

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MITO RED LIGHT, INC., Petitioner

v.

JOOVV, INC., Patent Owner.

Inter Partes Review Case No. IPR2024-00621
U.S. Patent No. 11,253,719

DECLARATION OF ERIC BRETSCHNEIDER, Ph.D.

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 or Title 18 of the United State Code, and that such willful false statements may jeopardize the validity of the '719 Patent.

Date: 27 February 2024


Eric Bretschneider, Ph.D.

LIST OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 11,253,719 (“the ’719 patent”)
1002	Reserved
1003	Prosecution History File Wrapper of the ’719 patent
1004	U.S. Patent Publication No. 2019/0030359 A1 (“ <i>Dijkstra</i> ”)
1005	U.S. Patent Publication No. 2006/0237439A1 (“ <i>Norwood</i> ”)
1006	U.S. Patent No. 10,478,635 (Reexamined) (“the ’635 patent”)
1007	Prosecution History File Wrapper of U.S. Patent No. 10,478,635 (excerpts)
1008	<i>Ex Parte</i> Reexamination History of U.S. Patent No. 10,478,635 (excerpts)
1009	U.S. Patent No. 10,639,495 (Reexamined) (“the ’495 patent”)
1010	Prosecution History File Wrapper of U.S. Patent No. 10,639,495 (excerpts)
1011	<i>Ex Parte</i> Reexamination History of U.S. Patent No. 10,639,495 (excerpts)
1012	U.S. Patent No. 11,524,172 (“the ’172 patent”)
1013	Prosecution History File Wrapper of U.S. Patent No. 11,524,172 (excerpts)
1014	Patent Owner’s Preliminary Infringement Contentions, Exhibit 5 (the ’719 patent) in <i>Joovv, Inc. v Mito Red Light, Inc.</i> , Civil Action No. Case 2:23-cv-01084-MTL (D. Ariz.) (October 20, 2023).
1015	U.S. Patent No. 6,314,699 B1 (<i>Tucker</i>)
1016	U.S. Patent Publication No. 2004/0127961 A1 (“ <i>Whitehurst</i> ”)
1017	U.S. Patent Publication No. US 2011/0054573 (“ <i>Mitchell</i> ”)

LIST OF APPENDICES

Appendix A	Curriculum Vitae of Eric Bretschneider, Ph.D.
Appendix B	List of Materials Considered

TABLE OF CONTENTS

I.	INTRODUCTION	11
II.	PROFESSIONAL BACKGROUND AND QUALIFICATIONS.....	12
III.	MATERIALS CONSIDERED	20
IV.	RELEVANT LEGAL STANDARDS	21
A.	Legal Standard for Claim Construction	21
B.	Legal Standards for Obviousness.....	22
V.	LEVEL OF ORDINARY SKILL IN THE ART.....	27
VI.	SUMMARY OF THE '719 PATENT.....	35
A.	The '719 Patent	35
B.	Prosecution History of the '719 Patent	36
C.	Prosecution History of the Related Patents.....	37
1.	The '635 Patent Prosecution History & Reexamination.....	38
2.	The '495 Patent Prosecution History & Reexamination.....	48
3.	The Prosecution History of the '172 Patent.....	58
VII.	THE PRIOR ART.....	67
A.	<i>Dijkstra</i> : U.S. Patent Publication No. 2019/0030359 A1	67

B.	Norwood: U.S. Patent Publication No. 2006/0237439	67
VIII.	OVERVIEW OF CONCLUSIONS.....	67
IX.	RECITATION OF THE CHALLENGED CLAIMS.....	68
X.	GROUND 1: CLAIMS 1, 2, 3, 9, 10, 11, 16, 17, 19 ARE OBVIOUS IN VIEW OF DIJKSTRA AND POSITA’S KNOWLEDGE	72
A.	Overview of <i>Dijkstra</i>	72
B.	Independent Claim 1	74
1.	[1 Preamble] “A method of providing a light therapy treatment, comprising:”	74
2.	[1a] “providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light”	75
3.	[1b] “providing a send light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light”	78
4.	1[c] “communicatively coupling the first light therapy device directly to the second light therapy device;”	79
5.	1[d] “emitting at least on of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights.”	81

6. 1[e] “placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.” 82
- C. Dependent Claim 2: “wherein the emitting at least one of red light and near infrared light from at least the portion of the first plurality of lights and at least the portion of the second plurality of lights is accomplished using a control panel coupled to the first housing of the first light therapy device.” 86
- D. Dependent Claim 3: “pressing a first input button on the control panel of the first light therapy device, wherein the emitting occurs in response to the pressing” 90
- E. Dependent Claim 9: “pausing the emitting in response to pressing a first input button on the control panel of the first light therapy device” 92
- F. Dependent Claim 10: “selecting the lead mode via a first switch coupled to the first light therapy device, wherein the first light therapy device is placed in the lead mode via the first switch; and selecting the follow mode via a second switch coupled to the second light therapy device, wherein the second light therapy device is placed in the follow mode via the second switch.” 94
- G. Dependent Claim 11: “indicating, via a first pair of indication lights on the first light therapy device, whether at least one of red light and near infrared light is being emitted from at least the portion of the first plurality of lights” 97

H.	Dependent Claim 16: “communicatively coupling the first light therapy device directly to the second light therapy device comprises coupling the first light therapy device and the second light therapy device via a wired connection”	100
I.	Claim 17: “coupling the first light therapy device and the second light therapy device via the wired connection comprises: inserting a first end of a communication cable into a first communication port on the first light therapy device; and inserting a second end of the communication cable into a second communication port on the second light therapy device.	101
J.	Dependent Claim 19: “providing a third light therapy device comprising a third housing and a third plurality of lights configured to emit at least one of red light and near infrared light; providing a fourth light therapy device comprising a fourth housing and a fourth plurality of lights configured to emit at least one of red light and near infrared light; communicatively coupling each of the third light therapy device and the fourth light therapy device directly to at least one of the first light therapy device and the second light therapy device; and emitting at least one of red light and near infrared light from at least a portion of the third plurality of lights and at least a portion of the fourth plurality of lights.”	105
XI.	GROUND 2: CLAIMS 1, 2, 3, 9, 10, 11, 16, 17, 19 ARE OBVIOUS IN VIEW OF <i>DIJKSTRA</i> , POSITA’S KNOWLEDGE AND <i>NORWOOD</i>	108
A.	Overview of <i>Norwood</i>	108

B.	Independent Claim 1	110
1.	[1 Preamble] “A method for providing a light therapy treatment, comprising:”	110
2.	[1a] “providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light”	111
3.	1[b] “providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light”	112
4.	1[c] “communicatively coupling the first light therapy device directly to the second light therapy device;”	113
5.	1[d] “emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights.”	113
6.	1[e] “placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.”	114
C.	Dependent Claim 2: “wherein the emitting at least one of red light and near infrared light from at least the portion of the first plurality of lights and at least the portion of the second plurality of lights is accomplished using a control panel coupled to the first housing of the first light therapy device.”	119

- D. Claim 3: “pressing a first input button on the control panel of the first light therapy device, wherein the emitting occurs in response to the pressing” 119
- E. Claim 9: “pausing the emitting in response to pressing a first input button on the control panel of the first light therapy device” 120
- F. Claim 10: “selecting the lead mode via a first switch coupled to the first light therapy device, wherein the first light therapy device is placed in the lead mode via the first switch; and selecting the follow mode via a second switch coupled to the second light therapy device, wherein the second light therapy device is placed in the follow mode via the second switch.” 120
- G. Claim 11: “indicating, via a first pair of indication lights on the first light therapy device, whether at least one of red light and near infrared light is being emitted from at least the portion of the first plurality of lights” 123
- H. Claim 16: “communicatively coupling the first light therapy device directly to the second light therapy device comprises coupling the first light therapy device and the second light therapy device via a wired connection” 124
- I. Claim 17: “coupling the first light therapy device and the second light therapy device via the wired connection comprises: inserting a first end of a communication cable into a first communication port on the first light therapy device; and inserting a second end of the communication cable into a second communication port on the second light therapy device.” 124

- J. Claim 19: “providing a third light therapy device comprising a third housing and a third plurality of lights configured to emit at least one of red light and near infrared light; providing a fourth light therapy device comprising a fourth housing and a fourth plurality of lights configured to emit at least one of red light and near infrared light; communicatively coupling each of the third light therapy device and the fourth light therapy device directly to at least one of the first light therapy device and the second light therapy device; and emitting at least one of red light and near infrared light from at least a portion of the third plurality of lights and at least a portion of the fourth plurality of lights.” 126

I. INTRODUCTION

1. I have been retained by counsel for Mito Red Light, Inc., which I may refer to as “Mito Red Light,” “MRL” or “the Petitioner,” as an expert witness in the above-captioned proceeding. I have been asked to provide my opinion about the patentability of claims of U.S. Patent No. 11,253,719 (“the ’719 patent”) with respect to the *inter partes* petition filed by Mito Red Light, which I may refer to as an IPR.

2. I understand that this IPR proceeding involves the ’719 patent and that the petition sets forth two grounds asserting unpatentability of the certain claims of the ’719 patent. Those grounds are:

Ground	Basis	References	Challenged Claims
1	§103	US 2019/0030359 A1 to <i>Dijkstra</i> and POSITA’s Knowledge ¹	1, 2, 3, 9, 10, 11, 16, 17, 19
2	§103	US 2019/0030359 to <i>Dijkstra</i> , POSITA’s Knowledge and 2006/0237439 A1 to <i>Norwood</i>	1, 2, 3, 9, 10, 11, 16, 17, 19

3. I understand that the ’719 patent is owned by Joovv, Inc., which I may refer to as the Patent Owner. I have been retained at my normal rate of \$400 per hour. No part of my compensation is dependent on the outcome of this proceeding

¹ As used herein, “POSITA’s knowledge” refers to a POSITA’s general knowledge.

or the specifics of my testimony. I am not currently, nor have I ever been, an employee of the Petitioner.

4. I have been asked to provide my objective, independent analysis of the '719 Patent and of the asserted prior art references cited in the Petition.

5. This declaration contains opinions I formed with respect to the subject matter of this proceeding based on information available to date. I specifically reserve the right to formulate and offer additional opinions based on any additional information or discovery that may be provided or derived, and I likewise reserve the right to supplement my opinions based on agreements between the parties, and additional evidence submitted by either party either prior to or at trial. I further reserve the right to supplement my opinions based on any expert testimony offered by the Patent Owner.

II. PROFESSIONAL BACKGROUND AND QUALIFICATIONS

6. I have a comprehensive background on the full range of LED production technologies, including MOCVD hardware/process, fabrication, LED chip and package testing and reliability, optical design, thermal management, color conversion, and SSL fixture/lamp design, integration, and reliability. I am a member of the University of Florida Department of Chemical Engineering Advisory Board. I have been a Conference Chair for LED Measurement and

Standards. I also am a member of a number of professional societies, including SPIE, Materials Research Society, and Illuminating Engineering Society (including a member of numerous committees, including the IES test procedures committee). I have a Ph.D in Chemical Engineering from the University of Florida (1997) and a BSE in Chemical Engineering from Tulane University (1989). I have direct experience with MOCVD hardware design, MOCVD process development (including AlGaAs, AlInGaP, and GaN materials), wafer characterization, die fabrication, LED test and reliability (die, package, and fixture level), LED package design (optical, thermal, and color-conversion), and design of LED lighting fixtures. I was the Director of IP for an LED public company. I have extensive industry experience as set forth in my CV attached as Appendix A to this report, and I am an inventor or named author on over 45 patents and publications, including LED patents relating to national security matters.

