

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CYTEK BIOSCIENCES, INC.,
Petitioner,

v.

BECKMAN COULTER, INC.,
Patent Owner.

U.S. Patent No. 12,174,107
Case No. PGR2025-00088

PATENT OWNER'S PRELIMINARY RESPONSE

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TABLE OF EXHIBITS

Exhibit	Description
EX2001	About Beckman Coulter (https://www.beckmancoulter.com/about-beckman-coulter/history-and-innovation)
EX2002	CytoFLEX Flow Cytometer (https://www.beckman.com/flow-cytometry/research-flow-cytometers/cytoflex)
EX2003	Beckman Coulter Patents (https://www.beckman.com/patents)
EX2004	Cytek Form S-1 Registration Statement (2021)
EX2005	Information Disclosure Statement for Application No. 15/817,237 to U.S. Patent No. 10,436,697 (May 7, 2019)
EX2006	Information Disclosure Statement for Application No. 15/942,430 to U.S. Patent No. 11,333,597 (June 17, 2021)
EX2007	Reserved
EX2008	Transcript of Scheduling Conference, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, D.I. 23 (D. Del. Nov. 12, 2024)
EX2009	Reserved
EX2010	Reserved
EX2011	Order, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, D.I. 124 (D. Del. July 30, 2025)
EX2012	Transcript of <i>Markman</i> Hearing of August 21, 2025, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, D.I. 151 (D. Del. Aug. 21, 2025)
EX2013	Transcript of <i>Markman</i> Hearing of September 17, 2025, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, D.I. 173 (D.

	Del. Sept. 17, 2025)
EX2014	U.S. Patent Pub. No. 2004/0165828 (“Capewell”)
EX2015	File History for U.S. Patent No. 9,746,412
EX2016	File History for U.S. Patent No. 10,330,582
EX2017	DocketNavigator, Time-to-Trial Statistics for District of Delaware (Sept. 2025)
EX2018	Reserved
EX2019	Reserved
EX2020	Reserved
EX2021	Assignment for U.S. Patent No. 8,922,778
EX2022	Assignment for U.S. Patent No. 8,605,283
EX2023	BD LSRFortessa Cell Analyzer User’s Guide
EX2024	Request for <i>Ex Parte</i> Reexamination of U.S. Patent No. 10,330,582 B2 Under 35 U.S.C. §§ 302-307 and 37 C.F.R. § 1.510 <i>et seq.</i>
EX2025	Reserved
EX2026	Reserved
EX2027	Reserved
EX2028	Declaration of David Schaafsma, Ph.D.
EX2029	Shapiro, Practical Flow Cytometry (2003), Chapter 7
EX2030	U.S. Patent No. 10,330,582
EX2031	Marcus Nebeling, CWDM: Lower Cost for More Capacity in the Short-Haul, Fiber Network Engineering (July 3, 2002)
EX2032	Telecommunication Standardization Sector of ITU, Recommendation

	G.694.2, Spectral Grids for WDM Applications: CWDM Wavelength Grid (Dec. 2003)
EX2033	Telecommunication Standardization Sector of ITU, Recommendation G.694.1, Spectral Grids for WDM Applications: DWDM Frequency Grid (June 2002)
EX2034	Order Denying Request for <i>Ex Parte</i> Reexamination, Application/Control Number: 90/015,441 (Oct. 6, 2025)
EX2035	M. Arumugam, <i>Optical Fiber Communication—An Overview</i> , 57 Pramana J. Physics 849 (2001)
EX2036	B.E.A. Saleh and M.C. Teich, <i>Fundamentals of Photonics</i> , 2d. Ed. 2007, Chapters 1, 24 (“Saleh”)
EX2037	Warren J. Smith, <i>Modern Optical Engineering</i> (3d ed. 2000, Chapter 9 (“Smith”)
EX2038	W.T. Welford, <i>Optics</i> (3d ed. 1990), Chapter 8 (“Welford”)
EX2039	Mohammad Azadeh, <i>Fiber Optics Engineering</i> (2009), Chapters 1, 2, 6 (“Azadeh”)
EX2040	Cytek’s 35 U.S.C. § 112 Contentions – Exhibit A U.S. Patent No. 10,330,582, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, (D. Del. October 22, 2025)
EX2041	Reserved
EX2042	Amended Scheduling Order, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, D.I. 198 (D. Del. Nov. 5, 2025)
EX2043	U.S. Provisional Patent Application No. 61/715,819 (“5819 Prov.”)
EX2044	Cytek’s 35 U.S.C. § 112 Contentions – Exhibit C U.S. Patent No. 12,174,107, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, (D. Del. October 22, 2025)
EX2045	Plaintiff Beckman Coulter, Inc.’s Second Election of Asserted Claims, <i>Beckman Coulter, Inc. v. Cytek Biosciences, Inc.</i> , C.A. No. 24-945, (D.

	Del. October 1, 2025)
EX2046	Cytek’s Election of Asserted Prior Art Grounds, C.A. No. 24-0945-CFC-EGT (D. Del. Nov. 25, 2025)
EX2047	Reserved
EX2048	December 4, 2025 Email from A. Cohen to D. Knight
EX2049	December 8, 2025 Email from R. Chen to A. Cohen
EX2050	December 12, 2025 Email from A. Cohen to R. Chen
EX2051	December 16, 2025 Email from A. Cohen to R. Chen
EX2052	December 18, 2025 Email from A. Cohen to Director Squires
EX2053	J. Paul Robinson, <i>Flow Cytometry: Past and Future</i> , 72 Biotechniques 159 (2022)
EX2054	https://cytekbio.com/pages/aurora
EX2055	File History for U.S. Patent No. 12,174,106

I. Introduction

U.S. Patent No. 12,174,107 (the “’107 patent”) claims groundbreaking innovations in flow cytometers. Beckman Coulter, Inc. (“Patent Owner”) utilizes the innovations claimed in the ’107 patent in its CytoFLEX Flow Cytometers and Sorters. EX2003. Before the family that led to the ’107 patent was filed, no one in the field of flow cytometry recognized how a wavelength division multiplexer (WDM), as claimed in the ’107 patent, could be used to improve light detection in a flow cytometer.

Cytek Biosciences, Inc.’s (“Petitioner” or “Cyttek”) Petition for post-grant review (“Pet.” or “Petition”) should not be instituted for several reasons. First, the ’107 patent is a pre-AIA patent and is ineligible for PGR. The ’107 patent claims priority to applications filed before March 16, 2013, and it was examined as a pre-AIA application. Petitioner argues that the ’107 patent is PGR-eligible because dependent claims reciting spot diameter of less than 1mm or specific lasers colors allegedly lack support and the patent is therefore not entitled to its priority date, and that certain claims lack written description support in the ’107 patent itself. However, one of the ’107 patent’s pre-AIA provisional applications recites, multiple times, how its inventions produce “a spot of less than 1 mm diameter,” and how the inventions can be used for multicolor flow cytometry which a POSA would

understand includes using lasers emitting the claimed colors which were standard in industry at the time, as demonstrated by the textbook cited in the same pre-AIA application. Further, Petitioner's § 112 Grounds, which Petitioner purports to rely on for PGR-eligibility, are based on a fundamental misunderstanding of § 112 law and the '107 patent's disclosure, and are irreconcilable with positions Petitioner has taken both in the parallel district court litigation and elsewhere in the Petition. Institution should therefore be denied as this proceeding is not available for the '107 patent.

Second, Petitioner has failed to demonstrate a reasonable likelihood that the '107 patent claims are invalid. In addition to Petitioner's § 112 Grounds, Petitioner's obviousness challenges to the '107 patent's inventions are based on four Grounds that each propose taking a component of an optical communications system and inserting it into a flow cytometry system. Specifically, Petitioner proposes removing fluorescence detection components in Chandler (a particle analyzer) (Grounds 8 and 9) or Oostman (a flow cytometry system) (Grounds 10 and 11) and replacing them with Goodman's demultiplexer device (an optical communications system). But the only evidence Petitioner submits that suggests adapting optical communications technology into a flow cytometer, apart from its expert's conclusory assertion, is the **'107 patent itself**. Petitioner's Goodman reference views comparable technologies

as spacecrafts and cable television systems, not flow cytometry. And Frazier, Petitioner's only flow cytometry reference that even considers optical communications technology, viewed the technology as incompatible with its goals for flow cytometry. Petitioner's additional references used in its obviousness Grounds are two webpage printouts that simply show certain APDs were available for sale in Japan—a fact never in dispute.

Petitioner's motivation to combine and reasonable expectation of success analysis is limited to just a handful of pages and does not engage with any limitations of the independent claims. Rather than offering detailed evidence, Petitioner relies solely on its expert's conclusory assertions that a person of ordinary skill in the art (POSA) would spot flaws in Chandler's or Oostman's disclosures and would look to entirely replace their detection subsystems with a subsystem used in optical communications, supposedly leading to the inventions claimed in the '107 patent. But Petitioner fails to provide any explanation of why, during the decade between the publication of its primary references and the '107 patent's priority date, no one actually combined the references in this way. That is because the purported deficiencies in Chandler or Oostman were all in fact *benefits* over prior art flow cytometers, and so a POSA would not have understood Petitioner's proposed combinations to result in an improved system. Petitioner's conclusory statements

fall far short of establishing a motivation to combine the references. Because Petitioner's obviousness analysis is deficient at every level, it cannot justify institution of post grant review on any claim.

Institution of post grant review of all challenged claims of the '107 patent should be denied.

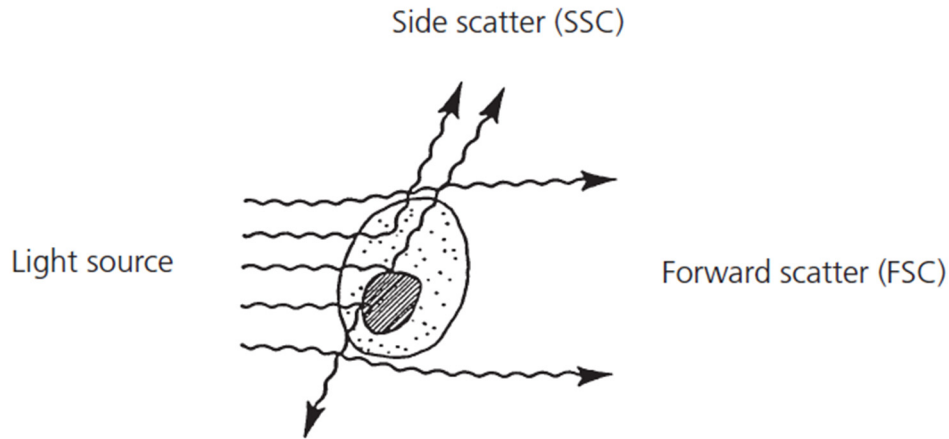
II. Technology Background

A. Basics of Flow Cytometers

In a flow cytometer, cells move in single file through a flow channel where they are illuminated by light, typically from a laser. EX1004 at 10, 17. When the light interacts with the cell, the light will scatter in multiple directions. *Id.* at 19-20; EX2023 at 100-01. Flow cytometers collect and analyze this light to measure multiple parameters of the cells. EX1001, 1:49-55. Flow cytometers perform this analysis on thousands of cells per second. *Id.* Flow cytometry has numerous uses in research and medicine, including cell sorting, rare cell detection, and diagnostics. *Id.*; EX1004 at 10; EX2028, ¶26.

1. Scattered Light Detection

Flow cytometers typically measure light scattered from the cells in two directions: forward (along the direction of the laser beam) and around 90 degrees to the side (side scatter), shown below.



EX2023 at 100. Light scattered in the forward direction provides information on how large the cell is: larger cells produce wider scattering. EX2028, ¶27. Light scattered in the forward direction is typically stronger in signal than side scattered light and can be detected by a forward scatter detector. EX2023 at 100; EX2028, ¶27.

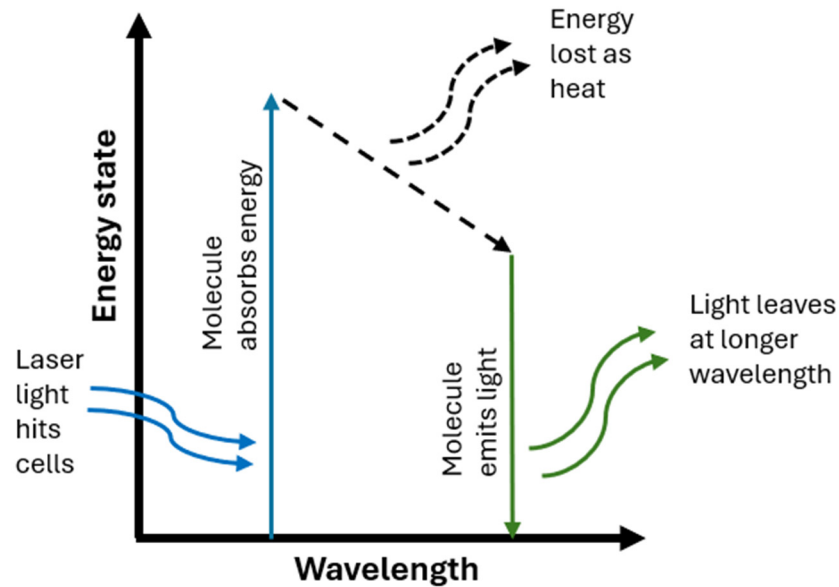
Light scattered in the side direction is used to measure and identify cells by their shape and internal structure and is both weaker and physically more spread out in all directions than forward scattered light. *See* EX2023 at 100; EX2028, ¶28. To capture as much of this scattered light as possible, flow cytometers use optical components having large openings to collect light (termed “apertures”). EX1004 at 19-20. These types of optical components produce a light beam with a wide diameter and high divergence. The combination of the aperture size and divergence angles is

often referred to as “étendue,” and flow cytometer optical systems typically require the étendue to be large to collect scattered light. EX1001, 44:63-45:9; *see also* EX2028, ¶28. Side scattered light typically has a significantly lower signal than forward scattered light, and fluorescent light has an even lower signal than side scattered light. *See* EX1004 at 23-24; EX2028, ¶29.

2. Fluorescence Detection

In addition to forward and side scattering measurements, some flow cytometers also use fluorescent light to detect additional properties of the cells. EX1004 at 10; EX1007 at 33; EX2028, ¶30.

When using fluorescence in flow cytometry, cells are labeled with molecules called fluorophores, which are typically attached to antibodies specific for certain cell surface proteins. EX1004 at 10; EX1007 at 33. Atoms or molecules in these fluorophores absorb light at specific wavelengths, at which point they become “excited” and momentarily move to a higher energy level. EX2028, ¶31. When these atoms or molecules fall back to their original state, they can emit light of a lower energy (i.e., longer wavelength) than the light they initially absorbed. *Id.*



EX2028, ¶31 (adapted from EX1007 at 103). This emitted light, which varies in wavelength¹ depending on the fluorophore, is then analyzed by the flow cytometer using detectors. EX2028, ¶31.

Since fluorescent light is collected from individual cells as part of the side scattered light and is thus similarly weak and diffuse, prior to the '107 patent, PMTs had been the detector typically used for fluorescent light detection in flow cytometers. EX1004 at 23-24; EX1007 at 154; EX2028, ¶¶32-35.

¹ Fluorophores used in flow cytometry emit various wavelengths across the visible spectrum. EX1007, 68; EX1001, 57:37-39; EX2028, ¶31 n.1.

B. Basics of Optical Communications Detection

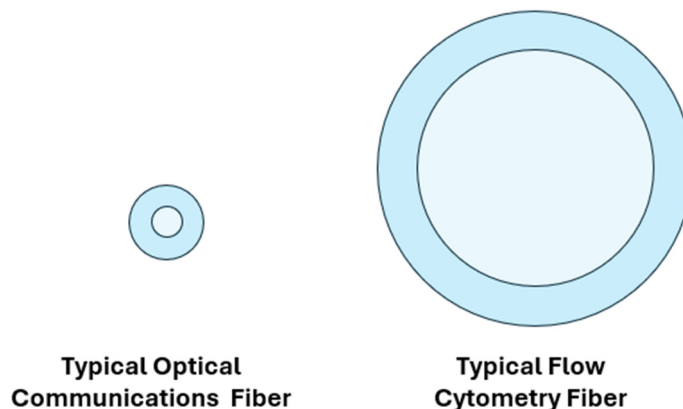
Optical communications refers to the transmission of information—such as with internet traffic and voice or video communication—through optical fibers using light as the carrier signal. EX2036 at 1073. Telecommunications systems increase data transmission capacity by encoding different signals in different wavelengths of light. EX2036 at 1104-05; EX2039 at 50-51. This involves combining (or multiplexing) light from multiple lasers at various wavelengths into one narrow light beam at the signal source and transmitting the combined/multiplexed light signals through an optical fiber. EX2036 at 1104-05. At the destination, a device then separates out (or demultiplexes) the light signals from those lasers according to wavelength. *Id.*; EX2028, ¶36.

C. Flow Cytometry Fluorescence Detection and Optical Communications Signal Detection Have Multiple Key Differences

In optical communications, light in a small range of wavelengths is transmitted directly from a laser into a fiber. *See* EX2035 at 850, 861. But in flow cytometry fluorescence detection, as discussed above in Section II.A, the collected light is scattered from cells, resulting in a wide cone of weak light (i.e., high étendue). Prior to the '107 patent, it was understood that these fundamental differences result in many design differences between flow cytometers and optical communications systems. EX2028, ¶37.

