E)(iv).

8. Bhandarkar discloses or suggests Claim 6

Claim 6 is disclosed or rendered obvious by Bhandarkar. Bhandarkar discloses “*The optical combiner of claim 1 wherein said optical combiner does not require the use of dielectric filters or waveguides.*” EX1013, FIG. 5, [0038]-[0043], [0056]; EX1015, pp. 9, 18, claims 1, 17; EX1003, §VIII(E)(v).

For example, the figures in Bhandarkar do not show, and the text does not describe, dielectric filters or waveguides. Bhandarkar also explains that “other components that are typically found in known WDM multiplexers are eliminated in the present invention, e.g., the filter array 130 and bounce cavity 140 in FIG. 1, which results in lower piece-part costs and assembly costs.” EX1013, ¶[0056]; *see also* EX1015, pp. 9, 11, 18, claims 1, 5, 9, 10; *see id.*, p. 11 (“Eliminates multiple bounce cavity.... Eliminates filter... Simpler design....”); EX1003, §VIII(E)(v).

9. Bhandarkar discloses or suggests Claim 7

Claim 7 is disclosed or rendered obvious by Bhandarkar. As explained above, claim 7 is substantially the same in scope as claim 2. *See* above, Section IV(B); EX1003 at ¶¶93-95. Accordingly, the analysis above for claims 1-2 applies equally here. EX1003, §VIII(E)(vi).

10. Bhandarkar discloses or suggests Claim 9

Claim 9 is disclosed or rendered obvious by Bhandarkar. Claim 9 differs from claim 6 only in that it depends from claim 7 instead of claim 1. Accordingly, the analysis above for claim 6 applies equally here. *See* EX1003, §VIII(E)(vii).

VI. DISCRETIONARY FACTORS FAVOR INSTITUTION

A. 35 U.S.C. § 314(a)

Under the factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020), discretionary denial of institution in light of district court litigation involving the '416 Patent would be improper. The district court litigation is in an early stage, and this Petition presents multiple compelling unpatentability challenges. *See Commscope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at p. 3 (PTAB Feb. 27, 2023). As such, the *Fintiv* factors weigh against discretionary denial.

While no party has sought a stay, there is no evidence that one would be denied. Thus, Factor 1 weighs in favor of institution, or, at most, is neutral.

No trial dates have been set, though the litigation parties have proposed a date of December 10, 2024 to the Court, so Factor 2 weighs against denial.

Because the case is in its early stages, the parties' and court's investment has been minimal. Therefore, Factor 3 weighs in favor of institution. For instance, claim construction briefing has not yet begun, no date is yet set for a claim construction hearing (though the litigation parties have proposed a date of February 5, 2024 to the Court), and although Patent Owner has provided its infringement contentions, invalidity contentions have yet to be served.

Based on Patent Owner's infringement contentions, the asserted claims include the Challenged Claims here. However, invalidity contentions have not yet been served. Therefore, other than the overlap in claims, there is little known overlap between the cases, and Factor 4 weighs in favor of institution.

The Petitioner—Opticis—is a defendant in the case, therefore, Factor 5 is neutral.

Even if Factors 1-5 favored discretionary denial – they do not – institution is still proper (Factor 6). With respect to Factor 6 (other circumstances), the Challenged Claims are unpatentable on multiple strong grounds (including art that was never before the office) that go to the points of novelty, as set forth above. Therefore, Factor 6 weighs strongly in favor of institution. The Petition presents grounds “in which the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.” *Commscope* at p. 3 (quoting USPTO Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022)). Given the similarities between the prior art and the purported invention of the '416 Patent, it is highly likely that Petitioner would prevail on at least one claim. *Id.* at p. 4. Thus, under the guidance set forth by Director Vidal, the Board should not discretionarily deny this Petition.

Finally, the '416 Patent has not been challenged in any prior petition. Thus, none of the *General Plastic* factors apply. *See Gen. Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16 (PTAB Sept. 6, 2017).

B. 35 U.S.C. § 325(d)

Non-institution would be improper under § 325(d) and in view of the factors set forth in *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 6–7 (PTAB Dec. 15, 2017).