7. I have 30 years of experience with lighting, lighting fixtures, displays, and LEDs, including a comprehensive background on a full range of LED technologies, including solid state lighting (SSL) fixture/lamp design, integration, and reliability, LED chip and package testing and reliability, fabrication, optical design, thermal management, color conversion, and Metal-Organic Chemical Vapor Deposition (“MOCVD”) hardware/process.

8. Throughout the course of my career, I have designed and transferred into manufacturing over 150 different LED-based lighting products, including LED lighting products designed to be installed in fixtures and in different lighting environments and applications. I have also designed and transferred into manufacturing dozens of different LED chips and packages for a variety of different applications.

9. I am currently the Chief Technology Officer at EB Designs & Technology. In that capacity, I am, among other things, responsible for the design of solid-state lighting technologies for clients ranging from startups to Fortune 100 companies. I previously served as Chief Technology Officer at QuarkStar, LLC, from 2016 until 2023. QuarkStar is primarily a technology development company that is focused on new approaches to improving performance and efficiency of products that rely on LED light sources.

10. I also served as a member of the University of Florida's Department of Chemical Engineering Advisory Board for 25 years from 1998 until 2022. During my tenure on this Advisory Board, I served as Chair for a total of 8 years. I also served on the Dean's Advisory board for the College of Engineering at the University of Florida from 2007-2009 and 2017 - 2022. I have been a Conference Chair for LED Measurement and Standards. I am also a member of a number of

professional societies, including the International Society for Optics and Photonics (SPIE), Optica, the Materials Research Society, The American Society of Agricultural and Biological Engineers (ASABE), and the Illuminating Engineering Society (IES).

11. Inside the IES, I am a founding member of the Science Advisory Panel which has oversight over all testing and technical committees and work groups inside the IES. I am also a full member of the Test Procedures Committee which develops test, measurement and reliability standards for lighting fixtures. Inside the Test Procedures Committee, I serve as chair of the projections and reliability subcommittee which develops reliability standards for LED based lighting products including utilizing all forms of lighting technologies. I recently lead the work group that revised TM-21 which is the internationally accepted standard for predicting reliability of LED packages. I also developed a new mathematical model that for the first time allows prediction of the color shift of an LED package over its time. This model is the basis for a new IES standard known as TM-35. Which predicts the rate of color shift for LED products over time.

12. I joined the IES in 2006 and have been a member of the Test Procedures Committee since that time. As a result, I have been an active participant in the development of testing standards related and have helped to

formalize the terminology for solid state lighting since the beginnings of the industry. Additionally, I also serve on the IES Color Committee and the IES Photobiology Committee.

13. Prior to my position at EB Designs & Technology, I served as the Director of Engineering at HeathCo, LLC. In that capacity, I was responsible for advanced technology/product development related to solid-state lighting, sensors, notifications, and control products.

14. Prior to my position as Director of Engineering at HeathCo, I was at the Elec-Tech International Co., Ltd., where I held the positions of Chief Engineer, ETi Lighting Research Institute and VP of Research and Development, ETi Solid State Lighting. In my Elec-Tech capacities, my responsibilities included developing all technology and product roadmaps for markets in North America, China, Europe, and Japan. I designed and developed LEDs, LED packages and LED based lighting products for all of these markets.

15. Between 2008 and 2011, I was at Lighting Science Group Corporation (LSG), first as a product development manager, and my responsibilities included developing solid state lighting products, then as VP of Research, and my responsibilities included developing advanced LED models for product development and production control. In these roles, I was involved in the design

and manufacture of numerous LED-based lighting fixtures and products. The products I helped launch included LSG's C2D (Curb to Door) products. These products were designed to be installed in outdoor locations including wall packs, parking lots, and streetlights. These fixtures, and in particular the wall pack fixtures in particular, were also suitable for installation in public transportation areas. Additionally, I helped develop horticultural light products and human health related products and technology for Lighting Science Group.

16. Between 2004 and 2008, I was at Toyoda Gosei North America, where I was a sales manager, and my responsibilities included managing and developing LED die and package sales accounts from the eastern region of North America. I was also tasked with providing technical support for the entire western hemisphere. The support I provided included design of LED packages and design of lighting fixtures and products that incorporated LED packages. My support included aiding customers in design of panel light-based fixtures for direct-view displays in indoor and outdoor environments. I also provided significant design support for several customers for both edge-lit and back lit displays for small electronics, computer display and entertainment applications.

17. Between 2003 and 2004, I was at Beeman Lighting, where I was Director of Solid State Lighting Engineering, and my responsibilities included leading development of solid state lighting systems and materials.

18. Between 1998 and 2003, I was at Uniroyal Optoelectronics where I held a number of positions including Team Leader for the Epitaxial Growth and Materials Characterization areas, Sr. Epi Scientist, Director of Intellectual Property, University Relations and Government Contracts. My responsibilities included MOCVD hardware modification, epitaxial process development as well as design, development and testing of new LED chip structures for both AlInGaP and GaN-based material systems. I was also responsible for providing technical support and assistance to customers on topics related to use of LED chips, design of LED packages and design of LED based lighting products and systems. This support included both optical and thermal design of LED packages and LED lighting products.

19. I also provided design support for several customers for phototherapy products. These included phototherapy products that operated at near UV wavelengths and deep red wavelengths. Other medical products included implantable light sources for photoactivated chemotherapy protocols for the Paul Allen Foundation.

20. I also consulted with NASA to develop horticultural lighting panels based on an early chip on board (COB) product, called the Hex, that I helped develop with a sister company called Norlux Corporation. The Hex products incorporated multiple LED chips of different types (emission wavelengths) and independent control of the optical energy emitted at different wavelengths.

21. From 1996 to 1998 I worked at Emcore Corporation as a Process Engineer. There I was responsible for qualifying MOCVD capital equipment for production and manufacturing process development for epitaxial structures. Some of the processes I developed included both AlInGaP and GaN based LED structures.

22. I have also authored and presented over 50 publications, presentations, and seminars, and I am a named inventor on more than 45 issued US patents as well as dozens of foreign patents. I am also a named inventor on over 25 pending US and foreign patents.

23. I earned a Ph.D. in Chemical Engineering from the University of Florida in 1997, where my graduate work focused on development of optoelectronic devices, including novel silicon based visible LEDs and sulfide based TFELD structures and zinc selenide blue LEDs.

24. In 1989, I worked for Shell Oil Corporation in Norco, LA. I was tasked with modeling heat exchanger performance for the crude oil distillation column in order to identify cost saving opportunities. I developed an improved model for determining the operating efficiency of heat exchange units that incorporated determined the economic impact on different operating conditions. The model was designed to be compatible with all major operating units on site and resulted in costs savings of over \$20 million/year at the Norco Facility alone. My work was quickly adopted throughout the entire corporation and has resulted in sustained annual cost savings of approximately \$500 million/year.

25. Based on the above education and experience, I believe that I have a detailed understanding of the state of the art during the relevant period, as well as a sound basis for opining how persons of ordinary skill in the art at that time would understand the claim terms and technical issues in this case.

26. I have previously served as a testifying expert witness in prior patent cases as set forth on Appendix A, at 13-14.

27. The opinions stated in this declaration are based on my own personal knowledge and professional judgment; if called as a witness during any proceeding in this matter I am prepared to testify competently about them.

28. In forming my opinions, I have considered the materials discussed and cited herein, including the asserted patents, the prosecution histories of the patents, and prior art references discussed herein, and any other references referred to or cited in this declaration.

III. MATERIALS CONSIDERED

29. In forming my opinions expressed in this declaration, I have reviewed and, in some cases, relied upon the documents and other materials cited in Exhibit B. To the best of my knowledge, those exhibits are true and accurate copies of what they purport to be. An expert in the field would reasonably rely on them to formulate opinions such as those set forth in this report. I reserve the right to modify my opinions based on the translations that are ultimately introduced as evidence at trial.

IV. RELEVANT LEGAL STANDARDS

30. In this section I describe my understanding of certain legal standards. I have been informed of these legal standards by Petitioner's attorneys. I am not an attorney and I am relying only on instructions from Petitioner's attorneys for these legal standards.

A. Legal Standards for Claim Construction

31. I have been instructed by counsel on the law regarding claim construction and patent claims, and understand that a patent may include two types of claims, independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim depends from an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to all of the limitations recited in the claim(s) from which it depends.

32. I understand that the claims of the '719 patent should be given their ordinary and customary meaning within the context of the patent in which the terms are used, *i.e.*, the meaning that the term would have to a person of ordinary skill in the art in question at the time of the alleged invention in light of what the patent teaches. This is the meaning I have applied to the claims in my analysis.

33. I understand that to determine how a person of ordinary skill in the art would understand a claim term, one should look to those sources available that show what a person of ordinary skill in the art would have understood disputed claim language to mean. Such sources include the words of the claims themselves, the remainder of the patent's specification, the prosecution history of the patent (all

considered “intrinsic evidence”), and “extrinsic” evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.

34. I reserve the right to respond to constructions offered by Patent Owner or adopted by the Board.

B. Legal Standards for Obviousness

35. I have been instructed by counsel on the law regarding obviousness, and understand that even if a patent is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

36. It is my understanding that a claim is not patentable under 35 U.S.C. § 103 if the claimed subject matter as a whole would have been obvious to a POSITA at the time of the alleged invention. I understand that time is viewed as of the earliest effective filing date of the patent application. I also understand that an obviousness analysis must take into account the scope and content of the prior art, the differences between the claimed subject matter and the prior art, and the level of ordinary skill in the art at the time of the invention.

37. I understand that a person of ordinary skill in the art provides a reference point from which the prior art and claimed invention should be viewed.

This reference point prevents one from using his or her own insight or hindsight in deciding whether a claim is obvious.

38. I also understand that an obviousness determination includes the consideration of various factors such as (1) the scope and content of the prior art; (2) the differences between the prior art and the asserted claims; (3) the level of ordinary skill in the pertinent art; and (4) the existence of secondary considerations such as commercial success, long-felt but unresolved needs, failure of others, etc.

39. I have been instructed by counsel on the law regarding obviousness, and understand that even if a patent is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

40. I am informed that the secondary indicia of non-obviousness may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) commercial success or lack of commercial success of processes covered by the patent; (3) unexpected results achieved by the invention; (4) praise of the invention by others skilled in the art; and (5) deliberate copying of the invention. I also understand that there must be a relationship, or nexus, between any such secondary indicia and the claimed invention. I further

understand that contemporaneous and independent invention by others is a secondary consideration supporting an obviousness determination.

41. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but other times the nexus linking two or more prior art references is simple common sense or ordinary knowledge available to a person of ordinary skill in the art. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

42. I understand that if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

43. I also understand that practical and common sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a person of ordinary skill in the art looking to overcome a problem will often be able to fit the teachings of multiple publications together like pieces of a puzzle. I also

understand that these puzzle pieces need not fit together perfectly. I understand that obviousness analysis takes into account the inferences and creative steps that a person of ordinary skill in the art would employ under the circumstances.