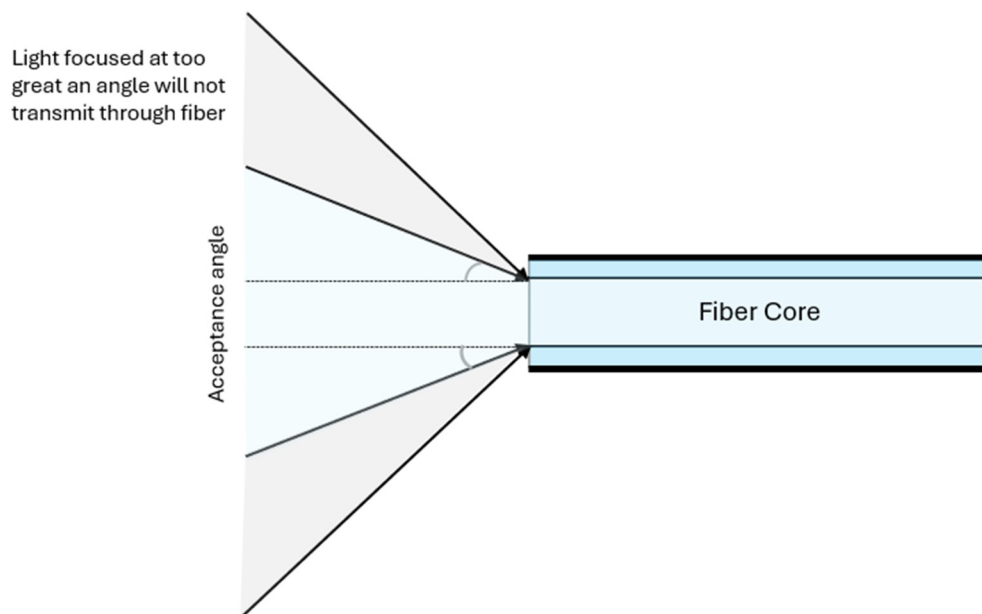
1. Different Optical Fibers

Flow cytometers typically use optical fibers with much greater core diameters than the fibers used in optical communications systems. *See, e.g.*, EX1007 at 148-49; EX2036 at 1076. Optical communications systems use fibers with core diameters ranging from less than 10 microns to around 50 or 62.5 microns. EX2035 at 851-53; EX2036 at 1076. In contrast, to collect the wide cone of light scattered from cells, flow cytometers typically use optical fibers with large numerical apertures having core diameters at least *ten times larger* than those in optical communications. *See* EX1007 at 148-49 (discussing how “[l]ight collection is limited by the N.A. of the fiber or waveguide” and discussing numerical apertures above 0.4).



EX2028, ¶38.

Fibers from optical communications were not treated as interchangeable with fibers in flow cytometry. EX2028, ¶¶39-40. For example, if light collected in flow cytometry was used with a typical optical communications fiber, the light beam would either (1) be too wide to enter the narrow fiber opening, or (2) have to be focused at such extreme angles that the light would be rejected from the fiber. *Id.* This latter limitation can be understood as an acceptance angle:



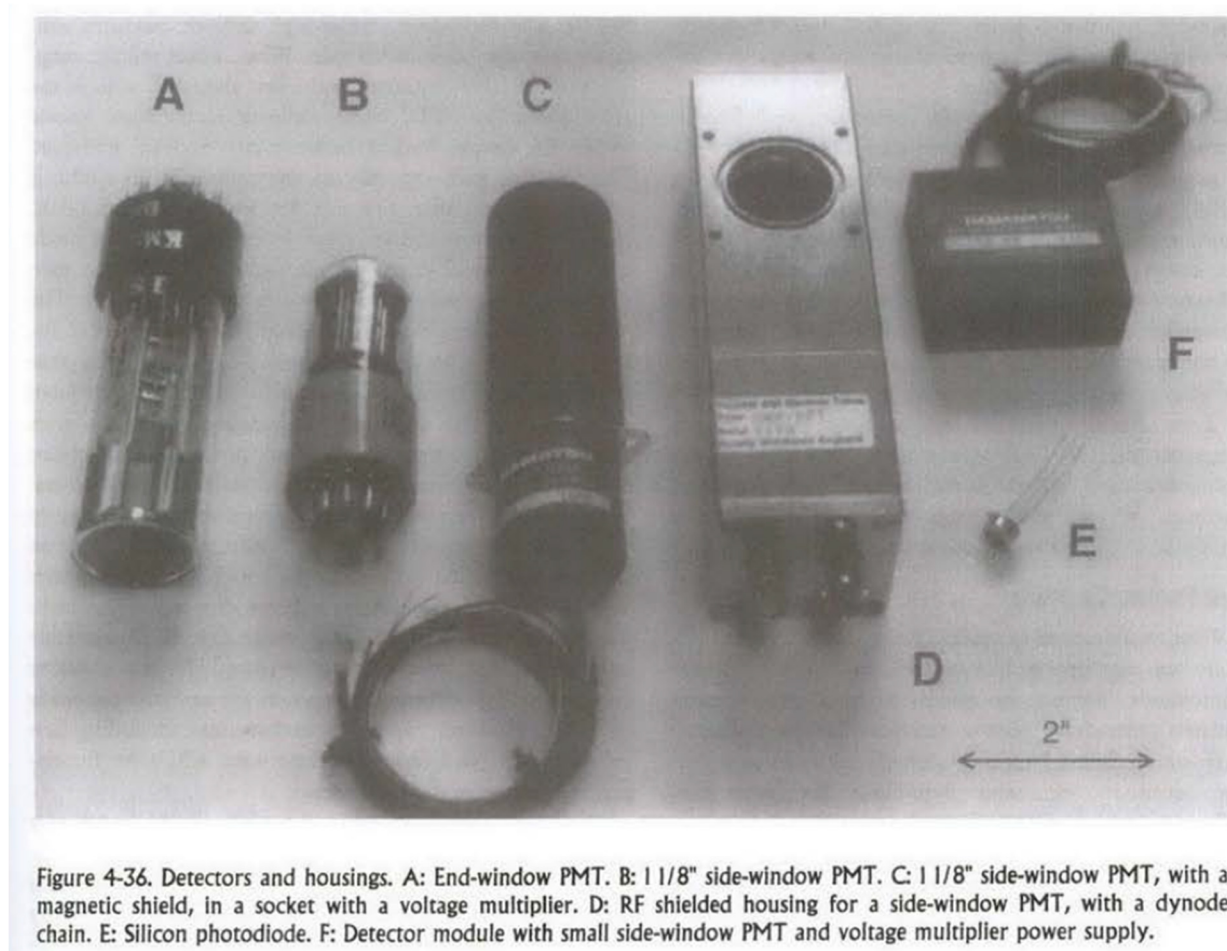
EX2028, ¶¶39-40 (adapted from EX2036 at 16); EX2037 at 282-83; EX2038 at 135-36.

2. Different Detectors

Semiconductor detectors for detecting light are photodetectors that use semiconductor materials to convert light into an electrical signal. EX2028, ¶41;

EX2039 at 157-60. When light hits the semiconductor material, photons are absorbed, creating a current or voltage proportional to the light intensity. *Id.* The output signal can then be processed for measurement. *Id.* Optical communication devices “almost exclusively” use diodes, either photodiodes or avalanche photodiodes (APDs) depending on the application, which are both types of semiconductor detectors. EX2039 at 173. Both photodiodes and APDs “provide very good responsivity in the wavelengths used in fiber optics.” EX2039 at 173; EX2028, ¶42.

Before the inventions described in the '107 patent, flow cytometers historically used PMTs for fluorescence detection. PMTs are not semiconductor detectors but instead make use of a vacuum tube. EX2028, ¶43. Specifically, they use the photoelectric effect, whereby photons strike a photocathode releasing electrons, which are then multiplied inside the tube. *Id.* If used in flow cytometers, photodiodes were primarily used for measuring the comparatively stronger forward scattered light. *Id.*



EX1007 at 154 (showing relative sizes of PMTs (Figure 4-36 A-C) and photodiodes (Figure 4-36 E)); EX2028, ¶43.

Compared to signals in optical communications, the fluorescence intensity in flow cytometry can be over 1,000,000 times weaker.² PMTs are bulky, fragile, and expensive, but they can amplify signals from low light conditions with excellent noise characteristics while also being tolerant of wide, diffuse light beams with their large active areas. *See* EX1004 at 24 (“Photomultipliers are photosensitive electron tubes with a more restricted spectral response [than diodes], but with high gain and good signal-to-noise characteristics suitable for the detection of weak

² Optical communications networks measure signal in decibel-milliwatts, a logarithmic scale proportional to milliwatts. EX2039 at 23-24. Optical communications signals typically range in milliwatts or microwatts. *Id.* Dr. Schaafsma explains how this correlates to *trillions* of photons per second or more. EX2028, ¶44. In contrast, in flow cytometry fluorescent light detection, only “*hundreds* of photons are likely to be emitted from each fluorescent molecule in or on a cell during the cell’s traverse of an illuminating beam at a wavelength at or near the molecule’s excitation maximum.” EX2029 at 283 (all emphasis added unless otherwise stated). Indeed, “even the most efficient fluorescence collection optics collect no more than about 20% of the total emission from cells,” meaning many such photons will not even reach the detector. *Id.*; EX2028, ¶44.

fluorescence.”); EX1007 at 152-153. In contrast to PMTs, an APD with equivalent size active area would produce a high amount of background noise. *See* EX1001, 43:67-44:6. Thus, before the inventions of the ’107 patent, the large diverging beam (i.e., high étendue) prevented the use of APDs and other small area detectors in flow cytometry. *See* EX1001, 44:33-39, 44:63-45:9. Prior art flow cytometers did not have mechanisms that enabled maintaining the beam diameter and focusing it down to sufficiently small spot sizes. *Id.* at 44:34-45:23. Thus, PMTs had been the detector of choice for fluorescence detection in flow cytometry for decades. *See id.* at 44:6-33; EX2028, ¶¶45-50.

III. Level of Ordinary Skill in the Art

For purposes of this POPR, Patent Owner does not currently dispute Petitioner’s proposed definition of a POSA. Pet. at 14; EX1002, ¶14. If a trial is instituted, Patent Owner reserves the right to submit a different definition than proposed by Petitioner. EX2028, ¶¶51.

IV. Claim Construction

The district court held two claim construction hearings, one of which was after the petition was filed. EX1103; EX1105. The Court construed the ’107 patent claim terms as follows:

Term	'107 Patent Claim	Construction
Focusing lenses ... configured to focus light	Claims 13, 17	Plain and ordinary meaning, that is “lenses that capture and converge light.” EX1105, 34:17-20
“Portion of”	Claims 1, 16	“subset of the spectrum of the wavelengths of.” EX1105, 92:21- 24.

The Court did not construe any other claim limitations, and no further claim limitations in the '107 patent are before the Court at this time. EX2028, ¶¶51-52.

V. Overview of the Asserted References

A. Goodman

U.S. Patent No. 6,542,306 (“Goodman”—EX1016) is a patent arising from an application filed on March 16, 2001. Goodman solely describes components for optical communications systems. EX1016, 2:7-14, 3:47-50. It describes an alternative light detection system for optical communications, primarily for use in “wide wavelength division multiplexing (WWDM) systems.” EX1016, 5:41-47. “WWDM” was not an industry-defined term by the time Goodman issued in 2004, but from the description in Goodman (wavelengths centered at 1310 nm and spaced

25 nm apart), its primary use case was for coarse wavelength division multiplexing (CWDM). EX1016, 2:21-29, EX2032 at 3; EX2028, ¶53.

Goodman describes demultiplexing devices that are “low cost,” “easy to mold and fabricate accurately,” and that could be produced at scale and easily inserted into optical systems ranging from “spacecraft and aircraft applications to closed circuit and cable television systems.” EX1016, 3:47-67, 6:62-64, 2:10-13. Goodman discloses a zig-zag configuration for the path of the light beam travelling through its device:

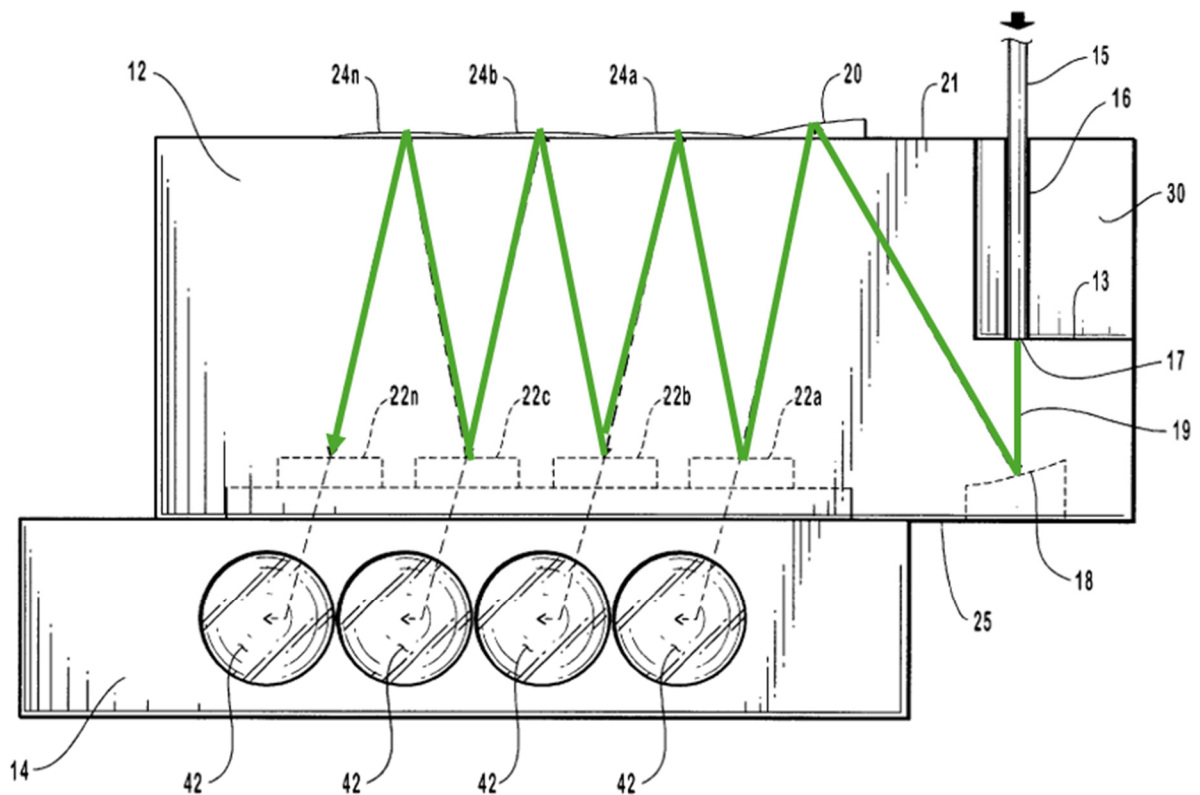


FIG. 1

EX1016 at FIG. 1 (annotated); EX2028, ¶55. Light coming into Goodman’s demultiplexing device from optical fiber 15 contacts two mirrors 18 and 20 before being directed into a series of filters and reflectors. EX1016, 7:17-8:27. Light passing through the filters goes through a beam-directing member, is reflected at a 90-degree angle, and is then focused to detectors outside the demultiplexing device. *Id.* at 11:8-16; EX2028, ¶¶55.

Goodman’s optical block and beam-directing member are both preferably “formed of a moldable thermoplastic material” so as to “facilitat[e] high volume production at low cost.” EX1016, 6:60-64. As Goodman’s device is not designed to be customized or adjusted after its manufacture, its filters are “affixed therein such as by an optical adhesive.” *Id.* at 8:44-47; EX2028, ¶56.

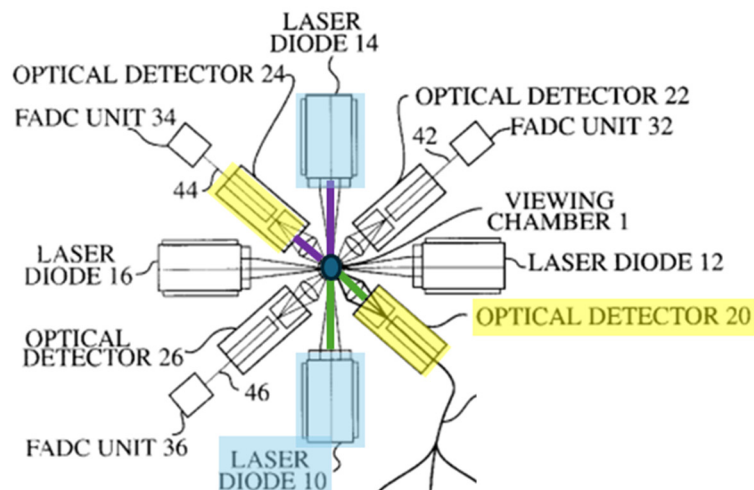
B. Chandler

U.S. Patent No. 6,139,800 (“Chandler”—EX1051) is a patent arising from an application filed by Luminex Corporation on June 22, 1998, and is directed to a particle analyzer used to measure multiple fluorescence wavelengths. In particular, the device detects fluorescent microspheres or particles coated with tags that bind to molecules of interest to be detected in a sample fluid (e.g., antigens, antibodies, cell receptors). EX1051, 2:1-10, 3:38-65, 9:5-10, 10:1-5; EX2028, ¶57.