For Grounds 1-4, none of the relied-upon references were before the Office during prosecution, nor are any substantially similar to what was before the Office during prosecution. For at least this reason, the factors support institution.

Moreover, with respect to Ground 5 and as explained in Section IV(D), Bhandarkar was before the Office, and the '416 Patent was allowed based on a swear-behind over Bhandarkar. But for that swear-behind, the Office would have maintained its initial rejection of the Challenged Claims under 35 U.S.C. § 102. As explained above in Section V(D)(2)-(3), the Office materially erred by finding the '416 Patent was entitled to priority based on a July 17, 2003 conception. *See Advanced Bionics, LLC v. MED-EL ElektromedizinischeGeräteGmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020); *Northern Stamping Co. v. Horizon Global Americas Inc.*, IPR2021-01411, Paper 10 at 18 (PTAB Feb. 22, 2022) (“Although the Office accepted the declarations to antedate the Withers reference, Petitioner has

shown that the Office made material errors in doing so. Accordingly, we do not exercise our discretion to deny under § 325(d)").

The Office should not have credited the asserted conception date or diligence because they were uncorroborated, except by evidence derived from the inventors. Additionally, there are significant windows of inactivity or insufficient activity to count as reasonably continuous diligence. Months were purportedly dedicated to prior art searching by the inventors, and any evidence of modeling, which also accounts for a large period of supposed activity, was lost. *See* above, Section V(D)(2); EX1002, pp. 75-76 (para. 6 of Ray declaration).

Finally, the Office should not have found the Challenged Claims entitled to priority based on the provisional application; that is, the provisional application did not constructively reduce the claimed invention to practice, because it did not support the claimed invention under 35 U.S.C. § 112. *See* above, Section V(D)(2)-(3).

VII. CONCLUSION

Petitioner requests institution of *inter partes* review to cancel the Challenged Claims.

Respectfully Submitted,

Date: July 28, 2023

By: / Michael H. Jones /
Michael H. Jones, Reg. No. 76,120

CERTIFICATE OF COMPLIANCE

I, the undersigned, certify that the above Petition for *Inter Partes* Review complies with the applicable type-volume limitations of 37 C.F.R. § 42.24(a)(1)(i). Exclusive of the portions exempted by 37 C.F.R. § 42.24(a), this Petition, including footnotes, contains 13,990 words, as counted by the word count function of Microsoft Word 2010 and as counted manually with respect to the included figures with annotations. This is less than the limit of 14,000 words as specified by 37 C.F.R. § 42.24(a)(1)(i).

Date: July 28, 2023

By: /Michael H. Jones /
Michael H. Jones, Reg. No. 76,120
Rothwell, Figg, Ernst & Manbeck, P.C.
901 New York Ave., N.W.,
Suite 900 East
Washington, DC 20001
Tel: (202) 783-6040
Fax: (202) 783-6031
Email: mjones@rfem.com

*Counsel for Petitioner
Opticis Co., Ltd.*

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4) and 42.105, the undersigned certifies that on July 28, 2023, a complete and entire copy of the foregoing **Petition For *Inter Partes* Review of U.S. Patent 7,198,416**, along with supporting Exhibits 1001-1015 and Power of Attorney, were served via First Class U.S. Mail on the Patent Owner, by serving the attorneys of record at the following correspondence address of record for the subject patent:

MURPHY, BILAK & HOMILLER/OMRON
PO BOX 1959
CARY, NC 27512-1959

A copy was also served on Inneos LLC by email to Chris.Mammen@wbd-us.com and via First Class U.S. Mail at the following address:

INNEOS LLC
WOMBLE BOND DICKINSON (US) LLP
50 California Street, Suite 2750
San Francisco, CA 94111

Date: July 28, 2023

By: /Michael H. Jones /
Michael H. Jones, Reg. No. 76,120
Rothwell, Figg, Ernst & Manbeck, P.C.
901 New York Ave., N.W.,
Suite 900 East
Washington, DC 20001
Tel: (202) 783-6040
Fax: (202) 783-6031
Email: mjones@rfem.com

*Counsel for Petitioner
Opticis Co., Ltd.*