44. I understand that a particular combination may be proven obvious merely by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

45. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, it is not likely patentable.

46. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the

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

47. I understand that a claim can be obvious in light of a single reference, without the need to combine references, if the elements of the claim that are not found explicitly or inherently in the reference can be supplied by the knowledge of one of skill in the art.

48. I understand that a person of ordinary skill in the art could have combined two pieces of prior art or substituted one prior art element for another if the substitution can be made with predictable results, even if the swapped-in element is different from the swapped-out element. In other words, the prior art need not be like two puzzle pieces that must fit together perfectly. The relevant question is whether prior art techniques are interoperable with respect to one another, such that that a person of ordinary skill in the art would view them as a design choice, or whether a person of ordinary skill in the art could apply prior art techniques into a new combined system.

49. In sum, my understanding is that prior art teachings are properly combined where a person of ordinary skill in the art having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor and would have been led to make the combination of elements recited

in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the alleged invention, can provide a reason for combining the elements of multiple prior art references in the claimed manner.

50. I have been informed and understand that the obviousness analysis requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

51. I understand a “preponderance of evidence” is required to show obviousness in an inter partes review.

V. LEVEL OF ORDINARY SKILL IN THE ART

52. I understand that central to the process of understanding the disclosures in a patent and assessing the validity of a patent is the notion of a person of ordinary skill in the art.

53. I understand that a person having ordinary skill in the art is a hypothetical person who is used to analyze the prior art without the benefit of hindsight. A person of ordinary skill in the art is presumed to be one who thinks along the lines of conventional wisdom in the art and is not one who undertakes to innovate, whether by extraordinary insights or by patient and often expensive systematic research.

54. I understand that the hypothetical person of ordinary skill is presumed to have knowledge of all references that are sufficiently related to one another and to the pertinent art, and to have knowledge of all arts reasonably pertinent to the particular problem that the claimed invention addresses.

55. In my opinion the hypothetical person of ordinary skill in the art of the '719 patent at the time of filing of the priority application would be an individual with a bachelor's degree in an engineering field (*e.g.*, mechanical, chemical, electrical or materials science) and at least two years of design experience with LED panel lighting or display products. Because the focus of the patent is related to mechanical and electrical product design issues and advanced degree would not reduce the required amount of product design experience.

56. In this regard, all of the technologies, techniques, methods, and components disclosed in the prior art references described below, would have been within the general knowledge of such a person of ordinary skill in the art.

57. In reaching my opinion as to the POSITA's level of skill, I have considered the types of problems encountered in the art, the prior solutions to those problems found in prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers

in the field, and my own experience working with those of ordinary skill in the art at the time of the invention.

58. The person of ordinary skill in the art would have had knowledge of panel design issues, including those related to thermal management of the LEDs, physical connections to mount a panel to a frame or to another panel and provisions for electrical power and communication.

59. Additionally, as LEDs are electronic components, it is necessary to be able to provide electrical power to the LEDs at the appropriate time. The use of some form of switch would be mandatory as it would be unsafe to connect a panel to an external source of electrical power without at least one switch.

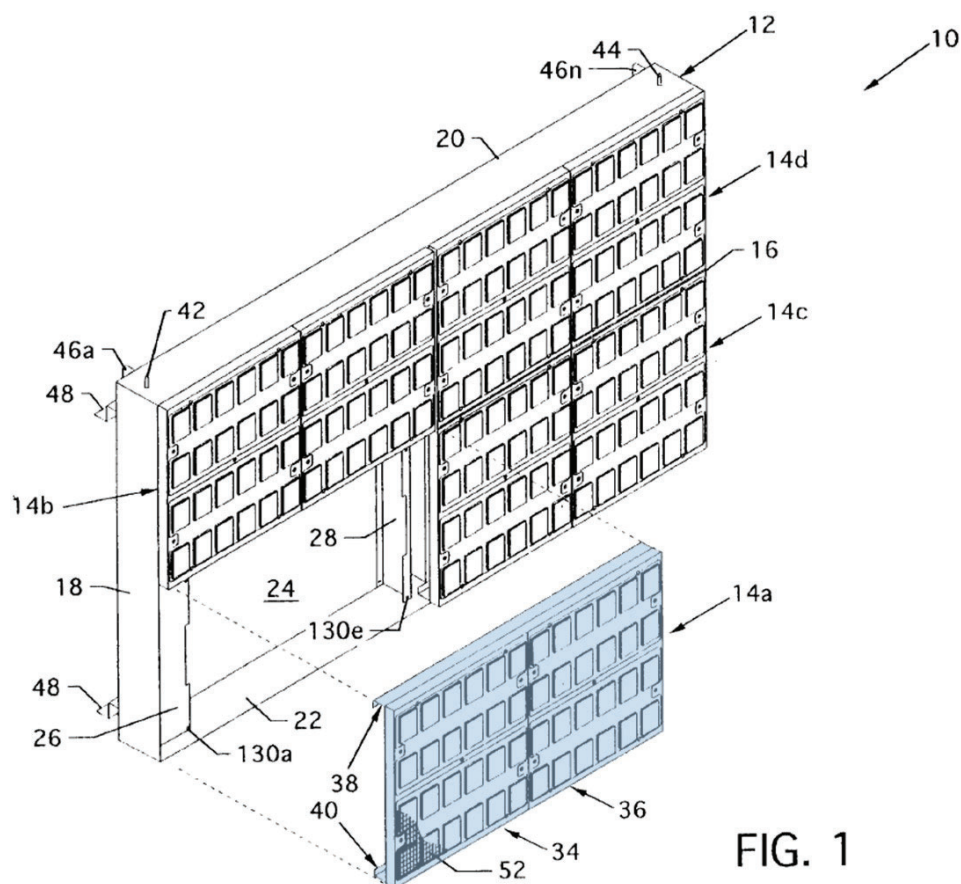
60. Further, a person of ordinary skill in the art would be aware of the solutions and methodologies developed for large area LED displays or panels. Beginning in the late 1990s LEDs began to be used for large area displays (greater than 20 ft diagonal) in sports arenas. These displays were assembled from smaller panels to simplify construction and assembly. Rather than routing power and control signals to each panel independently, panels were designed to be able to transfer electrical power and signals to adjacent panels.

61. The design considerations of such panels are essentially identical to those of devices used for phototherapy applications. Above a certain panel size,

manufacturing and cost concerns would lead a person of ordinary skill to form large area panels from groups of smaller panels. This construction was well known by at least 2000.

62. Shortly after the first high brightness blue LEDs became commercially available in the mid 1990s, they were used in large area, full color displays. Rather than constructing such displays as a single integrated unit, persons of ordinary skill in the art began using small modules that could be assembled and connected to form a large area display panel. U.S. Patent No. 6,314,669 to *Tucker* teaches such a panelized/modular electronic display. Ex. 1015. In the annotated reproduction of Fig. 1 of Tucker below shows such a design approach. I have highlighted one of the panel modules in light blue.

63. *Tucker* teaches “[t]he sectional display system 10 includes an enclosure cabinet 12 into which a plurality of panels 14a, 14b, 14c and 14d mount.” Ex. 1015 at 4:21-24.



64. In any panel lighting system that comprises multiple sub panels, it would be obvious and straightforward for each panel to be able to include a means of passing signals through a given panel to one or more additional panels. *Tucker* teaches “[a]n access termination panel 140 is also located on the planar back 24 for access to signal input and output jacks 142 and 144 and to a power input jack 145. The signal input and output jacks 142 and 144 facilitate connection of multiple sectional display systems 10 where a plurality of sectional display systems are stacked or placed side by side” Ex. 1015 at 7:22-28. A person of ordinary skill in

the art understands that if a sub-panel has signal input and output jacks, it must be capable of passing information through to other panels regardless of the operational state of the sub panel. This type of operating mode prevents a malfunction in a single panel from preventing normal operation of other sub panels.

65. The panels of *Tucker* also allowed for electrical power to be transferred through a sub panel to other panels. “Power and signal interconnects are quickly made between adjoining sectional display systems by cables between the access termination panels 140.” Ex. 1015 at 9:28-31.

66. None of these features are included in the claims of Tucker which confirms that a person of ordinary skill in the art would consider these design approaches and features as standard approaches with no novelty.

67. The understanding that a person of ordinary skill in the art would use a similar approach to using multiple panels of LEDs similar to those of *Tucker* in a phototherapy or therapeutic lighting device is evidenced by U.S. Patent Publication No. US 2004/0127961 A1 to *Whitehurst*. *Whitehurst* discloses “FIGS. 16a and 16b show a series of four coplanar LED arrays L in a twelfth embodiment arranged to treat one side of a patient. Each of the arrays is independently switchable so that selected sections of the patient can be treated.” Ex.1016 at [0073]

68. In the reproduction of Figs. 16a and 16b below, I have highlighted one of *Whitehurst's* arrays (*i.e.*, LED panels) in light blue.

FIG. 16a

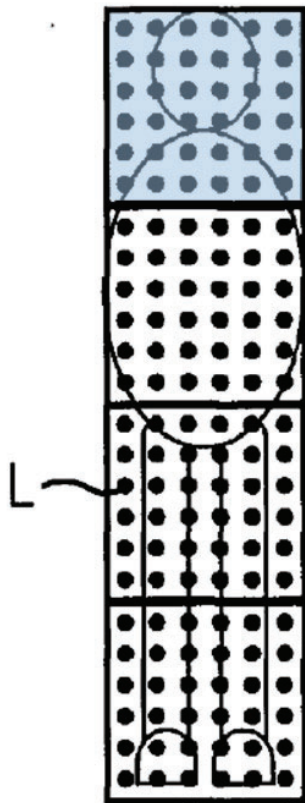
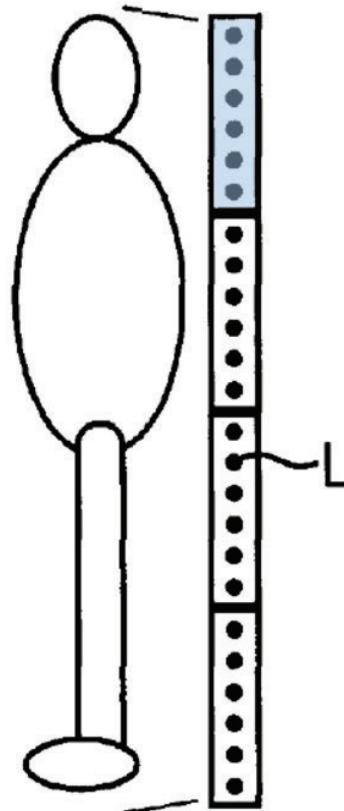


FIG. 16b



69. *Tucker* and *Whitehurst* are essentially contemporaneous and have priority dates almost two decades before the parent application of the '719 patent was filed. As such, they provide solid support for the knowledge of a person of ordinary skill in the art for the present matter.