Chandler's particle analyzer is intended to address specific limitations to fluorescence detection in conventional flow cytometers. Specifically, the number of fluorescent labels that could be simultaneously measured with one laser was restricted to two or three dyes due to dye properties and wavelength overlap. EX1051, 2:1-10; *id.* at 2:37-42; *see also id.* at 2:30-32 ("I have determined that the properties of the fluorescent dyes themselves limit this flow cytometric technique to about three different wavelengths."). This limited the analysis that could have been done on any one sample, and required multiple runs for meaningful analysis, which in turn required a larger quantity of the sample. *Id.* at 2:42-51. The prior art addressed this problem by using two lasers of different wavelengths, each focused on a different spot along the flow stream. *Id.* at 2:61-67. But since the measurements are taken at different times and location, it can be impossible to know if measurements are made on the same particle, because even the slightest flow turbulence can mix particles and cause errors. *Id.* at 3:8-17; EX2028, ¶¶58-59.

To address those limitations in fluorescence detection, Chandler proposes a system to enable excitation and detection of multiple fluorescence emissions at substantially the same time. EX1051, 3:38-41. Chandler's system uses multiple lasers (10, 12, 14, 16) of different excitation wavelengths and angled in different directions so that their focal regions are substantially overlapping to ensure that the

same particle is excited by all lasers—each laser is positionally paired with an optical detector (20, 22, 24, 26) that detects emissions resulting from excitation by its paired laser. *Id.* at 7:1-34. For example, in the annotated figure below, laser diode 10 is paired with optical detector 20, such that optical detector 20 receives the emissions from the laser diode 10's excitation of the particle (green); whereas laser diode 14 has a different excitation wavelength that is received by optical detector 24 (purple), as depicted below:



Id. at FIG. 4 (annotated); EX2028, ¶60. In one exemplary embodiment, Chandler's system operates the different lasers sequentially, with each laser turning on and off in turn as each single particle passes through the detection location. EX1051, 10:16-20; EX2028, ¶60.

The optical detector gathers emissions from the particles in the flow cell and “transmit[s] them a respective multi-mode fiber optic cable” that splits and directs each beam through multiple different band-pass filters in a filtering, amplification, and digital conversion (FADC) unit. EX1051, 7:10-54.

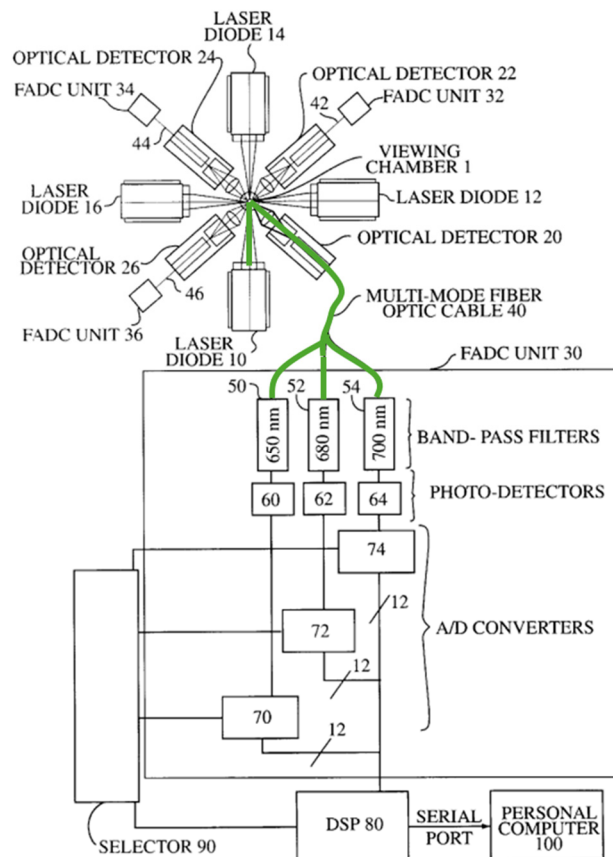


FIG. 4

Id. at FIG. 4 (annotated to show the light path from one laser to an FADC unit); EX2028, ¶62. The band-pass filters isolate the specific wavelengths corresponding to each dye, and the signals are detected, amplified, digitized, and processed.

EX1051, 8:6-50. This way, multiple wavelengths in each FADC unit can be detected. *Id.* at 7:24-34; EX2028, ¶63.

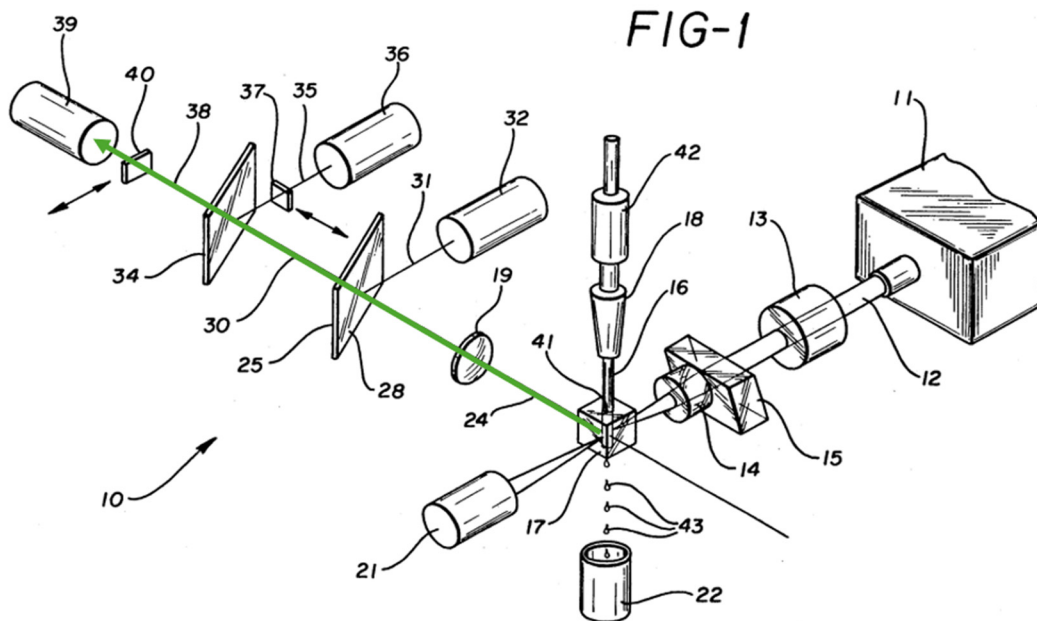
Chandler explains that its approach of using multi-mode optical fiber cables to split the beam is better than using beam splitters or other components to spectrally separate bands. EX1051, 11:38-50 (“The beam splitter approach, however, generally increases the size and manufacturing complexity, in contrast to the simpler and/or more compact and/or less expensive optical detector/multi-mode fiber optic cable approach.”); EX2028, ¶64. Chandler’s system utilizing microspheres operates at higher fluorescence levels than continuous flow cytometers such as Oostman (discussed below). EX2028, ¶58.

C. Oostman

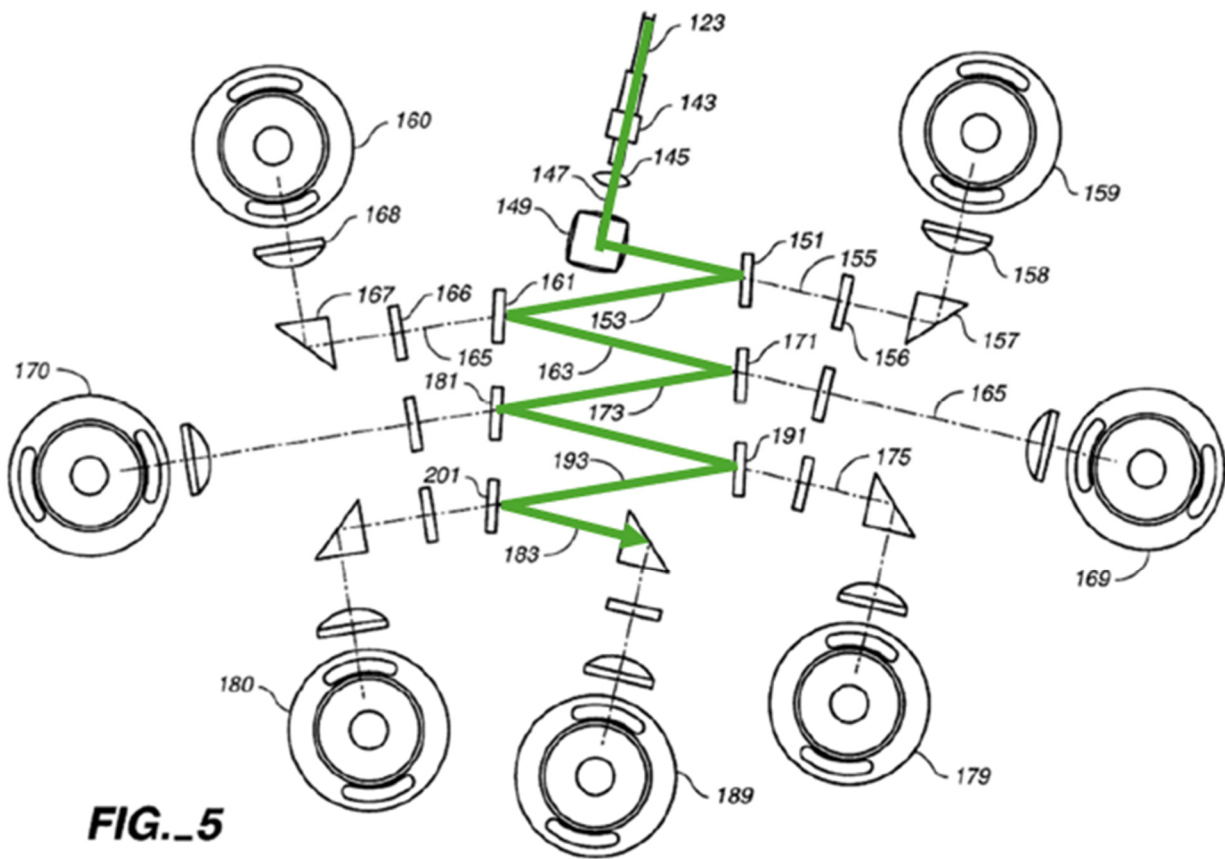
U.S. Patent No. 6,683,314 (“Oostman”—EX1005) is a patent arising from an application filed on August 28, 2001, and is directed to fluorescence detection instruments (e.g., in a flow cytometer) capable of separating more fluorescent colors over smaller areas than prior art flow cytometers. EX1005, 4:10-13, 4:65-5:2; EX2028, ¶63.

Oostman discloses two primary improvements over prior art flow cytometers. EX1005, 3:44-57, 4:14-16, 6:40-7:36, 8:18-9:3. The first improvement is changing the path of the fluorescent light: in the prior art, light from a flow cytometer would

go along one straight optical path, and planar beam splitters would reflect certain wavelengths of light to detectors. *Id.* at 1:54-2:16. The optical path of light in the prior art to Oostman is annotated in green below:



EX1005 at FIG. 1 (annotated); EX2028, ¶66. Light passing through beam splitters has loss from absorption compared to light reflected, so the signal attenuates as it passes through each beam splitter. *See* EX1005, 3:29-34, 4:16-24. Oostman flips this strategy, so that light transmitted through each beam splitter would go straight to a detector, and light would repeatedly be reflected across planar beam splitters in a zig-zag pattern:



EX1005 at FIG. 5 (annotated); *id.* at 3:44-57, 6:40-7:34; EX2028, ¶66.

Oostman's second improvement is developing an alternative optical path and PMT detector arrangement. FIG. 5 of Oostman depicts a zig-zag optical path, but use of PMTs means the overall detector cluster size is still large. *See* EX1005, 7:34-36; EX2028, ¶67. Therefore, Oostman proposes an alternative "star-shaped pattern yielding a more compact polygonal arrangement of detectors." EX1005, 7:34-36.

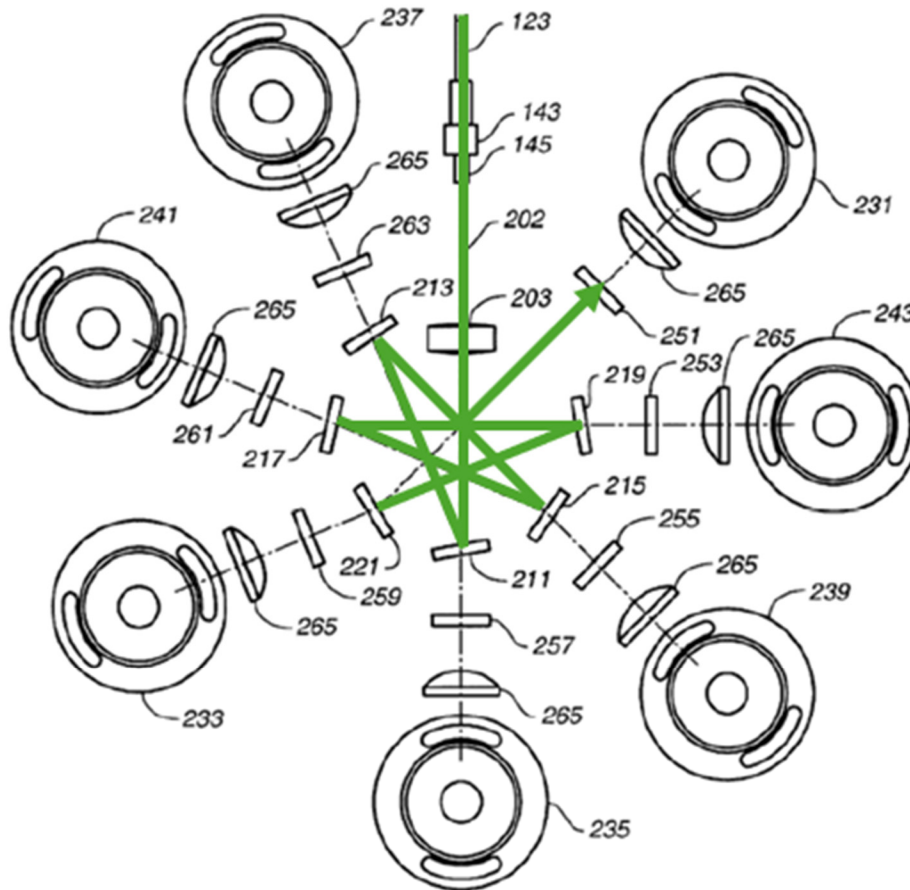


FIG. 6

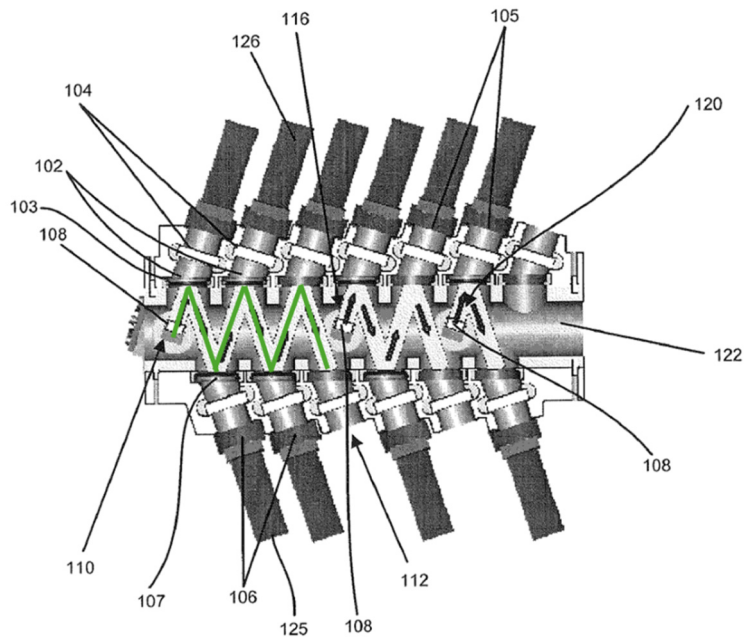
EX1005 at FIG. 6 (annotated); EX2028, ¶67. Oostman emphasizes the ability to add more detector clusters in a modular fashion, remove and replace beam splitters depending on the application, and adjust the clusters to improve light detection for specific applications. EX1005, 4:14-16, 8:18-9:3; EX2028, ¶67.

D. Frazier

U.S. Patent No. 8,284,402 (“Frazier”—EX1009) is a patent directed to fluorescence detection assemblies in flow cytometry using an optical alignment

assembly to introduce an output beam into an array of filters. EX1009 at Abstract; EX2028, ¶68.

In Frazier's detector assembly (100), light beams are introduced through a beam reflecting element such as a prism (108) to a dichroic filter (102), which splits the beam so that a portion of the beam goes through the filter and further through a bandpass filter (104) to isolate a desired band to each detector (e.g., 125, 126) in a detection port (112) for detection, and another portion is reflected to the next dichroic filter which captures a band of different wavelengths, while the remaining bands are reflected onward. EX1009, 4:55-5:11. The below annotation shows the beam as it is reflected through the central boulevard (122) to its final detector.



EX1009, FIG. 1 (annotated); EX2028, ¶70.

Frazier seeks to improve previous detector assemblies by providing assemblies that can be customizable, so that the number of dichroic filters and detectors associated with each light beam can be varied. *Id.* at 2:50-59; EX2028, ¶69.

Frazier discusses a reference from optical communications, U.S. Patent No. 4,244,045 (Nosu) which claimed priority to the 1970s and described a single detector array configuration. EX1009, 2:9-46. Frazier states that using the assemblies from Nosu would not be beneficial for Frazier's customization goals because Nosu's "prefabricated blocks" were not "customizable to accommodate multiple light beams, each of which may require separation of a different amount of wavelengths." *Id.*; EX2028, ¶71.