70. I am very familiar with the technology of the '719 patent as of the priority application filing time frame in September 2019. By 2019, I had extensive experience relating to LED design and packaging. Additionally, I had significant experience designing LED panel products for display, phototherapy and horticultural applications. As shown in my curriculum vitae and the Background and Qualifications section above, I have interacted with, and I am familiar with individuals having this level of skill at the relevant time both as a practitioner and as an educator. In particular, at the relevant time I had almost two decades of experience designing LED products for these applications.

71. It is my understanding that the claims of the '719 Patent should be given their ordinary and customary meaning for the purposes of this proceeding, and that claim terms should be given the meaning that the terms would have to a POSITA at the time of the alleged invention (September 2019). This is the meaning that I have applied to the claims in my analysis.

72. I understand that the parties have agreed to the construction of the following term in Case No. 2:23-cv-01084-MT, ECF No. 54, currently pending in the District of Arizona:

Claim Term	Agreed Construction
Switch	An interactive interface

73. In my discussion of various claims, I also refer to Patent Owner's apparent understanding of the claim terms. This is based on my review of Patent Owner's preliminary infringement contentions that were submitted in the related district court case. Ex. 1014. My reference to Patent Owner's apparent understanding of a claim term should not be taken as an admission (or argument) that Patent Owner's apparent understanding comports with the ordinary and customary meaning of the that term. It is not.

74. I reserve the right to respond to constructions offered by Patent Owner or adopted by the Board.

VI. SUMMARY OF THE '719 PATENT

A. The '719 Patent

75. The '719 application was filed on October 10 2019, and issued on February 22, 2022. Ex. 1001 (22), (45). The '719 patent claims priority to Nonprovisional application 16/227,289 filed on December 20, 2018. Ex. 1001 (63). The patent is entitled Photobiomodulation Therapy Systems and Methods." Ex. 1001 (54). The patent relates to "a therapy technique that uses low-level wavelengths of light to improve health and treat a variety of health conditions.... This treatment stimulates the body's natural healing processes." Ex. 1001, 1:43-50. The patent discloses that "there is a need for photobiomodulation therapy systems

that can treat several areas in fewer treatments” and existing “systems used are not big enough to treat the entire body at once.” Ex 1001, 1:54-55; 5:2-3. The patent presents a solution where two or more light therapy devices [are] communicatively coupled together to form a light therapy system. In so doing, the area of treatment can be expanded to reduce the time and number of treatments to achieve the desired results.” Ex. 1001, 5:4-8.

B. Prosecution History of the '719 patent

76. During the examination of the '719 patent, the Examiner rejected claims 1-8 and 11-20 and objected to claim 9-10. Ex. 1003 at 1-189. Claims 1-8 and 11-19 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by U.S. Pub. No. 2011/0054573 to Mitchell (“*Mitchell*”). Ex. 1003 at 190. Claims 1-4, 11-14, 16, 19, and 20 are rejected under 35 U.S.C. 102(a)(1)/(2) as being anticipated by U.S. Pub No. 2018/0008839 to Hamid (“*Hamid*”). Ex. 1003 at 195. Claims 9 and 10 were objected to as being dependent upon a rejected base claim, but the Examiner indicated those claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Ex. 1003 at 197.

77. On August 31, 2021, the applicant submitted amended claims whereby Claim 1 was amended to incorporate all of the subject matter of Claim 9,

thereby effectively rewriting Claim 9 in independent form, including all of the limitations of the base claim (Claim 1). Ex. 1003 at 19-20. Without addressing the merits of the Examiner's rejections, the applicant responded that "the amendment to Claim 1 to incorporate the allowable subject matter from Claim 9 overcomes the 35 U.S.C. § 102 rejections, both over Mitchell and Hamid." Ex. 1003 at 165.

78. On October 15, 2021, the Examiner issued a Notice of Allowability stating "[i]t is in the opinion of the examiner that the art of record neither anticipates nor renders obvious 'placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device' in combination with the rest of the claimed limitations set forth in the independent claim." Ex. 1003 at 71. The prior art relied upon in the Petition was not raised during the prosecution of the application what would issue as the '719 patent.

79. Based on my review, none of the events or arguments in the prosecution history of the '719 patent impact my analysis. I reserve the right to consider those events and the references cited therein should Patent Owner raise a claim construction argument.

C. Prosecution History of the Related Patents

80. The prior art references raised in the Petition were considered during the prosecution and *ex parte* reexamination of three patents related to the '719 patent. The arguments and statements made by the Patent Office and the applicant/Patent Owner in those histories are highly relevant to the arguments set forth in the Petition.

81. In particular, the '719 patent is related to three patents, U.S. Patent Nos. 10,478,635 (“the '635 patent”) (Ex. 1006), 10,639,495 (“the '495 patent”) (ex. 1009), and 11,524,172 (“the '172 patent”) (Ex. 1012). All four patents share the same specification. Ex. 1001, (63). The prosecution and reexamination histories, of these patents, are highly relevant to Petitioner’s arguments. In particular, the *Dijkstra* and *Dijkstra/Norwood* references, raised in Grounds 1 and 2, were applied in the *ex parte* reexaminations of the '635 and '495 patents and during the original prosecution of the '172 patent. As discussed herein, the applicant/Patent Owner made admissions regarding the disclosure and teachings of *Dijkstra* and *Norwood* references as they were applied to very similar claims that are highly relevant to the Petitioner’s argument.

1. The '635 Patent Prosecution History & Reexamination

82. The '635 patent was filed as application no. 16/227289 on December 20, 2018 and was based on continuation in part application no. 16/167,385 filed on October 22, 2018. Ex. 1006 (21), (63).

83. During the examination of the '635 patent, the Examiner rejected 1-13 and 15-19 and objected to claims 14-20. Ex. 1007 at 2. Claims 1, 2, 4-13, and 15-19 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by *Mitchell* (U.S. 2011/0054573). Ex. 1007 at 5 - 9. Ex. 1017. "Claims 14 and 20 were objected to as being dependent upon a rejected base claim, but [the Examiner indicated those claims] would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims". Ex. 1007 at 11. A telephone interview was conducted on March 7, 2019 and a corresponding response was filed by Patent Owner on March 18, 2019, cancelling several claims and adding new claims. Ex. 1007 at 15-21, 23-25. On May 28, 2019, the Office issued a second Office Action rejecting claims 1,2,4-6, 8, 10, 13-15, 21-27 and 30. Ex. 1007 at 27. The Office Action indicated claims 28 and 29 as being allowable. Ex. 1007 at 44. On June 14, 2019, the Patent Owner cancelled claims 1-20, 22, 26-28, and added new claims 31-44. Ex. 1007 at 44. On July 10, 2019, a Notice of Allowance was issued along with an examiner's amendment to cure informalities

to claim numbering. Ex. 1007 at 46-48. However, no rejection was given for any of the new claims added, and no reasoning as to why the application was allowed was provided. Ex. 1007 at 63. On October 21, 2019, the Patent Owner submitted an Information Disclosure Statement, and on October 21, 2019, a second Notice of allowance was issued. Ex. 1007 at 63. The second Notice of Allowance provided no reasoning as to why the application was allowed. On October 30, 2019, the Office provided an issue notification and the issue date of the '635 patent was November 19, 2019. Ex. 1007 at 64. Neither *Dijkstra* nor *Norwood* were considered during the original prosecution.

84. The '635 patent was originally issued with claims very similar to the challenged claims of the '719 patent. The chart below compares the original unamended issued claim 1 of the '635 patent and the challenged claim 1 of the '719 patent.

Challenged claims of the '719 patent, Claim 1	Original Issued Unamended, Claim 1, '635 Patent (Ex. 1006)
1[pre] A method for providing a light therapy treatment, comprising:	A <i>light therapy system</i> , comprising:
1[a] providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light;	a <i>first light therapy device comprising a first housing, a first plurality of lights arranged and configured to emit at least one of red light and near infrared light</i> , and a first

	communication module communicatively coupled to the first plurality of lights and located within the first housing
1[b] providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light;	a <i>second light therapy device comprising a second housing, a second plurality of lights arranged and configured to emit at least one of red light and near infrared light</i> , and a second communication module communicatively coupled to the second plurality of lights and located within the second housing,
1[c] communicatively coupling the first light therapy device directly to the second light therapy device;	wherein the <i>first communication module is configured to communicate directly with the second communication module</i> ;
1[d] emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights;	a first light therapy device comprising a first housing, a first plurality of lights <i>arranged and configured to emit at least one of red light and near infrared light</i> , and a first communication module communicatively coupled to the first plurality of lights and located within the first housing a second light therapy device comprising a second housing, a second plurality of lights <i>arranged and configured to emit at least one of red light and near infrared light</i> , and a second communication module communicatively coupled to the second

	plurality of lights and located within the second housing, a first control panel coupled to the first housing and communicatively coupled to the first communication module, the first control panel comprising <i>a first plurality of input buttons and a first pair of indication lights communicatively coupled to the first plurality of input buttons, the first pair of indication lights arranged and configured to indicate whether a portion of red lights of the first plurality of lights is emitting red light</i> and whether a portion of near infrared lights of the first plurality of lights is emitting near infrared light a second control panel coupled to the second housing and communicatively coupled to the second communication module, the second control panel comprising <i>a second plurality of input buttons and a second pair of indication lights communicatively coupled to the second plurality of input buttons, the second pair of indication lights arranged and configured to indicate whether a portion of red lights of the second plurality of lights is emitting red light</i> and whether a portion of near infrared lights of the second plurality of lights is emitting near infrared light.
1[e] placing the first light therapy device in a lead mode; and placing the	<i>Not present in the unamended claim</i>

second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.	
<i>Not present in independent claim 1 but present in dependent claims 2 & 3 (control panel) and dependent claim 11 (indication lights).</i>	a first control panel coupled to the first housing and communicatively coupled to the first communication module, the first control panel comprising a first plurality of input buttons and a first pair of indication lights communicatively coupled to the first plurality of input buttons, the first pair of indication lights arranged and configured to indicate whether a portion of red lights of the first plurality of lights is emitting red light and whether a portion of near infrared lights of the first plurality of lights is emitting near infrared light
<i>Not present in independent claim 1 but present in dependent claims 2 & 3 (control panel) and dependent claim 11 (indication lights).</i>	a second control panel coupled to the second housing and communicatively coupled to the second communication module, the second control panel comprising a second plurality of input buttons and a second pair of indication lights communicatively coupled to the second plurality of input buttons, the second pair of indication lights arranged and configured to indicate whether a portion of red lights of the second plurality of lights is emitting red light and whether a portion of near infrared lights of the second plurality of lights is emitting near infrared light.

85. A comparison of the two claims reveals that each have the same limitations, with the exception of the lead mode and follow mode limitations (e.g. 1[e]).

86. On September 1, 2021, during the pendency of the application for the '719 patent, an *ex parte* reexamination petition was filed challenging the claims 1-20 of the '635 patent. Ex. 1008 at 1-77. Of particular relevance, the claims were challenged as unpatentable under 35 USC §102 as being anticipated by *Dijkstra*, or alternatively under 35 USC §103(a) as being obvious over *Dijkstra*. Ex. 1008 at 8-11 [Ground 1].

87. During this time frame, on September 29, 2021, the Patent Owner for the pending '719 patent submitted an IDS which included, among many references, *Dijkstra*. Ex. 1003 at 23.

88. On October 7, 2021, the Office issued an order granting the *ex parte* reexamination of the challenged claims of the '635 patent. Ex. 1008 at 78-91. In the Order, the Office found that a substantial new question of patentability (SNQP) existed based on *Dijkstra* as well as five other references included in the petition. Ex. 1008 at 84-85.

89. On November 10, 2021, the Examiner issued an Office Action rejecting claims 1-4 and claims 9-20 of the '635 patent under 35 U.S.C. 102(a)(2)

as being anticipated by *Dijkstra*. Ex. 1008 at 92-112. The Examiner further rejected claims 11, 13, 18 and 20 under 35 U.S.C. 103(a) as being unpatentable over *Dijkstra*. Ex. 1008 at 96. In particular, the Examiner found that, among other things, *Dijkstra* teaches:

- a light therapy system (e.g. 200 in Fig. 8).
- a first light therapy device 200 comprising a first housing 210,
- a first plurality of lights (array per [0034]), arranged and configured to emit at least one of red light and near infrared light (at [0059-0063])
- and a first communication module communicatively coupled to the first plurality of lights and located within the first housing
- a second light therapy device (other 200 in Figure 8) comprising a second housing (see Figure 8)
- a second plurality of lights arranged and configured to emit at least one of red light and near infrared light,
- a second communication module communicatively coupled to the second plurality of lights and located within the second housing
- wherein the first communication module is configured to communicate directly with the second communication module;
- a first control panel coupled to the first housing and communicatively coupled to the first communication module (see [0090] and the discussion of a touchscreen display that allows for user input)
- the first control panel comprising a first plurality of input buttons (inherent to a touchscreen)
- a first pair of indication lights communicatively coupled to the first plurality of input buttons,

- the first pair of indication lights arranged and configured to indicate whether a portion of red lights of the first plurality of lights is emitting red light and whether a portion of near infrared lights of the first plurality of lights is emitting near infrared light
- a touchscreen display for selecting type of treatment, time and intensity.
- a third light therapy device comprising a third housing, a third plurality of lights arranged and configured to emit at least one of red light and near infrared light, and a third communication module communicatively coupled to the third plurality of lights and located within the third housing wherein the third communication module is configured to communicate directly with at least one of the first communication module and the second communication module
- a fourth light therapy device comprising a fourth housing, a fourth plurality of lights arranged and configured to emit at least one of red light and near infrared light, and a fourth communication module communicatively coupled to the fourth plurality of lights and located within the fourth housing
- the first light therapy device, second light therapy device, third light therapy device, and fourth light therapy device are communicatively coupled in at least one of series and parallel wired connections
- plurality of input buttons comprises a first time button configured to control a treatment time of the first light therapy device, a first play/pause button, and a first mode button configured to cause light to be emitted from at least a portion of the first plurality of lights, and cause light to not be emitted from at least a portion of the first plurality of lights
- first press of the first mode button causes at least a portion of red lights of the first plurality of lights to emit red light and at least a portion of near infrared lights of the first plurality of lights to not emit near infrared light, and a second press of the first mode button causes

at least a portion of red lights of the first plurality of lights to not emit red light.

Ex. 1008 at 96-104.

90. With respect to claim 5, the Examiner found that *Dijkstra* teaches that the first light therapy device and the second light therapy device are each configured to operate in one of a lead mode, a follow mode (master and slave at [0099]), wherein when the first light therapy device operates in the lead mode and the second light therapy device operates in the follow mode the second light therapy device performs operations as instructed by the first light therapy device.” Ex. 1008 at 106. However, because “the Request does not identify where *Dijkstra* teaches a neutral mode,” the Examiner confirmed claim 5 as patentable. Ex. 1008 at 106.

91. The challenged claims of the ’719 patent do not include any limitations directed to a neutral mode.

92. On December 6, 2021, the Office issued a Reexam Interview Summary. Ex. 1008 at 115-116. In that summary, the Office included an “Agenda for Examiner Interview on December 2, 2021” submitted by the Patent Owner. Ex. 1008 at 118. In that Agenda, the Patent Owner proposed an amended claim 1 with the inclusion of “the subject matter of allowable claim 5 (devices configured to operate in lead mode, follow mode, and *neutral mode*). Notably, the Patent Owner

admitted that “[n]eutral mode is the key novel aspect that was indicated as allowable over the art cited by the petition requestor.” *Id.*

93. On December 15, 2021, the Patent Owner submitted an interview summary, amended claims and remarks in response. Ex. 1008 at 121-135. In particular, the Patent Owner amended Claim 1 to include, “wherein the first light therapy device and the second light therapy device are each configured to operate in one of a lead mode, a follow mode, and a neutral mode, wherein when the first light therapy device operates in the lead mode and the second light therapy device operates in the follow mode the second light therapy device performs operations as instructed by the first light therapy device.” Ex. 1008 at 134. The Patent Owner noted that “the subject matter added to Claim 1 was previously presented in Claim 5, which was confirmed as allowable over the cited prior art.” *Id.* The subject matter of claim referred to is the additional limitation of a neutral mode.

94. The challenged claims of the ’719 patent include a limitation related to “lead mode” and “follow mode” like the reexamined claims of the ’635 patent. The challenged claims of the ’719 patent, however, *do not* include a neutral mode limitation which places them on par with the claims rejected during the reexamination of the ’635 patent.

95. In my opinion, the challenged claims of the '719 patent, which do not include the proclaimed "key novel aspect" of neutral mode, are very similar to those claims rejected over *Dijkstra* during the reexamination of the '635 patent claims. Based on my review of the *ex parte* reexamination history, it is my opinion that *Dijkstra* discloses all the limitations of the challenged claims of the '635 patent as applied by the Examiner in the reexamination. Moreover, it is my opinion that the Patent Owner understood the scope of *Dijkstra's* disclosure to encompass all the limitations of the challenged claims including the lead mode and follow mode limitations of claim 5 and was forced to add an additional limitation to overcome the *Dijkstra* rejections.

96. *Dijkstra* was never raised during the prosecution of the '719 patent.

2. The '495 Patent Prosecution History & Reexamination

97. The '495 patent was filed as application no. 16/584,784 on September 26, 2019 and was based on continuation application no. 16/227/289 filed on October 20, 2018, which issued as the '635 patent. Ex. 1009 (21), (63).

98. During the examination of the '495 patent, the Examiner rejected 1-7 and 9-20-19 and objected to claim 8. Ex. 1010 at 2. "Claims 12-20 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Adam et al. (U.S. 2007/0217199)." Ex. 1010 at 3. "Claims 1-7, 10, and 11 were rejected under 35

U.S. C. 103 as being unpatentable over Mitchell (U.S. 2011 /0054573) in view of Adam.” “Claims 1, 2, 6, 7, and 9-11 are rejected under 35 U.S.C. 103 as being unpatentable over Adam.” Ex. 1010 at 8.

99. Claim 8 was objected to as being dependent upon a rejected base claim, but the Examiner indicated those claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Ex. 1010 at 11.

100. A telephone interview was conducted and a corresponding response was filed by Patent Owner cancelling several claims and adding new claims. Ex. 1010 at 13-17. Rather than contest the application of the prior art, the Patent Owner merely “amended claim 1 to incorporate the allowable subject matter of claim 8, including intervening claim 6, as originally filed.” Ex. 1010 at 15.

101. On March 11, 2020, a Notice of Allowance was issued. Ex. 1010 at 24 - 28.

102. Neither *Dijkstra* nor *Norwood* were considered during the original prosecution.

103. The '495 patent was originally issued with claims very similar to the challenged claims of the '719 patent. The chart below compares the original

unamended issued claim 1 of the '635 and the challenged claim 1 of the '719 patent.

Challenged claims of the '719 patent, Claim 1	Original Issued Unamended, Claim 1, '495 Patent (1009)
1[pre] A method for providing a light therapy treatment, comprising:	1[pre] A <i>light therapy system</i> , comprising:
1[a] providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light;	1[a] a <i>first light therapy device comprising a first housing and a first plurality of lights coupled to the first housing and configured to emit at least one of red light and near infrared light</i> , wherein the first light therapy device is configured to operate in at least one of a lead mode and a follow mode, and wherein the first light therapy device comprises a first switch configured to select at least one of the lead mode and the follow mode; and
1[b] providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light;	1[b] a second light therapy device configured to communicate with the first light therapy device, <i>the second light therapy device comprising a second housing, a second plurality of lights coupled to the second housing and configured to emit at least one of red light and near infrared light</i> , wherein the second light therapy device is configured to operate in at least one of the lead mode and the follow mode, and wherein the second light therapy device comprises a second switch configured to select at least one of the lead mode and the follow mode,

1[c] communicatively coupling the first light therapy device directly to the second light therapy device;	1[b] 1[b] <i>a second light therapy device configured to communicate with the first light therapy device</i>, the second light therapy device comprising a second housing, a second plurality of lights coupled to the second housing and configured to emit at least one of red light and near infrared light, wherein the second light therapy device is configured to operate in at least one of the lead mode and the follow mode, and wherein the second light therapy device comprises a second switch configured to select at least one of the lead mode and the follow mode,
1[d] emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights;	1[a] <i>a first light therapy device comprising a first housing and a first plurality of lights coupled to the first housing and configured to emit at least one of red light and near infrared light</i>, wherein the first light therapy device is configured to operate in at least one of a lead mode and a follow mode, and wherein the first light therapy device comprises a first switch configured to select at least one of the lead mode and the follow mode; 1[b] a second light therapy device configured to communicate with the first light therapy device, the second light therapy device comprising a second housing, a second plurality of lights coupled to the second housing and <i>configured to emit at least one of red light and near infrared light</i>,

	wherein the second light therapy device is configured to operate in at least one of the lead mode and the follow mode, and wherein the second light therapy device comprises a second switch configured to select at least one of the lead mode and the follow mode,
1[e] placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.	1[a] a first light therapy device comprising a first housing and a first plurality of lights coupled to the first housing and configured to emit at least one of red light and near infrared light, <i>wherein the first light therapy device is configured to operate in at least one of a lead mode and a follow mode, and wherein the first light therapy device comprises a first switch configured to select at least one of the lead mode and the follow mode;</i> 1[b] a second light therapy device configured to communicate with the first light therapy device, the second light therapy device comprising a second housing, a second plurality of lights coupled to the second housing and configured to emit at least one of red light and near infrared light, <i>wherein the second light therapy device is configured to operate in at least one of the lead mode and the follow mode, and wherein the second light therapy device comprises a second switch configured to select at least one of the lead mode and the follow mode,</i>

	1[c] wherein <i>when the first light therapy device operates in the lead mode and the second light therapy device operates in the follow mode the second light therapy device performs operations as instructed by the first light therapy device, and when the second light therapy device operates in the lead mode and the first light therapy device operates in the follow mode the first light therapy device performs operations as instructed by the second light therapy device.</i>
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104. A comparison of the two claim reveals that each have the same limitations.

105. On September 1, 2021, during the pendency of '719 application, an *ex parte* reexamination petition was filed challenging the claims 1-20 of the '495 patent. Ex. 1011 at 1-89. Of particular relevance, the claims were challenged as unpatentable under 35 USC §103(a) as being obvious over *Dijkstra* in view of *Norwood*. Ex. 1011 at 54-67 [Ground 5].