E. Hamamatsu

"Hamamatsu" is described in the Petition and Grounds as a single reference, but it is actually two. EX1055; EX1056. These are two archived product webpages from Hamamatsu Japan in June 2010, and they describe specifications for certain APDs for "NIR High Sensitivity (EX1055) or "Short Wavelength Type" (EX1056). EX2028, ¶72. The webpages show APDs with active areas ranging from 0.2 mm diameter to 5 mm diameter. EX1055, EX1056.

VI. Overview of U.S. Patent No. 12,174,107

The '107 patent is titled “Flow Cytometer” and was filed on September 3, 2024. EX1001, Cover; EX2028, ¶73. The '107 patent claims the benefit of applications filed on or after May 2012. *Id.* The '107 patent names Yong Qin Chen as the sole inventor. *Id.*

The '107 patent sought to enhance the performance of flow cytometers while making them more compact and easier to use. *E.g.*, EX1001, 1:42-45. The '107 patent describes innovative, compact wavelength division multiplexers (“WDMs”) that permit the use of low noise, millimeter-sized detectors not previously used in flow cytometry, resulting in improved sample analysis and a smaller instrument footprint. *Id.* at 2:40-45, 45:35-46:6; EX2028, ¶74.

Flow cytometer detection systems present different challenges from light detection in other fields. For example, unlike in optical communications, flow cytometers must detect light with a wide range of wavelengths of unknown and uncontrolled signal strength. *See* EX1016, 2:20-64; EX1007 at 67, 151. Furthermore, in flow cytometry, light typically enters a detection system from a large optical fiber which produces a much larger light beam than the laser beam detected in optical communications. EX1001, 44:56-45:9. This presents challenges in controlling the light beam over an extended distance and focusing the beam onto the

detectors, as needed for effective detection. *Id.* at 44:33-53. The '107 patent recognized and overcame these challenges with its innovative WDM designs. EX2028, ¶¶75-76.

VII. Relevant Prosecution History

The '107 patent issued on December 24, 2024 as a continuation in a family of patents that had undergone extensive prosecution including numerous prior-art rejections by multiple examiners. EX2028, ¶77. For example, in the '107 patent's grandparent application, the Examiners considered U.S. Patent Pub. No. 2003/0048539 to Oostman³ and U.S. Patent Pub. No. 2004/0165828 ("Capewell") (EX2014), a reference from the optical communications field. EX2015 at 1070-1071. The Examiners combined Oostman's flow cytometer with Capewell's optical communications WDM and alleged that the references were "[i]n a similar field of endeavor." *Id.* Applicant did not amend the claims—instead Applicant argued that "the fluorescence detection instrument, as taught by *Oostman*, and the optical communication system, as taught by *Capewell*, are actually different kinds of optical systems with different sizes of light sources," and therefore the claims were valid.

³ The Examiners relied on the published application of U.S. Patent No. 6,683,314 (EX1005) ("Oostman"), Petitioner's reference in Grounds 10 and 11.

Id. at 1107-1109. The Examiner found these arguments “persuasive.” *Id.* at 1132; EX2028, ¶78.

In the '107 patent's prosecution, the Examiner performed a thorough prior art search covering nearly 300 separate search queries. *See* EX1003 at 182-232. In its reasons for allowance, the Examiner expressly stated that the claims were allowable over Oostman:

The closest prior art reference of Oostman, JR. et al. (2003/0048539 A 1) and Kanda (2007/0195310 A 1) discloses a flow cytometer.

However, Oostman, JR. and Kanda fail to disclose, teach or suggest wherein each of the mirrors in the array of mirrors is configured to: receive light reflected by a filter in the array of filters; and reflect light to another filter in the array of filters, as claimed and as specified in the present application specification.

Id. at 244; EX2028, ¶84.

The Examiner also verified during prosecution that it considered two of Petitioner's other references, Goodman (Grounds 8-11) and Frazier (Ground 10 & 11) as well:

PGR2025-00088
Patent No. 12,174,107
Patent Owner Preliminary Response

A72	6542306	4/1/03	Goodman
A73	6572255	6/3/03	Husher
A74	6608682	8/19/03	Ortyn et al.
A75	6618143	9/9/03	Roche et al.
A76	6638481	10/28/03	Sklar et al.
A77	6647175	11/11/03	LoRegio et al.
A78	6683314	1/27/04	Oostman Jr. et al.
A79	6713019	3/30/04	Ozasa et al.
A80	6748133	6/8/04	Liu et al.
A81	6767188	7/27/04	Vrane et al.
A82	6768593	7/27/04	Jutamulia
A83	6788409	9/7/04	Goodwin
A84	6794671	9/21/04	Nicoli et al.

A139	8284402	10/9/12	Frazier et al.
A140	8337096	12/25/12	Shen et al.
A141	8345237	1/1/13	Tsukii et al.
A142	8405048	3/26/13	Hayashi
A143	8432541	4/30/13	Rich
A144	8436371	5/7/13	Medendorp Jr., et al.
A145	8436993	5/7/13	Kaduchak et al.
A146	8488244	7/16/13	Li et al.
A147	8507279	8/13/13	Ball et al.

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EX1003 at 254, 257 (annotated); EX2028, ¶82. The Examiner similarly considered U.S. Patent No. 7,505,131 (“Roth-131”) (EX1045), which, like Petitioner’s other primary reference, Chandler (Grounds 8 & 9), was assigned to the Luminex Corporation. EX1003 at 256; EX2028, ¶83.

Petitioner has argued in related proceedings that U.S. Patent No. 11,703,443 and U.S. Patent No. 12,174,106, which like the ’107 patent, include a divisional application in their priority chain (U.S. Patent No. 11,255,772, which is a divisional of U.S. Patent No. 9,746,412 (the “’412 patent”)), is purportedly an improper “continuation of a divisional.” IPR2025-01319, Paper 9, at 17-18; PGR2025-00084, Paper 15, at 17-19. To the extent Petitioner argues the same here, Petitioner’s argument is misplaced. A patent is *not* invalid simply based on the type of application from which it depends. *See* MPEP §§ 201.06, 201.07 (continuation applications may be filed from any prior nonprovisional application (including a divisional), provided the disclosure remains the same and the parent is co-pending).

There was nothing improper about the prosecution of the '107 patent, which had the same art unit and overlapping classifications as the '412 patent. *Compare* EX1003 with EX1029. Finally, Petitioner's cited cases (*see* IPR2025-01319, Paper 9, at 18, 20; PGR2025-00084, Paper 15, at 18-19) do not hold otherwise; rather, these cases concern whether a patent maintains consonance to get the benefit of 35 U.S.C. § 121's safe harbor to protect the patent from obviousness type double patenting.

VIII. The PTO Has Already Rejected Petitioner's Request for Reexamination of Patent Claims in the Same Family Based on the Same Prior Art Grounds

On October 6, 2025, the PTO issued an order denying Petitioner's request for *ex parte* reexamination of claims of the '582 patent. EX2034. The '582 patent is in the same family as the '107 patent, claims priority to the same applications and shares the same specification, and is being asserted against Petitioner in the parallel district court litigation. *See* Paper 4 at 1.

Notably, the PTO rejected multiple proposed substantial new questions of patentability (SNQs) based on Chandler and Goodman with and without Hamamatsu (Grounds 8 and 9 here) and Oostman, Goodman, and Frazier with and without Hamamatsu (Grounds 10 and 11 here). EX2034 at 11-15. The PTO found that Goodman's failure to disclose a "curved mirror" (which the PTO understood to refer to a concave mirror) was fatal to all of Petitioner's claims of obviousness. *Id.* at 11-

15. The PTO has thus already denied Petitioner's validity challenges involving the same claim limitations and the same references at issue here.

IX. Institution Should Be Denied Because the '107 Patent Is Not PGR-Eligible

The '107 patent claims priority to applications including at least provisional application 61/715,819 filed on October 18, 2012 ("5819 Prov.") (EX2043); EX2028, ¶86. The '107 patent was thus examined under the "pre-AIA first to invent provisions." EX1003 at 243. Nonetheless, Petitioner files this proceeding as a PGR under 35 U.S.C. § 321(c) and 37 C.F.R. § 42.202(a). Petitioner argues PGR eligibility for alleged lack of provisional support for claims reciting "the diameter of the spot is less than 1 mm," and claims reciting "laser [that] is configured to emit blue light, yellow-green light, violet light, or ultraviolet light." *See* Pet. at 18.⁴ But because both limitations find support in a provisional application filed in 2012,

⁴ Petitioner further references Grounds 1, 3, 5, and 7 as allegedly lacking written description support in both its provisional and non-provisional applications. Pet. at 15 n.1, 16-17. Petitioner provides no separate assessment of written description support of the provisional applications in those Grounds, and their arguments regarding lack of written description in the '107 Patent's specification fail as discussed in more detail below, *see infra* Section X.A.

Petitioner's arguments fail. *See Fox Factory, Inc. v. SRAM, LLC*, PGR2016-00043, Paper No. 9 (PTAB Apr. 3, 2017) (petitioner fails to demonstrate patent is eligible for post-grant review when it fails to show the claim was “not entitled to the filing date of the” priority application). Petitioner produces a schematic of the alleged priority chain of the '107 Patent but critically omits that International Patent Application No. PCT/US2013/043453 (EX1071) claims priority to pre-AIA provisional applications, which, as explained below, provide support for the claims of the '107 Patent. *See* Pet. at 16.

A. Claims 14 and 18 Have Written Description Support in Pre-AIA Priority Application 61/715,819 Filed October 18, 2012

Petitioner first alleges that “the earliest written description support for the limitation ‘the diameter of the spot is less than 1 mm’” in claims 14 and 18 of the '107 patent “originates from new matter added to the '412 patent, a CIP of the post-AIA PCT App.” Pet. at 17. Petitioner cites to statements in the '412 patent reciting, e.g., “the beam of light in said branch being focused to a spot having a diameter of less than 1.0 mm.” *Id.* (citing to EX1070 at 9:46-60). But Petitioner ignores that near-identical disclosure is present in multiple claims of pre-AIA U.S. Provisional Application No. 61/715,819 ('5819 Prov.). *See Hyatt v. Boone*, 146 F.3d 1348, 1352 (Fed. Cir. 1998) (“The claims as filed are part of the specification, and may provide

or contribute to compliance with § 112.”). Claims in the provisional application reciting this limitation are reproduced below:

- EX2043 Cl. 3: “A wavelength division multiplexing device of claim 2, wherein another focusing optical element means is placed in one of the said branches and focuses the light beam of the branch into a ***spot of less than 1 mm diameter.***”
- EX2043 Cl. 4: “A wavelength division multiplexing device of claim 3, wherein the architecture of image relay optical element means, dichroic filter means and focusing optical element means is cascaded to produce additional ***focused spots of less than 1 mm diameter*** for multiple color bands of the said light source.”
- EX2043 Cl. 9: “A method of claim 8, wherein another focusing optical element means is placed in one of the said branches and focuses the light beam of the branch into a ***spot of less than 1 mm diameter.***”
- EX2043 Cl. 10: “A method of claim 9, wherein the architecture of image relay optical element means, dichroic filter means and focusing optical element means is cascaded to produce additional ***focused spots of less than 1 mm diameter*** for multiple color bands of the said light source.”

EX2028, ¶92.

Petitioner provides no analysis besides incorrectly stating that the provisional application does not describe the limitation. But regardless, the '5819 Prov. further describes throughout its specification how the inventor possessed a WDM capable of focusing light to a small spot size. *See, e.g.,* EX2043, FIG. 1; [0007], [0016], [0018]; Abstract (“Individual colored bands [] can be focused down to small spots compatible with low noise optical detectors.”); EX2028, ¶¶90-91. Petitioner’s statements regarding claims 14 and 18 are thus incorrect, and Petitioner has thus

failed to demonstrate PGR-eligibility based on claims 14 and 18 of the '107 patent. EX2028, ¶93.

B. Claims 6 and 22 Have Written Description Support in Pre-AIA Priority Application 61/715,819 Filed October 18, 2012

Petitioner next alleges lack of priority support for claims 6 and 22 of the '107 patent, which “recite a ‘laser [that] is configured to emit blue light, yellow-green light, violet light, or ultraviolet light.” Pet. at 18. Petitioner’s argument fails here as well. It is black letter law that to support a priority application, “the exact terms need not be used *in haec verba*.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997); *see also Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010). Instead, the disclosure must “demonstrate that the patentee was in possession of the invention that is claimed.” *Ariad*, 598 F.3d at 1355 (citation omitted); *see also Crown Operations Int’l, Ltd. v. Solutia Inc.*, 289 F.3d 1367, 1376 (Fed. Cir. 2002) (“Put another way, one skilled in the art, reading the original disclosure, must reasonably discern the limitation at issue in the claims.”). Furthermore, “[b]ecause the specification is viewed from the perspective of one of skill, in some circumstances, a patentee may rely on information that is ‘well-known in the art’ for purposes of meeting the written description requirement.” *Boston Scientific Corp. v. Johnson & Johnson*, 647 F.3d 1353, 1366 (Fed. Cir. 2011). “A specification may, within the meaning of 35 U.S.C. § 112 para. 1, contain a written

description of a broadly claimed invention without describing all species that [the] claim encompasses.” *Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1365 (Fed. Cir. 2003) (quoting *Utter v. Hiraga*, 845 F.2d 993, 998 (Fed. Cir. 1988)).

Here, the provisional application discloses that the invention is for “use in multicolor fluorescence spectroscopy applications such as in flow cytometry.” EX2043 at [0002]. The ’5819 Provisional then cites to EX1007 (Shapiro) as a general reference for such multicolor flow cytometers. *Id.* at [0003] (citing EX1007). A POSA would have understood that this disclosure provides written description support for laser light sources configured to emit light in the different wavelengths or colors as claimed because these are well known light sources used in multicolor flow cytometry. Indeed, Shapiro (EX1007), cited by the ’5819 Provisional, describes lasers of numerous wavelengths, including wavelengths corresponding with blue, yellow-green, violet, and ultraviolet light, that were well known for use in flow cytometers:

Ar Ion	Kr Ion	He-Cd	He-Ne	Solid State
275.4				
300.3				
302.4				
305.5				
		325.0		
333.6				
	357.4			
	350.7			
351.1				
		354.5		355 (Nd:YAG x 3)
	356.4			
363.8				
	406.7			
	413.1			
	415.4			
				430 (Cr:LISAF)
		441.6		
454.5				
				457 (Nd:YVO ₄ x 2)
457.9				
				460 (semi)
	468.0			
465.8				
472.7				
	476.2			
476.5				
	482.5			
488.0				488.0 (semi)
496.5				
501.7				
514.5				514.5 (Yb:YAG x 2)
	520.8			
528.7				
	530.9			
				532 (Nd:YAG x 2)
		533.7		
		537.8		
			543.5	
	568.2			
			594.1	
			611.9	
			632.8	
		635.5		
		636.0		
	647.1			
	676.4			
	752.5			
	799.3			

Table 4-2. Emission wavelengths of argon and krypton ion, helium-cadmium, helium-neon, and solid-state lasers that emit at discrete wavelengths. Diode, dye, and some solid-state lasers are tunable over ranges of wavelengths. See text for details.

EX1007 at 130; EX2028, ¶¶94-97.

Additionally, the provisional application discloses that the invention is for “use in multicolor fluorescence spectroscopy applications such as in flow cytometry.” EX2043 at [0002] (emphasis added). The ’5819 provisional further describes that its WDM uses a fluorescence light source and that numerous “fluorescence probes” (e.g., fluorophores) have been developed for use in biomedical studies which are accommodated with different filters. *Id.* at [0016], [0020]. As previously discussed, a POSA would have understood that the laser light sources used in flow cytometers should emit light of a wavelength or color that can excite typical fluorescent probes used in flow cytometry as disclosed in the ’5819 Prov. *See supra* Section II. Fluorescent probes that excite at each of the claimed colors were well-known in 2012, as were lasers emitting corresponding wavelengths to excite those probes. *See* EX1007 at 67-68, 85, 129-137. EX2028, ¶97.

Therefore, a POSA reading the ’5819 Provisional would have understood the inventor had invented a flow cytometer capable of use with a laser of any color for use in multicolor fluorescence flow cytometry. Given the well-known nature of the use of different color lasers for flow cytometers as of 2012, as exemplified by Shapiro, a POSA would have understood that the description of multicolor fluorescence flow cytometry is sufficient to describe the different color lasers

claimed. Petitioner has thus failed to demonstrate PGR-eligibility based on claims 6 and 22 of the '107 patent. EX2028, ¶98.

Thus, because the '107 patent is not available for PGR review, this proceeding should not be instituted.

X. Institution Should Be Denied Because Petitioner Has Failed to Demonstrate a Reasonable Likelihood that the Challenged Claims Are Invalid Under § 112 or Obvious

The Petition fails to establish a reasonable likelihood that the Petitioner will prevail on at least one of the challenged claims. Petitioner fails to show the claims are invalid for at least three reasons. *First*, Petitioner fails to show a lack of written description or enablement. *Second*, Petitioner has failed to show that the references cited in either Ground of the Petition disclose or render obvious a WDM for a flow cytometer as required by all claims. *Third*, Petitioner has failed to show that a POSA would view Goodman as analogous art to the claimed inventions or would combine Goodman and Chandler/Oostman, and instead asserts motivations for combining the prior art references that are based on hindsight and ignore the disclosures of the references themselves. *Fourth*, Petitioner fails to demonstrate a reasonable expectation of success in combining these disparate references. *Fifth*, Petitioner's secondary obviousness Grounds utilizing Hamamatsu do not cure the deficiencies of its primary Grounds. EX2028, ¶99.

A. The Petition Fails To Demonstrate a Lack of Written Description or Enablement of the Challenged Claims

1. The Challenged Claims Have Written Description Support for the Claimed “WDM” (Ground 1)

Petitioner alleges that the Challenged Claims lack written description support for the recited “wavelength division multiplexer” because the ’107 patent does not claim a “‘collimating optical element’ that projects a collimated beam” that is purportedly described in the specification as an essential element. Pet. at 19-20 (citing *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479-80) (Fed. Cir. 1998). Petitioner’s argument fails because Petitioner misunderstands the written description requirement and further ignores key statements from the specification.

Petitioner relies on *Gentry Gallery* to argue the challenged claims improperly “omit an element that is essential to the invention as described in the specification.” Pet. at 19-20. *Gentry Gallery* does not support Petitioner’s position. The Federal Circuit has made clear that “in *Gentry Gallery*, we did not announce a new ‘essential element’ test mandating an inquiry into what an inventor considers to be essential to his invention and requiring that the claims require those elements.” *Carnegie Mellon Univ. v. Hoffman-La Roche Inc.*, 541 F.3d 1115, 1127 (Fed. Cir. 2008) (internal quotations omitted). *Gentry Gallery* is also inapposite because it is simply directed to whether the original disclosure sufficiently supports the specification. *See Reiffin*

v. Microsoft Corp., 214 F.3d 1342, 1346 (Fed. Cir. 2000) (“The ‘original disclosure’ reference [in *Gentry Gallery*] simply recognized that the sufficiency [of a disclosure] under § 112, first paragraph must be judged as of its filing date.”) (alteration in original) (internal quotations omitted).⁵ As discussed below, the specification clearly supports the claimed WDM. “It is common, and often permissible, for particular claims to pick out a subset of the full range of described features, omitting others.” *Scriptpro, LLC v. Innovation Assocs., Inc.*, 762 F.3d 1355, 1359 (Fed. Cir. 2014) (collecting cases). Indeed, “[a] specification can adequately communicate to a skilled artisan that the patentee invented not just the combination of all identified features but combinations of only some of those features (subcombinations)—which may achieve stated purposes even without omitted features.” *Id.*

The inventions described in the ’107 patent relate to the WDM and the underlying relay architecture, which is what the ’107 Patent claims in the context of a flow cytometer. Collimating optical elements, including collimating optical

⁵ Though the specification itself clearly supports the claimed WDM as discussed *infra*, the ’107 patent’s issued claims are identical to its original claims and form part of the written description. Petitioner’s Ground fails for this additional reason.

elements positioned between an optical fiber and detection subsystem, were well-known by POSAs before the inventions of the '107 Patent (such as those described in, *e.g.*, Oostman). EX2005 at 7:37-42; EX2028, ¶101. “It is well established that ‘it is not necessary to claim in a patent every device required to enable the invention to be used.’” *Asyst Techs., Inc. v. Empak, Inc.*, 268 F.3d 1364, 1371 (Fed. Cir. 2001) (quoting *Hughes Aircraft Co. v. United States*, 640 F.2d 1193, 1197 (Ct. Cl. 1980)). Here, sufficient structure of the WDM is recited so that the claimed invention can achieve its purpose of maintaining the beam diameter and focusing it down to a small spot size.⁶ EX2028, ¶¶101-103

Petitioner incorrectly appears to argue that the claimed WDM requires “use of a ‘collimating optical element’ that projects a ‘collimated beam’ *throughout* a cascaded unit-magnification image relay architecture.” Pet. at 20 (emphasis added). But the specification expressly describes embodiments where the collimating optical element is optional, stating that in “an *exemplary embodiment*, a wavelength

⁶ Petitioner’s references to earlier applications in the priority chain reciting “collimating optical element” (Pet. at 25-26) is irrelevant, as the operative issue is what the patent’s written description discloses, not what claims Applicant had previously pursued.

division multiplexer ('WDM') *may* include at least two optical elements” (a collimating optical element and a relay element) and that “it is apparent to those skilled in the art that other types of refractive and/or reflective optical components may also be used to achieve the same design goal.” EX1001, 4:46-48, 5:8-10⁷. Furthermore, the specification supports both a WDM with a collimated beam path and an image relay beam path where light need not be collimated throughout (*e.g.*, can be focused). EX2028, ¶101. For example, the specification describes an embodiment of the WDM using a concave lens in a “cascaded unit-magnification image relay architecture,” (EX1001 at 4:62-63) and an embodiment that “comprises an imaging optical arrangement” (*id.* at 8:28-29), both of which a POSA would understand includes light that can be focused and thus does not require a collimated

⁷ The '5819 Prov. similarly does not describe the collimating optical element as essential. *See, e.g.*, EX2043, [0007] (“A device in accordance with the present invention, *generally* includes at least two optical elements.”); [0008] (“In one exemplary embodiment of the present invention, the said first optical element is a lens and the said second element is a concave mirror, although it is apparent to those skilled in the art that other types of refractive and/or reflective optical components may also be used to achieve the same design goal.”); EX2028, ¶101 n.4.

beam throughout. EX2028, ¶101. Additionally, most challenged claims require concave mirrors that, by virtue of their positive optical power, can take a diverging light beam and collimate it, or focus it. *See, e.g.*, EX1001, cls. 5, 16, 46:49-54; EX2028, ¶101. Thus, Petitioner is incorrect that the specification is limited to a light beam that is collimated throughout the WDM such that a “collimating optical element” that projects a “collimated beam” is required by the claimed WDM.

Petitioner identifies a statement in the specification that “efficient color separation can only be accomplished economically with [a] collimated light beam,” Pet. at 25 (citing EX1001, 44:33-53). But this statement is made in the context of the prior art and describing the problem the ’107 solves, not a limitation that must be met by the invention. EX2028, ¶103. Notwithstanding this, at most, accomplishing separation “*economically*” is not a claimed element and only indicates that a collimating optical element is “optional, though desirable, feature” of a WDM, which is not sufficient to invalidate the Challenged Claims. *Scriptpro*, 762 F.3d at 1360; EX2028, ¶103.

Thus, Petitioner fails to show the claims lack written description support for the claimed “WDM.”

2. The Challenged Claims Enable the Claimed “WDM” (Ground 2)

Petitioner's arguments that the claimed "WDM" is not fully enabled (Pet. at 26-29) is based on fundamental misunderstandings of fact and law.

First, Petitioner is incorrect that "[t]he breadth of the claims would extend to, and thus require enablement for, WDM embodiments, in any conceivable configuration." Pet. at 27. Rather, the specification need only enable a POSA to understand and practice operative embodiments within the scope of the claims, which Petitioner has not disputed. "It is not a function of the claims to specifically exclude ... possible inoperative [combinations]." *Atlas Powder Co. v. E.I. du Pont De Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984) (citation omitted); *see also id.* ("Even if some of the claimed combinations were inoperative, the claims are not necessarily invalid."). Enablement is satisfied "if the necessary information to limit the claims to operative embodiments is known to a person of ordinary skill in the art." *Crown Operation*, 289 F.3d at 1380 (discussing *In re Cook*, 439 F.3d 730, 735 (C.C.P.A. 1971)).

Second, a POSA under Petitioner's proposed definition has optics expertise and experience with designing optical systems such as flow cytometers and is thus well-equipped to make and use a WDM in a flow cytometer in accordance with the '107 patent without undue experimentation. *See Cephalon, Inc. v. Watson Pharms., Inc.*, 707 F.3d 1330, 1336 (Fed. Cir. 2013) ("[A] reasonable amount of routine

experimentation required to practice a claimed invention does not violate the enablement requirement.”); *In re Wands*, 858 F.3d 731, 737 (Fed. Cir. 1988) (“The key word is ‘undue,’ not ‘experimentation.’”). A POSA would understand how to properly position filters, mirrors, and lenses to account for the different light beams that can travel through the WDM as described in the specification while achieving the goal of maintaining the beam diameter. EX2028, ¶¶104-106; *see also supra* Section X.A.1, EX2028, ¶¶101-103. Petitioner argues that a POSA would have had challenges in such cases with “demultiplexing and processing of sufficient signal strength to overcome known technical signal-to-noise issues with APDs” (Pet. at 28), but this argument only suggests challenges in making a flow cytometer commercially optimized. EX2028, ¶106. Enablement does not require a POSA “make and use a perfected, commercially viable embodiment absent a claim limitation to that effect.” *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003).

Third, as Petitioner implicitly acknowledges (Pet. at 28), the ’107 patent provides exemplary working examples utilizing a collimating optical element such as a collimating lens, as discussed in the prior Section. EX2028, ¶¶104-106. The ’107 patent also describes exemplary embodiments where an optical element between the optical fiber and filter does not necessarily produce a collimated beam.

See EX1001, 57:10-59:2 (discussing an “imaging optical arrangement 902” only discussing in one section a “hypothetical case” where the “optical element produces a collimated beam”).⁸ EX2028, ¶104-106.

Fourth, Petitioner makes no substantive arguments as to predictability and amount of experimentation. Instead, Petitioner relies on expert say-so to state, in conclusory fashion, that alleged lack of teaching or working examples means “a POSA would have had to engage in excessive experimentation to practice the full scope to the claimed WDM.” Pet. at 28. But as discussed above, a POSA would be well-equipped to predictably identify and practice operative embodiments within the scope of the claims. EX2028, ¶106.

Thus, Petitioner fails to show the claims lack enablement for the claimed “WDM.” EX2028, ¶107.

3. Claims 1-3 and 5-14 Have Written Description Support and Enablement for an “Optical Fiber” (Grounds 3 and 4)

Petitioner’s Grounds 3 and 4 are premised entirely on the assumption that a POSA would understand claim 1’s recitation of “an optical fiber” for a “flow

⁸ Petitioner argues that this section still refers only to a collimating optical element (Pet. at 25 n.2), but the specification expressly describes the element more broadly than that. *See, e.g.*, EX1001, 57:10-59:2; EX2028, ¶105.

cytometer” as encompassing a single-mode fiber in a flow cytometer. Petitioners argue that because a single-mode fiber would not work in a flow cytometer, these claims lack written description support and enablement. This argument is blatantly incorrect, as even the Petition and Petitioner’s own expert acknowledge. *See* Pet. at 30 (“A POSA would therefore have understood all references to ‘optical fibers’ in the specification to comprise a multimode optical fiber and as teaching away from using a single-mode optical fiber within the claimed WDM.”); *see also* EX1002, ¶117.

A POSA would have understood that the claimed “optical fiber” is a multimode fiber. The specification makes clear that flow cytometers, in contrast to optical communications systems, use large core optical fibers, which are necessarily multimode. EX2028, ¶109. The ’107 Patent explains that a key distinction between flow cytometers or other fluorescence detection instruments and optical communications systems is that “the practical size of the pinhole or the core diameter of the multimode optical fiber is measured in millimeters, in contrast to the diameter of single mode optical fibers that are measured in micrometers.” EX1001 at 44:63-66; *see also id.* at 44:33-39.

Petitioner and Petitioner’s expert each recognize that flow cytometer systems were well-known by POSAs to utilize exclusively multimode optical fibers. *See* Pet.

at 31; EX1002, ¶124; *see also supra* Section II. Indeed, Petitioner and its expert both assert that “[a] POSA would therefore have understood all references to ‘optical fibers’ in the specification to comprise a multimode optical fiber and as teaching away from using a single-mode optical fiber with the claimed WDM.” Pet. at 30; EX1002, ¶117 (“A POSA would have recognized that all references to ‘optical fiber 852’ in the disclosed embodiments refer to a multimode optical fiber, as the ’107 written description refers to optical fiber 582 as an example of a multimode optical fiber that is also an extended light source.”). Thus, both Petitioner and its expert acknowledged that “optical fiber” and “multimode optical fiber” in the specification refer to the same multimode optical fiber. EX2028, ¶¶110-111.

Despite the clear import of the specification and state of the art that an “optical fiber” for a flow cytometer is multimode, Petitioner alleges that a POSA reading the same “optical fiber” term in claim 1 would view the term as encompassing a single-mode fiber, simply because a separate independent claim with multiple separate limitations recites “a multimode optical fiber configured to receive light from the flow cell.” EX1001, cl. 16. This claim differentiation argument is misplaced.

The doctrine of claim differentiation “is not a hard and fast rule, but instead ‘a rule of thumb that does not trump the clear import of the specification.’” *Starhome GmbH v. AT & T Mobility LLC*, 743 F.3d 849, 858 (Fed. Cir. 2014) (quoting *Edwards*

Lifesciences LLC v. Cook Inc., 582 F.3d 1322, 1332 (Fed. Cir. 2009). A claim drafter is allowed to “find[] different expressions to define the same invention,” and “the presumption of different claim scope is overcome by a contrary construction dictated by the written description.” *World Class Tech. Corp. v. Ormco Corp.*, 769 F.3d 1120, 1126 (Fed. Cir. 2014) (internal citations omitted). In the context of two claims not sharing a dependency relationship, the Federal Circuit has “characterized claim differentiation more generally, i.e., as the presumption that each claim in a patent has a different scope.” *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380 (Fed. Cir. 2006) (quoting *Versa Corp. v. Ag-Bag Int’l Ltd.*, 392 F.3d 1325, 1330 (Fed. Cir. 2004)). The Federal Circuit has also confirmed that “[i]t is not unusual that separate claims may define the invention using different terminology, especially where (as here) independent claims are involved.” *Hormone Research Found. v. Genentech, Inc.*, 904 F.2d 1558, 1567 n. 15 (Fed. Cir. 1990); *see also Curtiss-Wright*, 438 F.3d at 1381 (“In this context [of two independent claims], this court has cautioned that ‘[c]laim differentiation is a guide, not a rigid rule.’”) (quoting *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991)); *Clare v. Chrysler Grp. LLC*, 819 F.3d 1323, 1331 (Fed. Cir. 2006) (“We therefore agree with the district court that the limitations without the ‘substantially’ modifier do not require that the inventive pickup truck appear identical to a conventional

pickup truck, and that a person of ordinary skill in the art would understand that the two sets of limitations [with and without a ‘substantially’ modifier] have the same meaning.”).

Here, as discussed above, Petitioner and its expert repeatedly emphasize that a POSA reading the specification would understand that the “’107 written description teaches away from using a single-mode optical fiber with the disclosed WDMs,” Pet. at 30, EX1002, ¶121, and that any references to “optical fiber” in the written description necessarily mean “multimode optical fiber,” Pet. at 30, EX1002, ¶117. Applying claim differentiation to find otherwise would be “problematic” in view of these clear specification statements.⁹ *Clare*, 819 F.3d at 1330. And as

⁹ The ’5819 Prov. similarly contains statements making clear that the only optical fiber to be used in a flow cytometer of the inventions is a multimode flow cytometer. *See, e.g.*, EX2043 at [0016] (“Note that the practical size of the said pinhole or the core diameter of the said multimode optical fiber is measured in millimeter, in contrast to the diameter of single mode optical fiber measured in micrometer. Consequently, the etendue of the fluorescence light source, difined [sic] as the product of beam size and its divergence angle, is hundreds of times greater than its counterpart in optical communication.”); EX2028, ¶111 n.6.

discussed above, in the context of two independent claims, claim differentiation only “presume[es] that each claim in a patent has a different scope.” *Curtiss-Wright*, 438 F.3d at 1380. That presumption is easily fulfilled here: for example, claim 16 recites “a plurality” of mirrors, filters, and APDs, whereas claim 1 is directed to an “array” of these elements. EX2028, ¶112.

Petitioner’s Grounds 3 and 4 are entirely premised on “optical fiber” in claim 1 covering a single-mode optical fiber. Petitioner does not argue that “optical fiber” as properly understood to solely cover a multimode fiber is invalid under section 112. As claim 1 does not encompass single-mode fibers, Petitioner’s Grounds 3 and 4 both fail.

4. Claims 9 and 29 Have Written Description Support for “Wherein the WDM is Capable of Detecting a Substantially Full Spectrum of Visible Light” (Ground 5)

Petitioner argues claims 9 and 29, which recite a “WDM ... capable of detecting a substantially full spectrum of visible light,” lacks written description support because the specification does not explicitly discuss spectral flow cytometry (as opposed to conventional flow cytometry) and well-known algorithms used in spectral flow cytometry. Pet. at 34-38 (stating, e.g., that “spectral flow cytometers deconvolute to ‘unmix’ the fluorochrome signals that overlap across the spectrum using sophisticated computer algorithms” whereas the ’107 patent describes

“emission peak wavelength analysis performed as part of conventional flow cytometry”). But the correct inquiry is whether the specification demonstrates the inventor was in possession of the claimed subject matter, *see, e.g., Ariad*, 598 F.3d at 1349; **not** whether the specification specifically describes computer programs or other components used in certain “spectral flow cytometry” applications after detection has taken place. The specification demonstrates this possession, and Petitioner’s Ground fails as a result.¹⁰ EX2028, ¶113.