106. On September 29, 2021, the Patent Owner for the challenged '719 patent filed an IDS which included, among many references, a disclosure of *Dijkstra*. Ex. 1003 at 23.

107. On October 10, 2021, (three days after it granted the '635 patent *ex parte* reexamination petition), the Office issued a second order granting the *ex*

parte reexamination of the challenged claims of the '495 patent. Ex. 1011 at 90-101. In the Order, the Office found that a substantial new question of patentability (SNQP) existed based on *Dijkstra/Norwood* as well as four other references included in the petition. Ex. 1011 at 92-93, 97.

108. On November 3, 2021, the Examiner issued an Office Action rejecting claims 1-20 of the '495 patent under 35 U.S.C. 102(a)(2) as being anticipated by *Dijkstra*. Ex. 1011 at 102-119. The Examiner further rejected claims 1-20 under 35 U.S.C. 103(a) as being unpatentable over *Dijkstra* in view of *Norwood*. Ex. 1011 at 106. In particular, the Examiner found that *Dijkstra* teaches:

- “a light therapy system (e.g. 200 in Fig. 8), comprising:”
- “a first light therapy device 200 comprising a first housing 210 and”
- “a first plurality of lights (array per [0034]) coupled to the first housing and configured to emit at least one of red light and near infrared light (at [0059-0063])”
- “wherein the first light therapy device is configured to operate in at least one of a lead mode and a follow mode (master and slave at [0099],) and wherein the first light therapy device comprises a first switch configured to select at least one of the lead mode and the follow mode”
- “Dijkstra states that all devices are the identical a [0096] and states that "in some systems, a master is elected from a group of eligible devices, with the other devices acting in the role of slaves" at [0101], those having ordinary skill in the art before the invention would have understood this to mean that there is a switch to enable the preferred mode)”

- “a second light therapy device (other 200 in Figure 8) configured to communicate with the first light therapy device per [0096], the second light therapy device comprising a second housing (see Figure 8), a second plurality of lights coupled to the second housing (see above discussion of the array teaching) and configured to emit at least one of red light and near infrared light (at [0059-0063])”
- “wherein the second light therapy device is configured to operate in at least one of the lead mode and the follow mode (note above discussion of master and slave modes), and wherein the second light therapy device comprises a second switch configured to select at least one of the lead mode and the follow mode (note the above discussion of identical devices, thus each has the inherent switch).”
- “Dijkstra teaches that the first light therapy device and the second light therapy device are configured to communicate directly via a wired connection at [0096].”
- “Dijkstra teaches that the first light therapy device comprises a first plurality of communication ports and the second light therapy device comprises a second plurality of communication ports, the light therapy system further comprising a communication cable having a first end coupled to a first port of the first plurality of communication ports, and a second end coupled to a second port of the second plurality of communication ports. Those having ordinary skill in the art before the invention would have understood that the wired connection embodiment inherently includes such a cable and ports on each device.”
- “Dijkstra teaches a first control panel (see user power switch at [0072]) coupled to the first light therapy device, the first control panel comprising a first input button; and a second control panel coupled to the second light therapy device”
- “second control panel comprising a second input button, since the devices are identical [0096] then the second light therapy device also includes such a switch/control panel.”

- “Dijkstra teaches the first input button comprises at least one of a time button, a play/pause button, and a mode button.”
- “Dijkstra teaches a first pair of indication lights coupled to the first control panel and communicatively coupled to the first input button, the first pair of indication lights configured to indicate whether the first plurality of lights is emitting red light, infrared light, or both; and a second pair of indication lights coupled to the second control panel and communicatively coupled to the second input button, the second pair of indication lights configured to indicate whether the second plurality of lights is emitting red light, infrared light, or both
- “Dijkstra describes a touchscreen display for selecting type of treatment, time and intensity. It is considered inherent that such a display would indicate the types of light used in the treatment. To the extent one might disagree, merely adding such indicator or "on" lights would have been an obvious design choice to those of ordinary skill in the art before the invention as such "on" lights are typical on electronics in general to establish when a device or portion thereof is in operation.”
- “Dijkstra teaches a first control panel (see user power switch at [0072]) coupled to the first light therapy device, the first control panel comprising a first input button.”

Ex. 1011 at 106-112.

109. On December 7, 2021, the Office issued a Reexam Interview Summary. Ex. 1011 at 120-132. The Examiner noted “[r]egarding the time and intensity arguments, the panel offered that Dijkstra teaches a touch screen, which would inherently have virtual buttons to control these parameters and further teaches that the units are identical at [0096]. Patent Owner's representatives stated that physical buttons have advantages over a touch screen (such as cost) and that it

would be difficult to add such buttons in place of the touch screen of Dijkstra.” Ex. 1011 at 122.

110. On December 16, 2021, the Patent Owner submitted amended claims and remarks in response. Ex. 1011 at 1011-148. In particular, the Patent Owner amended Claim 1 to include, sidewall limitations “wherein the sidewall of the first housing is configured to physically contact the sidewall of the second housing.” Ex. 1011 at 34.

111. The Patent Owner then argued that “[o]f the references that disclose multiple devices (i.e., Dijkstra, Ferguson, and Lim), Patent Owner respectfully asserts that all three fail to disclose or make obvious physical contact between a sidewall of a first housing and a sidewall of a second housing, as claimed in amended Claim 1.” Ex. 1011 at 140. The Patent Owner argued that “Dijkstra discloses cylindrical light therapy devices configured to surround a user without physical contact between the devices. Figures 8 and 9 (annotated below) illustrate that the device of Dijkstra are intended to be remotely located with respect to each other, such that the devices are able to treat different parts of the body.” Ex. 1011 at 140-141.

112. The challenged claims of the ’719 patent include limitations related to “lead mode” and “follow mode” like the reexamined claims of the ’495 patent.

The challenged claims of the '719 patent, however, do not include the limitation where the sidewalls are configured to physically contact, which places them on par with the claims rejected during the reexamination of the '495 patent.

113. In my opinion, the challenged claims of the '719 patent, which do not include a configured to physically contact limitation, are very similar to those claims rejected over *Dijkstra/Norwood* during the reexamination of the '495 patent claims. Based on my review of the *ex parte* reexamination history, it is my opinion that *Dijkstra* discloses all the limitations of the challenged claims of the '495 patent as applied by the Examiner in the reexamination. Moreover, it is my opinion that the Patent Owner understood the scope of *Dijkstra's* disclosure to encompass all the limitations of the challenged claims including the lead mode, follow mode and switch limitations and was forced to add the additional limitations of “sidewalls” and “configured to physically contact” to overcome the *Dijkstra/Norwood* rejections.

114. *Dijkstra* was never raised during the prosecution of the '719 patent.
Ex. 1003.

3. The Prosecution History of the '172 Patent

115. The '172 patent was filed as application no. 17/665,475 on February 4, 2022. Ex. 1012, (21), (63). The '172 patent is related to the '719 patent and shares the same specification. Ex. 1012, (63).

116. During the examination of the '172 patent, the Patent Owner presented claims very similar to the challenged claims of the '719 patent. The chart below compares the original application claim 1 of the '172 and the challenged claim 1 of the '719 patent.

Challenged claims of the '719 patent, Claim 1	Original Application Claim 1, '172 Patent (Ex. 1013)
1[pre] A method for providing a light therapy treatment, comprising:	A <i>light therapy system</i> , comprising:
1[a] providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light;	a <i>first light therapy device comprising a first housing, a first plurality of lights arranged and configured to emit red light or near-infrared light;</i>
1[b] providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light;	a <i>second light therapy device comprising a second housing, a second plurality of lights arranged and configured to emit red light or near-infrared light, the second light therapy device,</i>

1[c] communicatively coupling the first light therapy device directly to the second light therapy device;	configured to <i>communicatively couple to the first light therapy device</i> , device instructs the first light therapy device to perform operations.
1[d] emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights;	a first light therapy device comprising a first housing, a first plurality of lights <i>arranged and configured to emit red light or near-infrared light ...</i> a second light therapy device comprising a second housing, a second plurality of lights arranged and <i>configured to emit red light or near-infrared light, the second light therapy device</i> ,
1[e] placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.	wherein the first light therapy device and the second light therapy device are each <i>configured to operate in a lead mode and a follow mode</i> , and wherein, when the first light therapy device operates in the lead mode and the second light therapy device operates in the follow mode, the first light therapy device <i>instructs the second light therapy device to perform operations</i> , and when the second light therapy device operates in the lead mode and the first light therapy device operates in the follow mode, the second light therapy device <i>instructs the first light therapy device to perform operations</i> .

117. A comparison of the two claim reveals that each have the same limitations, albeit worded slightly differently.

118. In response to the application for the '172 patent, on May 6, 2022, the Examiner rejected all pending claims 12-20 as being anticipated by *Mitchell*. Ex. 1013 at 1-9. Ex. 1017. Before the Patent Owner responded, on July 5, 2022, the Office issued a Superseding Office Action in which the Examiner added rejections of Claims 1-18 under 35 U.S.C. 103 as being unpatentable over *Dijkstra* in view of *Norwood* et al. (U.S. Patent No. 7,932,482). Ex. 1013 at 9-26.

119. In particular the Examiner found that *Dijkstra* disclosed:

- In “Figs. 1, 2, 8, and 9 a light therapy system, comprising”:
- “a first light therapy device (200) comprising a first housing (210), a first plurality of lights (LED and lasers, paragraphs [0019], [0129], [0133], claim 3)
- arranged and configured to emit red light or near-infrared light (*Dijkstra* et al. discloses light in a range of 100-1600 nm wavelength, paragraphs [0063, 0067], it is noted that this wavelength range includes red light and near -infrared
- light; wavelengths in the range of 800-1072 nm in paragraph [0037] which is in the near-infrared range; wavelengths in the range of 632-904 nm and 660-nm - 905 nm in paragraph [0129] which includes the red light range and the near-infrared range; and wavelength of 1072 nanometers in paragraph [0130] which is in the near-infrared range));
- a second light therapy device (200, it is noted that Fig. 8 shows two therapy devices and Fig. 9 shows four therapy devices) comprising a

second housing (210), a second plurality of lights (LEDs and lasers, paragraphs [0019], [0129],[0133], claim 3)

- arranged and configured to emit red light or near-infrared light (Dijkstra et al. discloses light in a range of 100-1600 nm wavelength, paragraphs [0063, 0067], it is noted that this wavelength range includes red light and near-infrared light; wavelengths in the range of 800- 1072 nm in paragraph [0037] which is in the near-infrared range; wavelengths in the range of 632- 904 nm and 660-nm - 905 nm in paragraph [0129] which includes the red light range and the near-infrared range; and wavelength of 1072 nanometers in paragraph [0130] which is in the near-infrared range),
- the second light therapy device configured to communicatively couple to the first light therapy device (see paragraphs [0099, 0101]), wherein the first light therapy device and the
- second light therapy device are each configured to operate in a lead mode and a follow mode (Dijkstra appears to indicate that any of the therapy devices (200) can act as the lead/master or the follow/slave, see paragraph [0101]), and wherein, when the first light therapy device (200) operates in the lead mode and the second light therapy device (200) operates in the follow mode, the first light therapy device (200) instructs the second light therapy device to perform operations,
- and when the second light therapy device (200) operates in the lead mode and the first light therapy device operates in the follow mode, the second light therapy device instructs the first light therapy device to perform operations (paragraph [0099] discloses how the light therapy devices are controlled and paragraph [0101] appears to indicate that any of the therapy devices (200) can act as the lead/master or the follow/slave).”
- “Dijkstra discloses that each of the first control panel, the second control panel, the third control panel, and the fourth control panel comprises a respective plurality of input buttons configured to control a treatment time, a type of light emitted, or a commencement and a

pausing of light emission (see paragraphs [0026] and [0072] and claim 11). ”

Ex. 1013 at 18-24.

120. The Examiner noted that although “it is not entirely clear whether Dijkstra et al. discloses that the first light therapy device and the second light therapy device are each configured to operate in a lead mode and a follow mode an additional reference (Norwood et al.) has been provided to teach this limitation. Norwood et al. discloses in an analogous art of lighting a plurality of illuminated diffusers (600) in which each diffuser includes a switch (642) and circuitry that allows each diffuser (600) to operate in either a lead/master mode or a follow/slave mode, see column 23, lines 20-53 and Fig. 17 of Norwood et al. In view of the teachings of Norwood et al. it would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to modify Dijkstra et al. by adding a switch (642) and circuitry to each of the light therapy devices (200) since this would allow each of the light therapy devices (200) to act as either the lead or the follower which makes the system of light therapy devices more flexible, e.g. any of the devices can be a lead or a follower. In addition, the addition of the switch (642) and circuitry to each of the light therapy devices allows the mode (lead mode, follow mode) of each light therapy device (200) to be changed in an easier and faster manner.” Ex. 1013 at 20.

121. Like the Examiner, it is my opinion, as detailed below, that *Dijkstra* discloses that the first light therapy device and the second light therapy device are each configured to operate in a lead mode and a follow mode.

122. Like the Examiner, it is also my opinion, as discussed below, that *Norwood* discloses the analogous art of lighting a plurality of illuminated diffusers where the diffuser includes a switch and circuitry that allows each diffuser to operate in either a lead/master mode or a follow/slave mode. Like the Examiner, it is also my opinion that POSITA would consider the inclusion of a switch to initiate either a lead/master mode or a follow/slave mode to be an obvious design modification to *Dijkstra*. It would be natural to incorporate a switch into *Dijkstra*'s touchscreen control panel and would allow for easy, flexible control of the light therapy devices. Moreover, because *Dijkstra* teaches that each light therapy device is identical, Ex. 1004 at [0096], a POSITA would incorporate a switch into each device.

123. Doing so would be well within the capabilities of a person of ordinary skill in the art. More importantly incorporating the switch into each device would simplify the design, manufacturing, assembly and installation of the devices of *Dijkstra* while also reducing production costs.

124. If the devices of *Dijkstra* were designed to either be master or slave units, then the manufacturer would need to design and produce two different types of units, each of which would have its own manufacturing assembly lines, work instructions, quality control/testing requirements and warehouse locations. Final installation would require the correct number of master and the personnel installing the units would need to ensure that they were using either a master unit or a slave unit as required.

125. Since the necessary switch would be a small and low-cost component, manufacturing efficiency and cost could be reduced by simply incorporating the switch into each unit. This would allow for manufacturing using a single manufacturing assembly line, set of work instructions, and set of quality control/testing equipment and requirements. The savings associated with a common manufacturing process would more than compensate for the cost of a switch. Additionally, since all units would be identical, they could all be stored in a common location. Installation would merely require the requisite number of units without concern about the correct number of master and slave units. Further, the by allowing the personnel installing the units to determine which operate as master units and which operate as slave units, installation time is decreased resulting in additional economic benefits.

126. For these reasons alone, a person of ordinary skill in the art would be highly motivated to use such a switch to determine the master/slave operation of a unit as opposed to dedicated master or slave units.

127. The Patent Owner responded to the *Dijkstra/Norwood* rejection with remarks and claim amendments on September 26, 2022 (several months after the challenged claims of the '719 patent issued). Ex. 1013 at 27-42. The Patent Owner “amended independent Claim 12 to recite, in part, ‘when the first light therapy device operates in the neutral mode, the first light therapy device ignores instructions from the second light therapy device.’” Ex. 1013 at 41. Patent Owner argued that “neither Dijkstra nor Norwood, taken alone or in combination, teaches, discloses, or make obvious at least the recited element of amended Claim 12.” Ex. 1013 at 41.

128. Particularly germane to the challenged claims here, the Patent Owner admitted that “Dijkstra and Norwood both disclose a ‘master/slave mode;’ however, neither discloses an explicit neutral mode. Insofar as the devices of Dijkstra and/or Norwood may be configured to operate independently (i.e., in a neutral mode of sorts), both references still fail to teach or disclose a device operating in a neutral mode such that the device ‘ignores instructions’ from another device, as recited in amended Claim 12.” Ex. 1013 at 41.

129. After the amendments and remarks the Examiner issued a notice of allowance on October 25, 2022. Ex. 1013 at 43-49.

130. In my opinion, the Patent Owner's statement regarding the disclosure of *Dijkstra* and *Norwood* in the context of the '172 patent is an admission that *Dijkstra* and *Norwood* both disclose a "master/slave mode." As discussed herein, master/slave mode correlates to the lead/follow mode of the challenged claims. Notably, the '719 patent claims do not include a limitation directed to a "neutral mode" such that the device "ignores instructions" from another device, which the Patent Owner argued *Dijkstra* and *Norwood* failed to disclose.

131. In all three instances of the reexamination of the '635 and '495 patents and the prosecution of the '172 patent, the Patent Owner was confronted with *Dijkstra* and *Dijkstra/Norwood* rejections that read directly onto claims that are essentially the same as the challenged claims of the '719 patent. In each instance, the Patent Owner was required to amend the claim to include additional limitations to overcome the *Dijkstra* and *Dijkstra/Norwood* rejections. Those additional limitations or any other limitations, are not present in the challenged claims. As discussed below, I, like the examiners in the reexamination of the '635 and '495 patents and the prosecution of the '172 patent, am of the opinion that the

limitations found in the challenged claims of '719 patent are clearly and explicitly disclosed by *Dijkstra* and *Dijkstra/Norwood* and are therefore unpatentable.

VII. THE PRIOR ART

A. *Dijkstra*: U.S. Patent Publication No. 2019/0030359 A1

132. I understand that US 2019/0030359 A1 to *Dijkstra* ("*Dijkstra*") is prior art under 35 U.S.C. §102(a)(2) because it was filed October 2, 2018. Ex. 1004 (22).

B. *Norwood*: U.S. Patent Publication No. 2006/0237439

133. I understand that US 2006/0237439 A1 to *Norwood* ("*Norwood*") is prior art under 35 U.S.C. §102(a)(2) because it was filed as a PCT application on February 9, 2004 and published on October 26, 2006. Ex. 1005 (22), (65). US 2006/0237439 A1 to *Norwood* issued as U.S. Patent No. 7,932,482 on April 26, 2011. Citations herein are to US 2006/0237439 A1.

VIII. OVERVIEW OF CONCLUSIONS

134. I have reviewed and agree with the analysis in the Petition for *inter partes* review of the '719 patent. It is my opinion that each and every limitation of each and every challenged claim would have been obvious to a person of ordinary skill in the art at the time of the alleged invention in view of the prior art cited in

the Petition and further explained in this declaration. Below is a summary of my conclusions:

- **GROUND 1** – It is my opinion that claim claims 1, 2, 3, 9, 10, 11, 16, 17, 19 of the '719 patent are rendered obvious by *Dijkstra* and a POSITA's general knowledge.
- **GROUND 2** - It is my opinion that claim claims 1, 2, 3, 9, 10, 11, 16, 17, 19 of the '719 patent are rendered obvious by *Dijkstra*, a POSITA's general knowledge, and *Norwood*.

IX. RECITATION OF THE CHALLENGED CLAIMS

Claim 1
1[pre] A method for providing a light therapy treatment, comprising:
1[a] providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light;
1[b] providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light;
1[c] communicatively coupling the first light therapy device directly to the

second light therapy device;

1[d] emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights;

1[e] placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.

Claim 2

The method of claim 1, wherein the emitting at least one of red light and near infrared light from at least the portion of the first plurality of lights and at least the portion of the second plurality of lights is accomplished using a control panel coupled to the first housing of the first light therapy device.

Claim 3

The method of claim 2, further comprising pressing a first input button on the control panel of the first light therapy device, wherein the emitting occurs in response to the pressing.

Claim 9

The method of claim 2, further comprising pausing the emitting in response to

pressing a first input button on the control panel of the first light therapy device.

Claim 10

The method of claim 1, further comprising:

selecting the lead mode via a first switch coupled to the first light therapy device,

wherein the first light therapy device is placed in the lead mode via the first switch; and

selecting the follow mode via a second switch coupled to the second light therapy device,

wherein the second light therapy device is placed in the follow mode via the second switch.

Claim 11

The method of claim 1, further comprising indicating, via a first pair of indication lights on the first light therapy device, whether at least one of red light and near infrared light is being emitted from at least the portion of the first plurality of lights.

Claim 16

The method of claim 1, wherein communicatively coupling the first light

therapy device directly to the second light therapy device comprises coupling the first light therapy device and the second light therapy device via a wired connection.

Claim 17

The method of claim 16, wherein coupling the first light therapy device and the second light therapy device via the wired connection comprises:
inserting a first end of a communication cable into a first communication port on the first light therapy device; and
inserting a second end of the communication cable into a second communication port on the second light therapy device.

Claim 19

The method of claim 1, further comprising:
providing a third light therapy device comprising a third housing and a third plurality of lights configured to emit at least one of red light and near infrared light;
providing a fourth light therapy device comprising a fourth housing and a fourth plurality of lights configured to emit at least one of red light and near infrared light;

communicatively coupling each of the third light therapy device and the fourth light therapy device directly to at least one of the first light therapy device and the second light therapy device; and
emitting at least one of red light and near infrared light from at least a portion of the third plurality of lights and at least a portion of the fourth plurality of lights.

X. GROUND 1: CLAIMS 1, 2, 3, 9, 10, 11, 16, 17, 19 ARE OBVIOUS IN VIEW OF DIJKSTRA AND POSITA’S KNOWLEDGE

A. Overview of *Dijkstra*

135. *Dijkstra* is directed to “a light therapy system [] having two or more light therapy devices to provide maximum or full body treatment with minimum user intervention and body movement.” Ex. 1004, [0017]. As seen in Figure 9, *Dijkstra* teaches that the light therapy devices are arranged around the treatment subject for maximum exposure to therapeutic light and are communicatively couple together. Ex. 1004, [0099, 0101].