First, Petitioner contends the ’107 patent must disclose an unclaimed feature. Spectral flow cytometry involves two components: (1) flow cytometry hardware – e.g., including an optical subsystem (such as a WDM) that is used to detect light; and (2) software – e.g., computer algorithms well-known in the art to process the detected light and unmix fluorochrome signals. *See* EX2053 at 162. The ’107 Patent

¹⁰ As with prior Grounds, claims 9 and 29 are original claims that further provide written description support as of the ’107 patent’s filing date. *See supra* Section X.A.1.

only claims the former. The '107 patent describes and enables¹¹ this optical subsystem by describing (1) a way to control beam diameter over a longer optical path, allowing for more detector channels, and (2) how to utilize APDs, which have better detection than PMTs in the red (and near-infrared) wavelengths. EX1001,

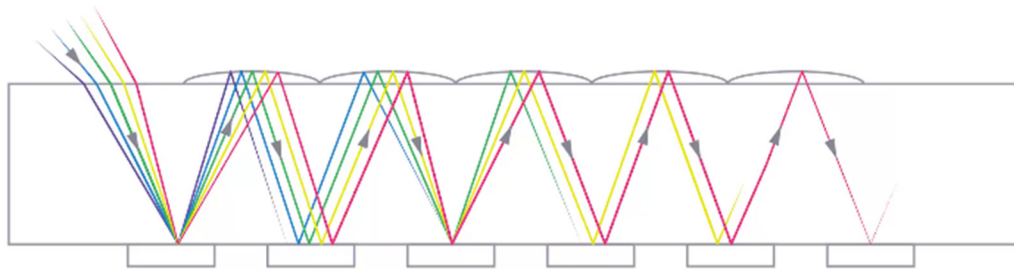
¹¹ Petitioner confuses requirements for written description and enablement, arguing that the '107 patent lacks written description because it purportedly does not “describe how the claimed WDM (and its detectors) would enable SFC.” Pet. at 37. Regardless, the specification does enable claims 9 and 29 as discussed in the next Section.

2:36-39, 43:62-67, 45:45-48, 46:7-12, 58:30-40; EX2028, ¶114.¹² These innovations are applicable to both spectral and “conventional” flow cytometry systems, and claims 9 and 29 are similarly applicable to both systems. The claims are not directed to algorithms for spectral flow cytometry or any other flow cytometry application, and there is no requirement for the specification to recite such algorithms.

Second, Petitioner’s argument that the innovations described in the ’107 patent could not be used in spectral flow cytometry is blatantly false. Petitioner

¹² The ’5819 Prov. contains similar teachings evidencing possession as of October 18, 2012. *See, e.g.*, EX2043 at [0004] (Noting that PMTs have “poorer quantum efficiency and less reproducible spectral response than silicon based semiconductor detectors [e.g., APDs], particularly in the biologically important red to near infrared spectral region.”); [0007] (“The cascaded unit-magnification image relay architecture of the present invention provides a means to greatly extend the collimated optical path length without large beam expansion.”); [0016] (“As shown in [FIG. 1], due to the 1:1 imaging architecture of the present invention, the focal spots produced by focusing lenses 6, 8, 18, 19, 20 and 21 are all smaller than the source, therefore can be easily captured by small area APDs.”); EX2028, ¶114 n.7.

implies that spectral flow cytometry can only be practiced “us[ing] a light dispersing element (e.g., grating or prism instead of WDM) to disperse the fluorescent light into different wavelength bands, which is absent in the ’107 claims and written description’s WDM disclosures.” Pet. at 36. However, the ’107 patent describes a method to capture a substantially full spectrum of visible light using its mirror:filter relay, and Petitioner’s *own product* utilizes a WDM with these same components and configuration to do the same thing:



Proprietary high sensitivity Spectrum Profile Detection Modules enable more efficient spectrum capture for dyes emitting in the 365-829 nm range. Full Spectrum Profiling™ (FSP®) technology captures the full emission signature of every fluorochrome, unlocking its complete expression across the entire light spectrum.

EX2054; EX2028, ¶115. According to Petitioner, this configuration “captures the full emission signature of every fluorochrome, unlocking its complete expression *across the entire light spectrum.*” *Id.* EX2054; EX2028, ¶115. That certain prior

art systems utilized light-dispersing elements to capture a substantially full spectrum of visible light is irrelevant to whether the inventions in the '107 patent also describe a configuration that does the same.

Third, Petitioner next argues that since the specification describes optional embodiments with replaceable dichroic filters, its disclosure is necessarily limited to non-spectral flow cytometers (Pet. at 37-38). Petitioner similarly cites to discussion elsewhere in the specification regarding emission peak wavelength analysis typically used in “conventional” flow cytometry. *Id.* But discussion of optional embodiments utilizing replaceable dichroic filters or certain computational methods elsewhere in the specification is far short of a disclaimer that would limit claim scope, nor does Petitioner suggest disclaimer.

Finally, Petitioner implies that the timing of commercial sale of Patent Owner’s spectral flow cytometry add-on module somehow evidences lack of written description support in the '107 patent’s specification, but this is completely disconnected from any factual or legal basis. On the facts, Petitioner provides no assessment of whether the timing of commercial products was related to technical versus commercial/market-based reasons, nor do they describe any specific features of the system’s WDM hardware not described in the '107 patent but needed for operation. And on the law, Petitioner cites no caselaw suggesting that a commercial

embodiment of one specific embodiment within the scope of a claim—or even any actual embodiment—is in any way required, or even relevant, to written description. *C.f., Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1352 (“We have made clear that the written description requirement does not demand either examples or an actual reduction to practice....”).

Petitioner has thus failed to show the claims lack written description support for a “WDM [that] is capable of detecting a substantially full spectrum of visible light.” EX2028, ¶116.

5. Claims 9 and 29 Are Enabled (Ground 6)

Petitioner’s Ground regarding claims 9 and 29’s recitation of a WDM “capable of detecting a substantially full spectrum of visible light” is similarly based on a misunderstanding of the enablement requirement and is devoid of substantive analysis.

First, claims 9 and 29 recite a WDM “capable of detecting a substantially full spectrum of visible light,” and this is the claim scope which the specification must enable. Within this scope, the specification does provide clear guidance and working examples. For example, the ’107 patent’s mirror:filter relay architecture controls beam diameter over a longer distance from prior art fluorescence detection systems, which allows light to be relayed through multiple filters to detect light across many

channels. *See, e.g.*, EX1001, 2:36-39, 45:45-48, 46:7-12, 58:30-40; EX2028, ¶118. Additionally, the '107 patent's WDM describes how to efficiently utilize low-noise APDs, which as even Petitioner acknowledges has stronger sensitivity to light in the red (and near-infrared) region. Pet. at 11; EX1001, 43:62-67. Each of these features taught in the specification provide guidance to a POSA seeking to detect a substantially full spectrum of visible light.

Second, Petitioner's *sole* argument regarding state of the art, level of a POSA, predictability, and amount of experimentation relates to which companies commercialized spectral flow cytometers and when. Pet. at 39-40. As previously discussed, commercial considerations are irrelevant to the question of enablement absent claim limitations requiring them. *See supra* Section X.A.2; *CFMT*, 349 F.3d at 1338 (enablement does not require a POSA "make and use a perfected, commercially viable embodiment absent a claim limitation to that effect"). But regardless, a POSA would predictably be able to practice a flow cytometer with a WDM capable of detecting a substantially full spectrum of visible light utilizing the '107 patent's teachings by increasing the number of channels and filters so as to separate the light into color bands covering the visible light spectrum. EX2028, ¶118; EX1001, 2:36-39, 45:45-48, 46:7-12, 58:30-40. Even Petitioner recognizes this fact in their obviousness Grounds, as they allege that a combination purportedly

encompassing all limitations of the Challenged Claims “includes sufficient scalability to accommodate an array of demultiplexing channels and corresponding APDs that can demultiplex light across substantially the full visible light spectrum.” Pet. at 70.

Thus, Petitioner fails to show the claims lack enablement for a “WDM [that] is capable of detecting a substantially full spectrum of visible light.” EX2028, ¶119.

6. Claim 30 Has Written Description Support (Ground 7)

Petitioner’s Ground 7 argues that claim 30 lacks written description support because “it recites ‘the plurality of mirrors comprise five *or more* mirrors; and the plurality of filters comprise six *or more* filters.’” Pet. at 40 (emphasis in original). According to Petitioner, “a POSA at the time of the invention would not have recognized the inventor to possess an operable version of the claimed WDM with hundreds or thousands of mirrors and filters.” *Id.* However, Petitioner misunderstands the written description requirement, and this Ground fails as a result.

The Federal Circuit has made clear that “[o]pen-ended claims are not inherently improper; as for all claims their appropriateness depends on the particular facts of the invention, the disclosure, and the prior art.” *Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1376–77 (Fed. Cir. 2007) (citing *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1572 (Fed. Cir. 1991)). Such

claims “may be supported if there is an inherent, albeit not precisely known, upper limit and the specification enables one of skill in the art to approach that limit.” *Id.*

Here, as Petitioner themselves argues, a POSA would understand “there is an inherent, albeit not precisely known, upper limit” on the number of channels (with corresponding mirrors and filters) that could be used in a WDM. Pet. at 40-41. First, a POSA would understand practical limits such as “photon loss” with any beam of light traveling long distances, as Petitioner itself describes. *Id.* Further, as a practical matter, a flow cytometer has an inherent maximum number of channels that have value in separating color bands, which is limited by the emission range of fluorophores typically used in flow cytometry. Fluorophores useful for flow cytometry have broad emission ranges from ultraviolet to near-infrared, but even with separating bands of light by 20-nanometer wavelength ranges results in at most tens of channels, not “hundreds or thousands” of channels as Petitioner discusses. EX2028, ¶122.

Petitioner provides no argument for why the inventions disclosed in the ’107 patent would not “enable[] one of skill in the art to approach” a limit in the tens of channels, *see Andersen*, 474 F.3d at 1376–77, and their Ground fails for this reason alone. Regardless, the specification does enable one of ordinary skill in the art to construct a WDM approaching this limit. As the specification states, the ’107

patent's 1:1 image relay configuration utilizing, e.g., concave mirrors with positive optical power prevents the beam from diverging over long distances such that light can be relayed through many channels. *See, e.g.*, EX1001, 2:36-39, 45:45-48, 46:7-12, 58:30-40.¹³

Because Petitioner's argument is based on an incorrect understanding of the written description requirement and is factually incorrect, Petitioner fails to show claim 30 lacks written description support.

¹³ The '5819 Prov. contains similar teachings evidencing possession as of October 18, 2012. *See, e.g.*, EX2043 at [0007] ("The cascaded unit-magnification image relay architecture of the present invention provides a means to greatly extend the collimated optical path length without large beam expansion."); [0016] ("As shown in [FIG. 1], due to the 1:1 imaging architecture of the present invention, the focal spots produced by focusing lenses 6, 8, 18, 19, 20 and 21 are all smaller than the source, therefore can be easily captured by small area APDs."); EX2028, ¶122 n.8.

B. The Petition Fails to Demonstrate Obviousness of the Challenged Claims (Grounds 8-11)

1. No Ground Discloses All of the Challenged Claim Limitations

- i. Petitioner Fails to Demonstrate that Chandler and Goodman Disclose “a wavelength division multiplexer (WDM)” for “[a] flow cytometer” (Grounds 8 and 9)*

All of the challenged claims require a “wavelength division multiplexer” for use in “a flow cytometer.” See EX1001, cls. 1, 16; EX2028, ¶124. Petitioner relies on Chandler’s FADC unit as purportedly disclosing a WDM (Pet. at 52-53, 80), but based on Petitioner’s own characterization, Chandler actually teaches away from using a WDM. Petitioner states, “A POSA would have known that a ‘wavelength division [de]multiplexer’ or ‘WDM’ refers to the optical components that demultiplex light into [] color bands. ... WDMs accomplish spectral separation through the use of filters, mirrors, and lenses to separate light into color bands and focus those color bands into photodetectors.” *Id.* at 8. By contrast, Chandler’s FADC units split a beam of fluorescent light into three separate fibers and directs the light in each fiber through a *different* wavelength-specific bandpass filter. EX2028, ¶126. For example, rather than directing all light having a wavelength of 650 nm to the 650 nm band-pass filter, Chandler’s system splits all wavelengths of light into three separate fibers and then passes each beam through one of three different bandpass filters, EX1051, 7:35-54, which divides the signal for each channel in the

FADC. EX2028, ¶¶61-62, 126. Chandler teaches that its approach is sufficient and preferable for its system. EX1051, 11:38-50. In fact, Chandler acknowledges but teaches against using a “beam splitter approach” (i.e., a WDM as characterized by Petitioner) because it “generally increases the size and manufacturing complexity, in contrast to the simpler and/or more compact and/or less expensive optical detector/multi-mode fiber optic cable approach.” EX1051, 11:38-50; EX2028, ¶¶126-127. Thus, Petitioner fails to show that Chandler discloses a WDM.

Petitioner proposes incorporating Goodman’s demultiplexing configuration into Chandler’s system by “replac[ing] Chandler’s branched FADC unit(s)” to render obvious a “WDM” for a “flow cytometer.” Pet. at 52-53. As explained in detail below, a POSA would not have been motivated to replace the fluorescence detectors from Chandler with Goodman’s demultiplexing device because of the fundamental differences between detecting light for optical communications and detecting scattered fluorescent light in a particle analyzer. *See infra* Section X.B.2, X.B.3, X.B.4; EX2028, ¶¶128-130, 132-153. Petitioner also fails to recognize that a POSA would neither view Goodman as analogous art to the claimed inventions nor combine Goodman and Chandler. *See infra* Section X.B.3; EX2028, ¶¶154-158. Petitioner’s motivations for combining the prior art references are based on hindsight and ignore the disclosures of the references themselves. EX2028, ¶130.

Petitioner's combination thus fails to disclose or render obvious a WDM for a flow cytometer. EX2028, ¶131. Institution should therefore be denied. *See, e.g., Liberty Energy Inc. v. U.S. Well Services, LLC*, IPR2025-00066, Paper 10 at 19 (PTAB Apr. 29, 2025) (denying institution because Petitioner failed to establish why a POSA would have combined prior art references that use their components for “different types of devices” and “are designed for different purposes”); *R.J. Reynolds Vapor Co. v. Philip Morris Prods. S.A.*, IPR2021-00826, Paper 11 at 15 (PTAB Nov. 9, 2021) (“Petitioner’s rationale for combining Alarcon and Rabin does not account adequately for these fundamental differences between Alarcon’s electronic cigarette and Rabin’s capillary force vaporizer.”).

ii. Petitioner Fails to Demonstrate that Oostman, Goodman, and Frazier Disclose “a wavelength division multiplexer (WDM)” for “[a] flow cytometer” (Grounds 10 and 11)

To argue that a “wavelength division multiplexer” for use in “a flow cytometer” is disclosed in Oostman with Goodman and Frazier (Grounds 10 and 11), Petitioner’s combination proposes incorporating Goodman’s demultiplexing device into Oostman’s flow cytometer. Pet. at 86-87. This combination ignores that a POSA would not have been motivated to replace the detection module of Oostman with Goodman’s demultiplexing device because of the fundamental differences

between detecting light for optical communications and detecting scattered fluorescent light in flow cytometry. *See infra* Section X.B.2; EX2028, ¶¶131.

Petitioner's combination thus fails to render obvious a WDM for a flow cytometer. EX2028, ¶104. Institution should therefore be denied. *See, e.g., Liberty Energy*, IPR2025-00066, Paper 10 at 19; *R.J. Reynolds Vapor*, IPR2021-00826, Paper 11 at 15.

2. A POSA Would Not Have Looked to a Reference from Optical Communications to Solve Problems in Flow Cytometry

Petitioner fails to establish why a POSA would have been motivated to combine the prior art references to arrive at the claimed WDM for a flow cytometer. The fields of optical communications and flow cytometry faced entirely different problems. EX2028, ¶133. The light detection system built for Goodman was in a different type of device, it was designed for a different purpose, and it addressed

different problems than the light detection systems in Chandler and Oostman.¹⁴ *Id.* at ¶¶132-140. Petitioner fails to account for these differences and explain why a POSA would have been motivated to combine these references to arrive at the claimed wavelength division multiplexer (WDM) for a flow cytometer. *Id.* at ¶141.

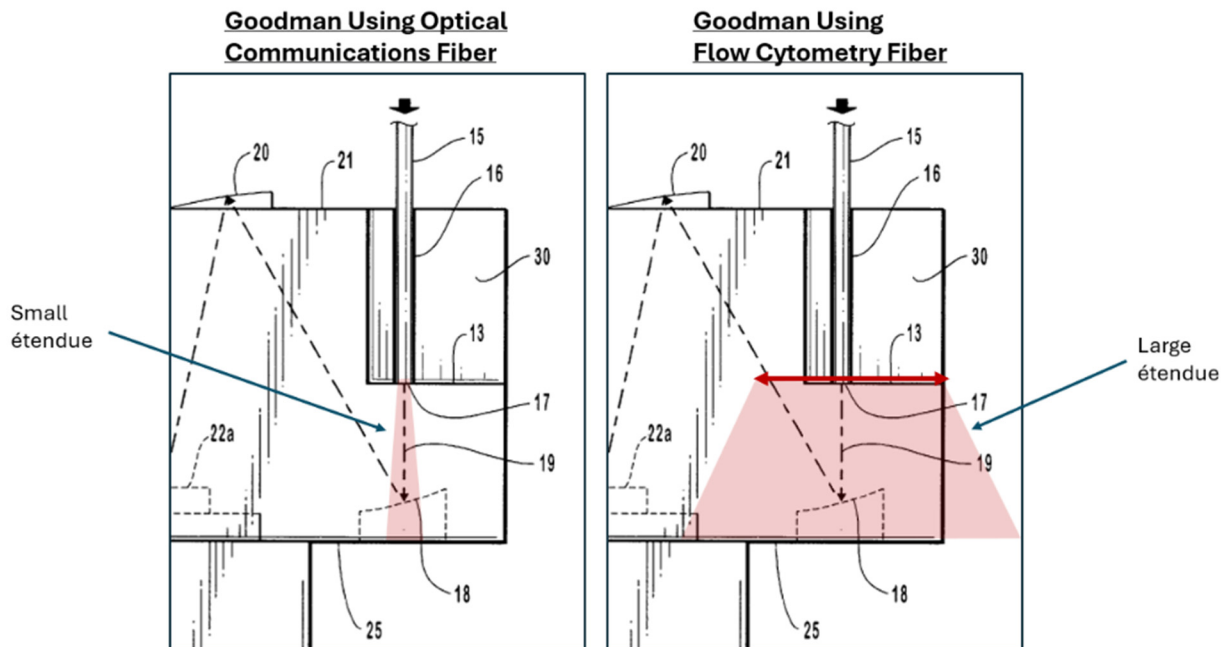
One fundamental difference between an optical communications system and the devices of Oostman and Chandler is how light propagates in the systems. Optical communications systems, like Goodman, detect intense light at narrow infrared wavelength ranges with light beams having a small diameter. *See* EX1016, 5:42-47, 2:20-29; EX2036 at 1080 (discussing how “narrow spectral widths” are “critical for the efficient operation of 1.3 and 1.55 μm wavelength-division-multiplexed (WDM) optical communications systems”). In contrast, fluorescence detection systems such as those disclosed in Chandler and Oostman needed to detect a wide range of

¹⁴ Chandler’s specific disclosure is best characterized as a particle analyzer, which utilizes microspheres and operates at higher fluorescence intensity than continuous flow cytometers such as in Oostman, *see, e.g.*, EX1001, 47:22-26, but these fluorescence levels are still far lower than the light detected in side scatter, forward scatter, or signals in optical communications, and the fluorescent light in Chandler is still collected into a large core optical fiber. EX2028, ¶138.

wavelengths of unknown and uncontrolled signal strength in the visible light spectrum. *See* EX1016, 2:20-64; EX1007 at 67, 151. Thus, even if a POSA were motivated to improve or modify Chandler or Oostman, they would not have considered doing so by integrating Goodman's light detection device because of the significant differences in the light propagation between the two systems. EX2028, ¶¶132-140.

The significant differences in the light that travels through, and is ultimately detected by, the two different systems in Chandler/Oostman and Goodman demonstrates the incompatibility and inoperability of Petitioner's combination. For example, the imaging optical element 18 (e.g., imaging mirror) in Goodman's demultiplexing device is not configured to receive light from a optical fiber as would be used in Chandler or Oostman (which as discussed in the background are large core optical fibers), but instead from an optical communications optical fiber that is at least ten times smaller in diameter than the optical fibers used in Chandler or Oostman. EX1016, 7:17-30. Goodman's imaging optical element 18, as designed for optical communications, would thus fail to reflect the majority of the light coming from a flow cytometer or particle analyzer optical fiber because of the significantly larger etendue or spread of the light emerging from such as fiber optic.

See supra Section II.C.1; EX2028, ¶142. The differences in the light path are illustrated below:



EX1016 at FIG. 1 (annotated); EX2028, ¶142. The only way to make Goodman partially workable would be to reduce the distance from the fiber 15 to the imaging optical element 18. EX2028, ¶142. However, the necessary distance would be so small that the light reflected by the mirror would not clear the fiber coupling 30 to reach mirror 20 and would severely limit Chandler's and Oostman's ability to detect

fluorescent light.¹⁵ *Id.*; see *Deere & Co. v. David's Sozer V-Lov System, Inc.*, IPR2024-01442, Paper 10 at 40 (PTAB Mar. 18, 2025) (“[W]here a prior art reference’s modification—in order to satisfy the claim language—would render ‘inoperable for its intended purpose,’ the reference ‘teaches away from the ... proposed modification.’”) (quoting *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984)); see also EX2028, ¶¶141-142.

Petitioner does not address these fundamental incompatibilities. Instead, Petitioner asserts without evidence that a POSA would have identified numerous deficiencies in Chandler and Oostman. For Chandler, Petitioner contends a POSA would have “naturally have consulted alternate WDM arrangements.” Pet. at 47-48. For Oostman, Petitioner states a POSA “would have predictably” substituted “Oostman’s detector array cluster arrangements with Goodman’s ... demultiplexers.” Pet. at 86. Yet in the nearly ten years since Goodman, Chandler, and Oostman published, there is no art identified by Petitioner combining these

¹⁵ Conversely, Goodman’s optical communications optical fiber, being significantly smaller than that typically used in flow cytometry, would fail to transmit much of the fluorescent light. See *supra* Section II.C.1; EX2028, ¶142.

disclosures or suggesting to do so until the inventions of the '107 patent.¹⁶ EX2028, ¶¶144-149.

Petitioner, seeking to minimize the differences between these fields, alleges that Goodman is in the same field as the alleged inventions by being broadly “related to fiber optics” (or “optical fibers”) and “modular optical instruments for color separation and detection.” Pet. at 48, 87. But Petitioner’s high-level characterization of the '107 patent’s field being related to “optical instruments” overgeneralizes the field. *See R.J. Reynolds*, IPR2021-00826, Paper 11 at 15 (finding no motivation to combine and noting that Petitioner’s characterization of the field was “overly broad”); *see also* EX2028, ¶145.

In fact, Goodman and Petitioner’s cited references only further support the conclusion that Goodman and other optical communication references are directed to completely different fields with completely different problems than flow cytometry and the '107 patent. Nothing in Goodman implies that its inventions can

¹⁶ The only flow cytometry reference Petitioner identifies as even acknowledging an optical communication device is Frazier, which rejected the teachings in those disclosures because it viewed “prefabricated blocks” as not optimal compared to more “customizable” options. EX1009, 2:9-46; EX2028, ¶144.

or should be used in flow cytometry or any life sciences application. Goodman states its devices “are particularly suited for use in wide wavelength division multiplexing (WDM) systems,” i.e., wavelengths centered at 1310 nm with channel spacing 25 nm apart, far above flow cytometry’s typical visible light wavelength ranges. EX1016, 5:42-47, 2:20-29, EX1001, 57:37-39. Petitioner points to Goodman’s statements that its invention “is easy to incorporate into other optical systems,” (Pet. at 48, 49) (citing EX1016, 3:65-67); however, Goodman already makes clear what optical systems it is referring to: “The scope of applications for WDM devices ranges from spacecraft and aircraft applications to closed circuit and cable television systems.” EX1016, 2:10-13; EX2028, ¶146.

As for flow cytometry/particle analyzer references, Petitioner does not contend that its references contain any suggestion that POSAs would have considered optical communications art as being within the same field or reasonably pertinent to problems in flow cytometry. Indeed, the *only life sciences reference* Petitioner identifies that even mentions art from optical communications is Frazier in Grounds 10 and 11. Pet. at 46-47. However, Frazier merely identifies a single detector array configuration from a patent claiming priority to the 1970s, and then explicitly rejects that reference’s disclosures as *not beneficial* for Frazier’s goals. EX1009, 2:9-46 (discussing and rejecting a reference from optical communications

because its “prefabricated blocks” were not optimal compared to more “customizable” options). EX2028, ¶¶147-148.

Rather than provide support from prior art, Petitioner relies on two statements from the '107 patent itself discussing its inventions. *See* Pet. at 10, 48, 87-88. This is improper, and nevertheless, Petitioner misconstrues the statements in the patent. EX2028, ¶150.

First, Petitioner’s excerpted quote leaves out the specification’s explanation that it is “[a]s *a result*” of the claimed inventions, which allow, e.g., for “extend[ing] the collimated optical path length without large beam expansion,” that “WDM techniques well-established in the optical communication industry can be readily adapted for fluorescence light detection,” EX1001, 4:62-5:5. The fact that techniques from a different field can be adapted “[a]s a result” of the claimed invention simply demonstrates how to now adapt WDMs from a different field using the benefit of the claimed inventions. *See Sci. Plastic Prods., Inc. v. Biotage AB*, 766 F.3d 1355, 1359 (Fed. Cir. 2014) (whether prior art is analogous is analyzed with “the foresight of a person of ordinary skill, not with the hindsight of the inventor’s successful achievement”); *see also* EX2028, ¶151.

Second, Petitioner’s cherry-picked quote from the specification, that color separation devices in flow cytometry “are almost identical in function and

architecture to the wavelength division multiplexers (WDM) widely used in optical communication” (Pet. at 10, 87-88 (citing EX1001, 44:25-33)), omits the very next sentence, which emphasizes fundamental differences between optical communications and flow cytometry, and the challenges therein. Specifically, the specification explains that light in flow cytometry enters a detection system from a large optical fiber which produces a much larger light beam than produced in optical communications. EX1001, 44:56-45:9; *see supra* Section II. The ’107 patent explains that this presents challenges in controlling the light beam over an extended distance and focusing the beam onto the detectors, as needed for effective detection. EX1001, 44:33-53. Indeed, the ’107 patent states that these fundamental differences “prevent[ed] the use of small area APD in fluorescence detection instrumentation,” despite APDs having “wide acceptance [] in optical communication.” *Id.* at 44:20-53; *see also* EX2028, ¶152.

Petitioner’s unsupported assertions that a POSA would have combined a demultiplexing device from optical communications to improve a flow cytometer is pure hindsight. *See Liberty Energy*, IPR2025-00066, Paper 10 at 12 (citing *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) and warning to “be aware ‘of the distortion caused by hindsight bias and [] be cautious of arguments reliant upon *ex post* reasoning’”); *R.J. Reynolds*, IPR2021-00826, Paper 11 at 18 (“That lack of

explanation [as to how disclosed advantages of one reference were applicable to another] appears on this record as a classic exercise of impermissible hindsight reconstruction.”). Petitioner makes no attempt to explain how Goodman’s demultiplexing device would work with light emitted from a flow cytometry fiber optic (or how Goodman’s fiber optic would work in a flow cytometer). Petitioner proposes no modifications to Goodman that would allow it to function as a flow cytometry WDM as recited in independent claims 1 and 16. Nor does Petitioner rely on any disclosure from Chandler or Oostman in the alternative. Petitioner’s combinations thus fails to render obvious a “wavelength division multiplexer (WDM)” for use in “a flow cytometer.” EX2028, ¶153.

3. Petitioner Fails to Show that Goodman Is Analogous Art to the Claimed Inventions

Prior art references must qualify as “analogous art” to be considered in an obviousness analysis. *K-TEC, Inc. v. Vita-Mix Corp.*, 696 F.3d 1364, 1375 (Fed. Cir. 2012). To be “analogous art,” the reference must (1) be from “the same field of endeavor;” or (2) be “reasonably pertinent to the particular problem with which the inventor is involved.” *Id.* Notwithstanding Petitioner’s two-sentence explanation in each Ground, Pet. at 48, 87, and for similar reasons as discussed above in Section X.B.2, Goodman (EX1016) is **not** analogous art that can be afforded any weight in the obviousness analysis. EX2028, ¶¶154-158.

First, Petitioner’s overly broad characterization of the field of endeavor ignores the “explanations of the invention’s subject matter in the patent application, including the embodiments, function, and structure of the claimed invention.” *Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1380 (Fed. Cir. 2019) (citation omitted). As Petitioner concedes, Goodman is related to a **different** field of endeavor—the “field of optical communications,” not flow cytometry. Pet. at 1.

Second, Petitioner improperly argues that Goodman and the ’107 patent were directed to the overly general problem of “efficiently demultiplexing and detecting light.” Pet. at 48. This ignores that the ’107 patent specifically describes the problems that its inventor was able to solve: to create “an improved flow cytometer” that is “reliable, compact and easy to manufacture,” and “provides a Wavelength Division Multiplexing (WDM) system to separate a light beam into multiple colored bands” that “may be compatible with low noise semiconductor detectors” and “may be reconfigurable.” EX1001, 2:5-45. A POSA faced with these same problems, e.g., how to control and focus a large, diffuse beam diameter over an extended distance would not have found optical communications references dealing with intense light with narrow beam diameters “reasonably pertinent to the particular problem with which the inventor is involved.” *See K-TEC*, 696 F.3d at 1375; *see also* EX2028, ¶¶157-158.

4. Chandler and Oostman Would Not Be Improved By Goodman

Even if a POSA would have considered teachings from optical communications, Petitioner has not demonstrated that a POSA would have looked to Goodman to modify Chandler or Oostman. Petitioner argues that a POSA reviewing Chandler or Oostman would have immediately become aware of various purported shortcomings in its fluorescence detection design, and that Goodman would solve these shortcomings. Pet. at 47-50, 86-87. However, Petitioner provides no explanation or rationale beyond its expert's verbatim say-so, and these "conclusory statements" do not provide "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *See Wasica Finance GmbH v. Continental Automotive Systems, Inc.*, 853 F.3d 1272, 1286 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Indeed, both Chandler and Oostman's disclosure expressly contradicts Petitioner's conclusory assertions, as discussed below. EX2028, ¶159.

i. The proposed combinations would remove Chandler and Oostman's features that improve the prior art

Petitioner puts forth various arguments, largely supported only by expert say-so, to suggest that a POSA would have substituted Chandler's branched configuration of bandpass filters within its FADC units (Pet. at 47) or Oostman's

detector array cluster arrangements (Pet. at 86) with Goodman’s demultiplexer. But as discussed below, these arguments fail because there is *no evidence* to support this claim. In fact, a POSA would not want to remove these features from Chandler and Oostman because they were *features to improve* the prior art, including Goodman. EX2028, ¶160.

First, Petitioner argues that a POSA would have sought to “reduce the footprint” of Chandler’s FADC units (Pet. at 47) or similarly reduce the size of Oostman’s system (Pet. at 86), but both arguments are entirely conclusory and supported only by its expert’s say-so. For Chandler, Petitioner argues that “Chandler’s branched configuration in the FADC units was suboptimal” for making “small and inexpensive” devices without “sacrificing detection capabilities.” Pet. at 47 (citing EX1051, 3:51-55). For Oostman, Petitioner says even less, and simply assumes without explanation that the proposed combination would lead to “more

modular, compact, and efficient optical block demultiplexers.” Pet. at 86.¹⁷ Petitioner provides no reason why Goodman would reduce the size of Chandler or Oostman and cites no supporting evidence. EX2028, ¶161.

In particular, Petitioner does not provide any evidence or even argue that Goodman would provide an improvement other than bare citations to Goodman in Ground 8 stating its design “is easily scalable” (Pet. at 48-49 (citing EX1016, 3:48-67)). Indeed, Goodman discloses its preferred embodiment has four “wavelength selective elements [e.g., filters] 22a-22n,” which corresponds to four channels for

¹⁷ Petitioner also describes the combination as “includ[ing] Oostman’s collimating lens,” Pet. at 86, but never discusses it within the combination. To the extent Petitioner intends to include Oostman’s collimating lens in the combination, Goodman’s optical block is monolithic and made from plastic or glass, (i.e., a solid plastic or glass block), EX1016, 6:56-67, as are lenses, *e.g.*, Oostman at 10:4-15. A POSA would have recognized that incorporating a lens *inside* a monolithic plastic or glass optical block (i.e., placing a glass lens inside a solid glass block while still having the lens function as a lens) would have been extremely impractical and removed any purported manufacturing efficiency benefits of Goodman. EX2028, ¶168 n.9.

wavelength separation and four detectors. EX1016, 8:28-29. And while Goodman contemplates that more wavelength selective elements may be added to separate additional wavelengths, it specifically notes that the number of channels is limited by “the attenuation of the beam of light that will occur and the number of wavelength channels that can be multiplexed.” EX1016, 8:27-35. In other words, Goodman teaches that there are practical limits for how many channels its device can maintain a strong beam of light for demultiplexing. A POSA would have understood that this practical challenge of maintaining signal strength is similarly present in flow cytometry, and a POSA would thus not assume that Goodman provides for a way to reduce the footprint in Chandler’s or Oostman’s systems. *See, e.g.*, EX1005, 3:42-57, 4:16-24; EX2031 at 4, 8-9; EX2028, ¶¶161-167.

There is also no evidence that Goodman’s demultiplexing device would allow an increased number of detectors compared to one of Chandler’s FADC units or Oostman’s detector clusters. Thus, Petitioner’s conclusory arguments—which Petitioner relies solely on expert say-so for support—are at best irrelevant because one would still need to use multiple of Goodman’s demultiplexing devices. But even if Goodman did allow for more filters and detectors in one device, Goodman would similarly just “redistribute[]” the footprint in only a vertical or horizontal direction

(i.e., one long row of filters and detectors).¹⁸ Petitioner does not attempt to explain how the orientation in Goodman would reduce a flow cytometer's footprint compared to Chandler or Oostman or what effect doing so would have on Chandler's or Oostman's functionality. EX2028, ¶¶168-171.

Petitioner also ignores that a POSA would not have been motivated to remove the FADC units from Chandler or the detector array cluster arrangements from Oostman because each reference expressly describes those components as a *feature* of the invention and an *improvement* over the prior art, not a constraint of its device. Chandler states that “an advantage to using such a multiplexing technique would be a reduction in complexity and/or cost of the overall flow cytometer resulting from fewer photo-detectors and fewer A/D converters being needed.” EX1051, 12:8-1. And Oostman states that “[b]y using reflective transfer legs for most detectors, the detectors may be clustered in a polygonal arrangement of between five and ten light detectors in a common plane” and its “apparatus is modular because a greater number of fibers can feed a greater number of clusters.” EX1005, 3:42-55, 4:14-16;

¹⁸ As discussed in Section X.B.5, Petitioner cites no evidence that Oostman's configuration is actually more compact than Goodman's when accounting for the size of PMTs, with which Oostman is configured to operate. EX2028, ¶171 n.10.

EX2028, ¶163. Indeed, Oostman states that, due to its detector clusters, “the instrument of the present invention has a wide spectral response.” EX1005, 6:36-39. As Petitioner concedes, Oostman’s device was expressly designed to “provide an improved system for detecting fluorescent light having multiple colors emitted from a target using a greater number of detectors than has been achieved in the prior art.” Pet. at 44 (quoting EX1005, 2:60-63); *see also id.* at 86 (quoting EX1005, 4:14-16); EX2028, ¶163.

Thus, Petitioner’s rationale for combining Goodman with Chandler or Oostman ignores the express improvements over the prior art and instead suggests that improvement be replaced. Petitioner fails to explain why a POSA would be motivated to take such action. Instead, Petitioner’s argument is merely a hindsight driven approach that attempts to arrive at the claimed invention. EX2028, ¶172.

- ii. *Chandler’s FADC units and Oostman’s detector clusters are intentional design choices that would be negated by Goodman’s optical block and Frazier teaches against using an optical block*

Chandler and Oostman were both designed for problems specific to fluorescent detection, and incorporating Goodman’s design would not benefit either system.

Regarding Chandler’s system, Petitioner proposes replacing one or more of Chandler’s FADC units with Goodman’s configuration to achieve “more color

separation per light source,” Pet. at 47, 52-54, but Chandler teaches that more color separation per light source is not useful for its purposes. For example, Chandler states that “[a]t any given excitation wavelength [i.e., for any one laser exciting dyes at a specific wavelength], I have determined that there are often only about two or three commercially available dyes that emit a spectrum of wavelengths narrow enough and sufficiently separated enough that they are individually measurable simultaneously.” EX1051, 2:37-42; *see also id.* at 2:30-32 (“I have determined that the properties of the fluorescent dyes themselves limit this flow cytometric technique to about three different wavelengths.”). Chandler’s proposed solution to this problem is to use multiple lasers (i.e., multiple light sources) angled in different directions to excite dyes at multiple wavelengths. *Id.* at 7:1-8:8; FIG. 4; *see also id.* at 7:24-34 (“Each optical detector can be associated with an adjacent, near, or operationally responsive laser diode. Optical detector 20 detects emissions resulting from excitation by, for example, laser diode 10; optical detector 22 detects emissions resulting from excitation by, for example, laser diode 12, and the like.”). With this configuration, some light scattered from every laser will hit the different collecting elements, but each of the four FADC units has its *own* set of bandpass filters to filter the wavelengths emitted from each laser. Incorporating Goodman’s configuration into each one of Chandler’s FADC units—even if each of Goodman’s configuration

can detect more than three channels—would provide no benefit to Chandler because of Chandler’s self-described limitations on the number of channels that would be useful in each branch. EX2028, ¶¶173-174.

For Oostman, Petitioner points to Goodman’s “optical block” to provide “[o]ptical alignment” that would be useful “in Oostman’s non-integrated designs where light propagates through air and optical components are oriented/fixated through holders” (Pet. at 86-87). This argument is flawed for multiple reasons. EX2028, ¶175.

First, Oostman rejects a fixed, prefabricated configuration for wavelength detection. Goodman’s prefabricated optical block configuration with integrated filters, *see* EX1016, 8:37-50, 10:45-59, cl. 9, goes against Oostman’s express teachings of providing an adjustable flow cytometer. EX1005, 8:35-40 (“The dichroic mirror holders and the filter holders are mounted in vertically removable housings so that dichroic mirrors and associated filters may be interchanged or replaced.”); *see also, e.g.,* EX1009, 2:27-38. Optical communications demultiplexing devices have industry-standard channels that rarely, if ever, need to be changed, and predictable inputs of light size and intensity entering the demultiplexing device. *See, e.g.,* EX2032; EX2033; EX2028, ¶177. Meanwhile, Oostman recites interchangeability of its detector clusters as a feature of its

invention, not a limitation. *See, e.g.*, EX1005, 8:19-20 (“Each lens 265 is movable for adjusting the focal spot during calibration of the instrument.”), 8:35-40; *see also id.* at 5:62-6:5; 8:48-9:3; EX2028, ¶¶175-177.

In contrast to Oostman, Goodman, consistent with standards for optical communications demultiplexing devices, discloses using adhesives for permanently affixing its filters 22a-22n to its optical block, meaning that the filters cannot be easily switched. EX1016, 8:44-47; EX2028, ¶178. Frazier, which is part of this proposed combination, cites similar considerations as key reasons to reject application of an optical communications device for its life sciences fluorescence detection instruments. *See* EX1009, 2:27-38. For example, the BD LSR Fortessa (which is marked with Oostman’s patent, EX2023 at 2) has multiple variations of mirror/filter combinations depending on the fluorochromes:

Five-color blue laser configuration

The following map shows the five-color configuration for the 488-nm blue laser.

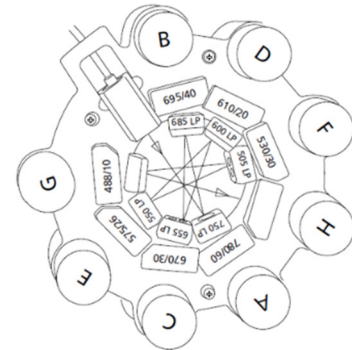
PMT	LP mirror	BP filter	Fluorochromes
A	750	780/60	PE-Cy7
B	685	695/40	PerCP-Cy5.5
C	600	610/20	PE-Texas Red®
D	550	575/26	PE
E	505	530/30	FITC, Alexa Fluor® 488
F	Blank	488/10	SSC



Six-color blue laser configuration

The following map shows the six-color configuration for the 488-nm blue laser.

PMT	LP mirror	BP filter	Fluorochromes
A	750	780/60	PE-Cy7
B	685	695/40	PerCP-Cy5.5
C	655	670/30	PE-Cy5
D	600	610/20	PE-Texas Red®
E	550	575/26	PE
F	505	530/30	FITC, Alexa Fluor® 488
G	Blank	488/10	SSC



EX2023 at 140-141 (annotated). EX2028, ¶178.

Second, Oostman provides its own features for adjusting alignment. Petitioner contends alignment challenges would motivate a POSA to use Goodman's optical block. Pet. at 60. But Petitioner ignores that Oostman teaches that the option of adjusting alignment is an important feature for its flow cytometers and its detector clusters. *E.g.*, EX1005, 8:49-50 ("The beam splitter mirror 321 is held in a mirror holder frame *at a desired angle*."), 8:61-65 (emphasizing ability to adjust focusing lenses to focus light at more sensitive spots on PMTs). And Oostman discloses its detector clusters made with mechanically-stabilized mounts (*see, e.g.*, Oostman FIG. 7) that allow correction of alignment issues such that using adhesives such as in Goodman were not the only (or even best) way of achieving alignment and

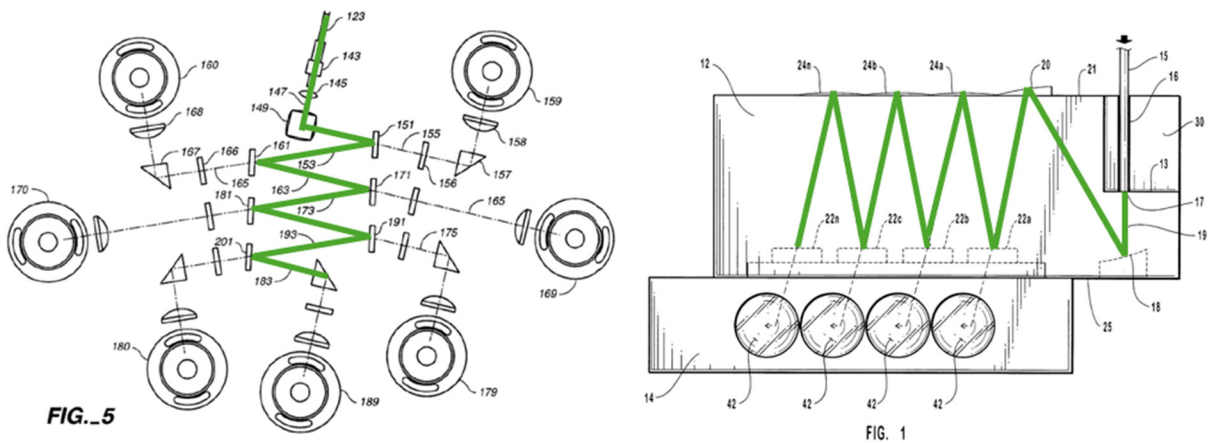
mechanical stability. *See* EX2023 at 140-141; *see also* EX1005, 5:63-6:23, cl. 32. EX2028, ¶¶179-180.

iii. Petitioner does not explain why a POSA would select Goodman's zig-zag pattern

Petitioner also argues it would have been obvious to try Goodman's demultiplexing device in Chandler's system because Goodman's zig-zag pattern is a known alternative to Chandler's branched configuration. Pet. at 49. Petitioner similarly argues it would have been obvious to try Goodman's demultiplexing device in Oostman's system because Goodman's zig-zag configuration is more "modular" and "efficient." *Id.* at 87. Petitioner does not explain how a POSA would adapt Goodman for Chandler's system, or whether, if adapted, Goodman's demultiplexing device would actually improve Chandler's system. "It is not enough merely to quote the comparative advantages disclosed in [one prior art reference] without explaining why a POSA would have expected to achieve similar improvements when modifying a different device...disclosed in" another reference. *R.J. Reynolds*, IPR2021-00826, Paper 11 at 21-22. EX2028, ¶¶181-182.

Nor does Petitioner attempt to explain why Goodman's demultiplexing device would be chosen over Oostman's star-shaped flow cytometer. Indeed, Petitioner ignores that Oostman discloses that its star-shaped configuration is *more compact* than a zig-zag configuration:

zig-zag configuration. Petitioner provides no explanation as to why a POSA would jettison Oostman's star-shaped configuration for Goodman's zig-zag configuration when Oostman already discloses that a zig-zag configuration is less compact than its star-shaped configuration in FIG. 6:



Cir. 2024) (“The mere fact that these possible arrangements existed in the prior art does not provide a reason that a skilled artisan would ... make this substitution...”); *R.J. Reynolds*, IPR2021-00826, Paper 11 at 21 (“Petitioner does not explain how or why eliminating this intentional gap would minimize heating of unnecessary thermal mass, improve response times, or reduce the maximum heater temperature in a device, such as Alarcon’s, that produces vapor by an entirely different mechanism....”). EX2028, ¶185.

5. Petitioner Fails to Explain How Goodman Would Improve Chandler or Oostman Specifically

For Ground 1, Petitioner reproduces a series of six quotes from Goodman’s summary section to contend that “Goodman teaches improvements aligned to Chandler’s design goals.” Pet. at 48. These quotes do not explain how Chandler would specifically be improved, nor Oostman to the extent relied upon in Grounds 10 and 11. EX2028, ¶187.

The first four quotes Petitioner relies on are all directed towards ease of fabrication; however, Petitioner provides no explanation how or why Goodman’s manufacturing method would be simpler to manufacture than Chandler’s or Oostman’s, or even if it was, why such benefits would outweigh Chandler’s and Oostman’s benefits of customizability and reduced size. Petitioner’s fifth quote, that Goodman’s WDM is “easy to incorporate into other optical systems,” Pet. at 48,

ignores that Goodman’s description of relevant applications for its technology was “spacecraft and aircraft applications” and “closed circuit and cable television systems,” not flow cytometry. EX1016, 2:10-13. And Petitioner’s final quote, that Goodman “is easily scalable or modified,” Pet. at 49, ignores that both Chandler’s and Oostman’s systems are each similarly, or more, easily scalable as discussed above. *See* Section X.B.4; *see also* EX2028, ¶¶188-189.

Furthermore, Petitioner does not attempt to explain why, rather than modify Chandler’s or Oostman’s configuration, a POSA would have changed every other aspect of Chandler’s and Oostman’s design (e.g., its lenses, mirrors, filters, etc.), in favor of Goodman, or even more drastically, jettison Chandler’s FADC units or Oostman’s detector clusters completely and just try to plug in Goodman’s demultiplexing device. *See Axonics, Inc. v. Medtronic, Inc.*, 73 F.4th 950, 957 (Fed. Cir. 2023) (“The proper inquiry is whether the relevant artisan would be motivated to make the combination to arrive at the claims’ actual limitations[.]”); *Free-Flow Packaging Int’l, Inc. v. Automated Packaging Sys., Inc.*, IPR2016-00444, Paper 8 at 15 (PTAB Jun. 22, 2016) (requiring “‘some articulated reasoning with some rational underpinning’ to combine the known elements in the manner required in the claim at issue”) (quoting *KSR*, 550 U.S. at 418). It is not enough to provide some motivation to change certain features of a reference and assume, without analysis,

that a POSA would have made multiple additional changes to achieve the claimed invention. Petitioner's motivation to combine analysis is completely absent in this respect, and should be rejected for this additional reason. EX2028, ¶¶190-192.

C. Petitioner Fails to Demonstrate a Reasonable Expectation of Success for Either Combination

In each set of primary obviousness Grounds (Grounds 8 and 10), Petitioner devotes a single paragraph of its Petition to argue that a POSA would have had a reasonable expectation of success in implementing Goodman's WDM into Chandler or Oostman. Pet. at 49-50, 87. But Petitioner's sole evidence on this front are (1) two statements from Goodman stating its WDM could be incorporated into other generic optical systems; and (2) statements from the '107 patent itself. *Id.* at 49-50. Each of these pieces of evidence are flawed, and Petitioner fails to meaningfully engage with actual facts in assessing reasonable expectation of success. *See Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1335 (noting that reasonable expectation of success "requires a 'plausible rational [sic] as to why the prior art references would have worked together'") (quoting *Power-One, Inc. v. Artsyn Techs., Inc.*, 599 F.3d 1343, 1351 (Fed. Cir. 2010)); *see also* EX2028, ¶193.

First, as discussed above, Goodman's generalized statements do not explain how its optical communications demultiplexing device could be incorporated into a flow cytometer fluorescence detection system, and Goodman itself states that

relevant applications for its technology range from “spacecraft and aircraft applications to closed circuit and cable television systems.” EX1016, 2:10-14; *see supra* Section X.B.2. None of these applications have any connection to life science fluorescence detection systems, and Petitioner has not explained how a POSA would have had a reasonable expectation of success based on this general statement. EX2028, ¶194.

Second, as discussed above, the statements cited from the ’107 specification actually highlight the **challenges** in translating WDMs from optical communications to flow cytometry prior to the inventions disclosed in the ’107 patent. EX1001, 44:63-45:13. And regardless, the obviousness inquiry is not whether a POSA, reading a patent specification, would have had a reasonable expectation of success in achieving the inventions disclosed therein—it is whether a POSA would have had a reasonable expectation of success **in view of the prior art**. *PAR Pharmaceutical, Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014) (“Proper analysis under § 103 requires, *inter alia*, consideration of ... (2) **whether the prior art** would also have revealed that in so making or carrying out [a claimed invention], those of ordinary skill would have a reasonable expectation of success.”) (citations omitted); *see also Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985) (“[O]ne should not go about determining obviousness under § 103 by inquiring into

what *patentees* (i.e., inventors) would have known or would likely have done, faced with the revelations of references.”); *Amgen Inc. v. F. Hoffman-La Roche Ltd*, 580 F.3d 1340, 1363 (Fed. Cir. 2009) (quoting *Standard Oil*, 774 F.2d at 454, to support that an inventor’s “personal expectations are not conclusive of an ordinarily skilled artisan’s reasonable expectations”). EX2028, ¶195.

Finally, though Petitioner proposes incorporating Goodman’s entire detection system into Chandler’s system or Oostman’s flow cytometer, Petitioner does nothing to explain how a POSA would have reasonably expected Goodman’s entire system to work. For example, Petitioner does not explain whether Goodman’s imaging elements 18 and 20 would function when receiving light from a large diameter flow cytometry fiber optic which produces light at an etendue hundreds of times greater than what they were designed for, nor whether Goodman’s optical communications fiber optic would receive sufficient fluorescent light, nor whether Goodman’s detectors designed for optical communications would be operable in a flow cytometer. Petitioner’s conclusory statements on reasonable expectation of success fall short of “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418 (internal citations omitted). EX2028, ¶¶197-199.

D. Petitioner’s Grounds 9 and 11 Fall with Grounds 8 and 10

Petitioner's Grounds 9 and 11 add two separate webpages from Hamamatsu's website (EX1056 and EX1056) to its Ground 8 and 10 combinations to show that certain APDs were available for sale in Japan. *See* Pet. at 84-85, 104-05. Petitioner uses Hamamatsu in these Grounds only for its disclosure of dependent claims and provides no additional analysis of the independent claims, *see id.*, and thus it falls with Grounds 8 and 10.

For the foregoing reasons, Petitioner fails to show a reasonable likelihood of invalidity based on obviousness.

XI. CONCLUSION

For the above reasons, Patent Owner respectfully requests that the Board deny Petitioner's Petition for post grant review of the '107 patent in its entirety.

Respectfully submitted,

Dated: January 2, 2026

/Alexis R. Cohen/
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CERTIFICATE UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Patent Owner Preliminary Response totals 17,417 words, which is less than the 18,700 words allowed under 37 CFR § 42.24(a)(1)(ii).

Respectfully submitted,

Dated: January 2, 2026

/Patrick E. Nyman/
Patrick Nyman
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CERTIFICATE OF SERVICE

I hereby certify that on January 2, 2026, I caused a true and correct copy of the following materials:

- Patent Owner's Preliminary Response
- Exhibit List
- Word Count Certification Under 37 CFR § 42.24(d)
- Exhibits for Patent Owner's Preliminary Response (EX2016, EX2023-EX2024, EX2028-EX2029, EX2031-2033, EX2035-2040, EX2053-2055)

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