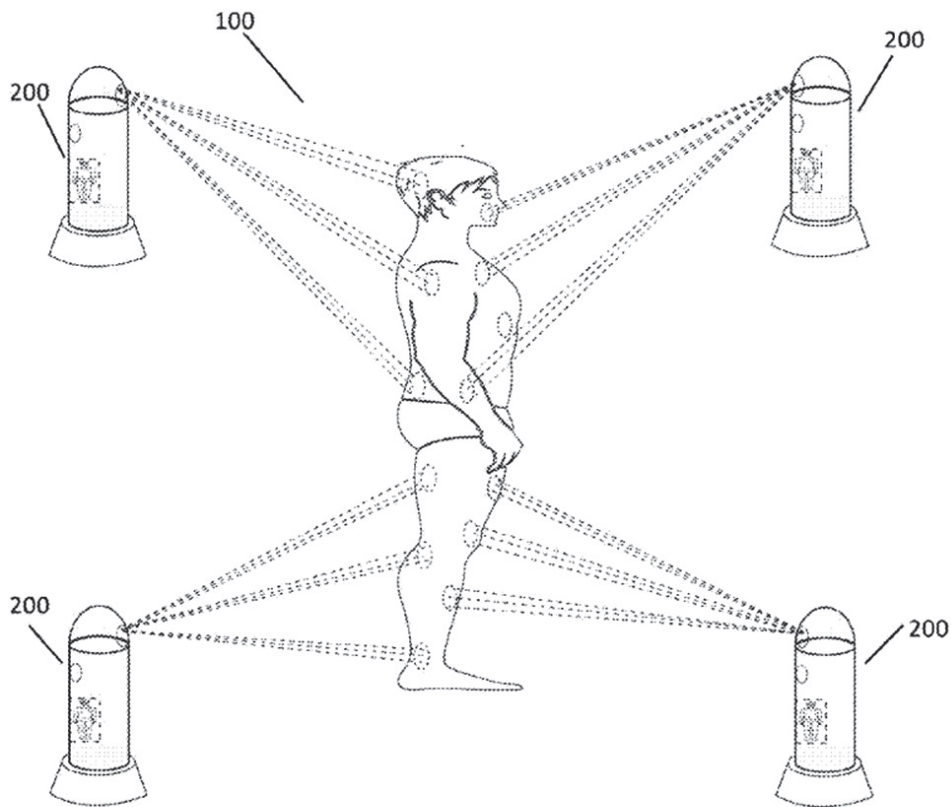


FIG. 9

136. *Dijkstra* discloses that both red and infrared light therapy wavelengths may be used for treatment. Ex. 1004, [0063, 0067]. *Dijkstra* teaches that the multiple light devices establish wired or wireless connection and synchronize for treatment. Ex. 1004, [0099, 0101]. To further the goal of providing “full body treatment by using different type of light therapies according to internal and external body conditions or diseases,” *Dijkstra* describes each therapy light device may be configured to operate in either a lead mode and a follow mode “where one device or process has unidirectional control over one or

more devices.” Ex. 1004, [0011, 0099, 0101]. In this “master-slave model,” “the master light therapy device has a controlling unit which is controlling the other slave light therapy devices, each of the slave light therapy devices is having a communication module to communicate with the master light therapy device and a light projection unit works as per the master light therapy device input.” Ex. 1004, [0011]. *Dijkstra* also describes “a touchscreen display mounted on the outer surface of the light therapy device acting as an input unit, in which the user can manually select and prioritize the external body condition and/or the internal body condition based upon his/her own intellect.” Ex. 1004, [0090]. This touchscreen allows “the user can determine the type of treatment required for a particular body condition and can also determine the time and intensity required for the treatment.” Ex. 1004, [0090].

B. Independent Claim 1

137. In my opinion, Claim 1 is rendered obvious by *Dijkstra* and POSITA’s knowledge.

1. [1Preamble] “A method for providing a light therapy treatment, comprising:”

138. To the extent the preamble is limiting, *Dijkstra* discloses a method for providing a light therapy treatment. Ex. 1004, [0001], [0096]. The ’719 patent teaches that “[p]hotobiomodulation therapy (or light therapy) is a therapeutic

technique that uses low-level wavelengths of light to improve health and treat a variety of health conditions, including skin issues, such as wrinkles, scars, and persistent wounds, among many other conditions.” Ex. 1001, at 1:42-45. Thus, the ’719 patent is directed to therapeutic techniques using light to treat at least skin issues and conditions.

139. *Dijkstra* describes “a light therapy system [] having two or more light therapy devices to provide maximum or full body treatment with minimum user intervention and body movement.” Ex. 1004, [0017]. A POSITA would understand that *Dijkstra* is directed to and discloses a light therapy system and that system’s use would disclose the claimed method.

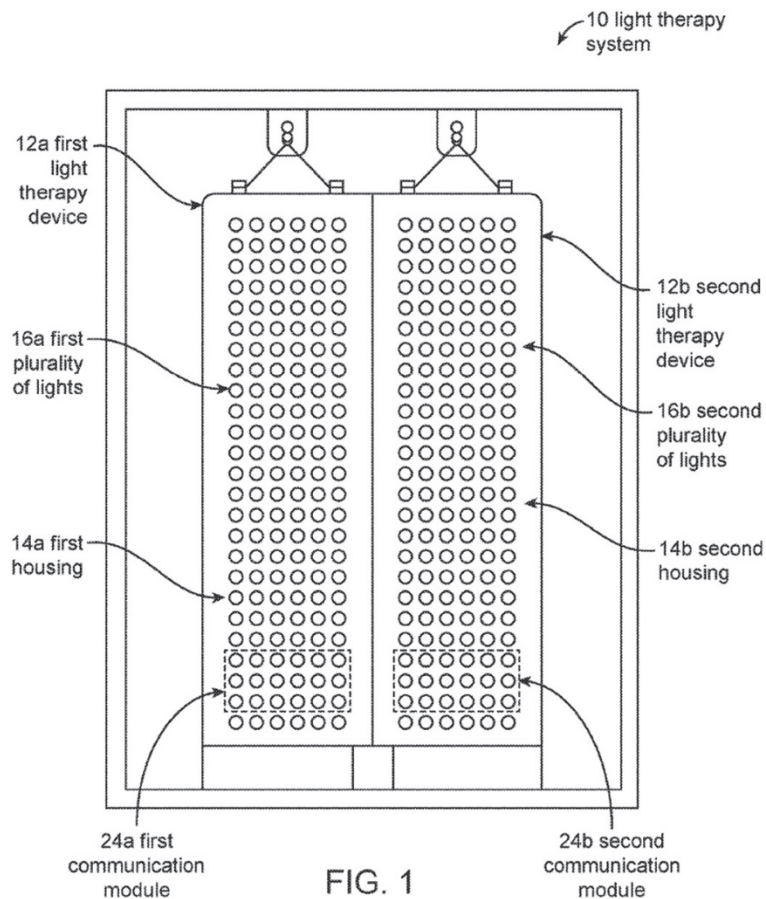
140. Notably, the Examiners in the reexamination of the ’635 and ’495 patents and the prosecution of the ’172 patent, also found that *Dijkstra* discloses a light therapy treatment device. *See infra* ¶¶80-131.

141. In my opinion, the preamble of claim 1 is met by the disclosure in *Dijkstra*.

2. [1a] “providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light”

142. *Dijkstra* discloses providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red

light and near infrared light. Referring to Figure 1, the '719 patent describes that “the first light therapy device 12a may have a first housing 14a, a first plurality of lights 16a, and a first communication module 24a” and “[i]n some embodiments, the first plurality of lights 16 a may be red lights, near infrared lights, or some combination of red lights and near infrared lights.” Ex. 1001, 5:16-21.



143. *Dijkstra* shows in Figs, 1, 2, 8 and 9 a light therapy system, comprising a first light therapy device (200) comprising a first housing (210) and a first plurality of lights arranged and configured to emit red light or near-infrared

light. Ex. 1004 [0019, 0129, 0133]. *Dijkstra* discloses that the light therapy device can emit light in a range of 100-1600 nm wavelength. Ex. 1004 [0063, 0067]. This wavelength range includes red light and near -infrared light; wavelengths in the range of 800-1072 nm (Ex. 1004, [0037]), which is in the near-infrared range; wavelengths in the range of 632-904 nm and 660-nm - 905 nm (Ex. 1004, [0129]) which includes the red light range and the near-infrared range and wavelength of 1072 nanometers (Ex. 1004, [0130]) which is in the near-infrared range.

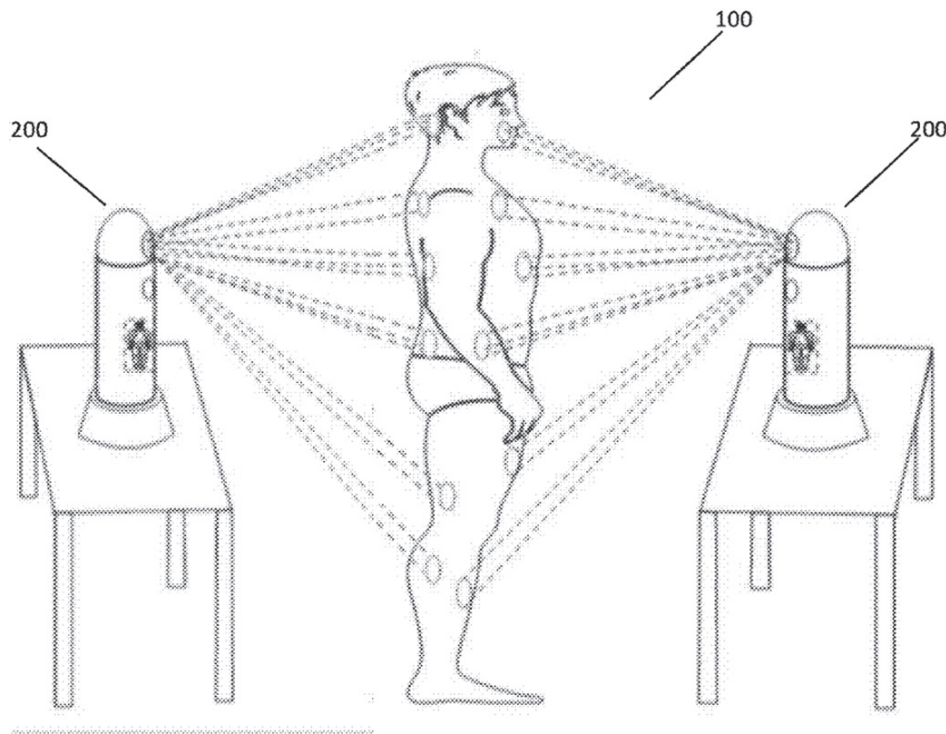


FIG. 8

144. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses a first light therapy device comprising a first housing and a first

plurality of lights configured to emit at least one of red light and near infrared light. *See infra* ¶¶80-131.

145. In my opinion, the limitation 1[a] of claim 1 is met by the disclosure in *Dijkstra*.

3. 1[b] “providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light”

146. *Dijkstra* discloses providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light. The '719 patent describes “the second light therapy device 12b may include a second housing 14b, a second plurality of lights 16b, and a second communication module 24b. The second plurality of lights 16b may be mechanically coupled to the second housing 14b. In some embodiments, the second plurality of lights 16b may be red lights, near infrared lights, or some combination of red lights and near infrared lights.” Ex. 1001, 5:26-35.

147. *Dijkstra* shows in Figs. 8 and 9 a light therapy system, comprising at least two light therapy devices (200), each with a housing (210) and configured to emit red and near-infrared light. Ex. 1004 [0019, 0063, 0067, 0129, 0133]. *Dijkstra* teaches that each light device is identical. Ex. 1004, [0096].

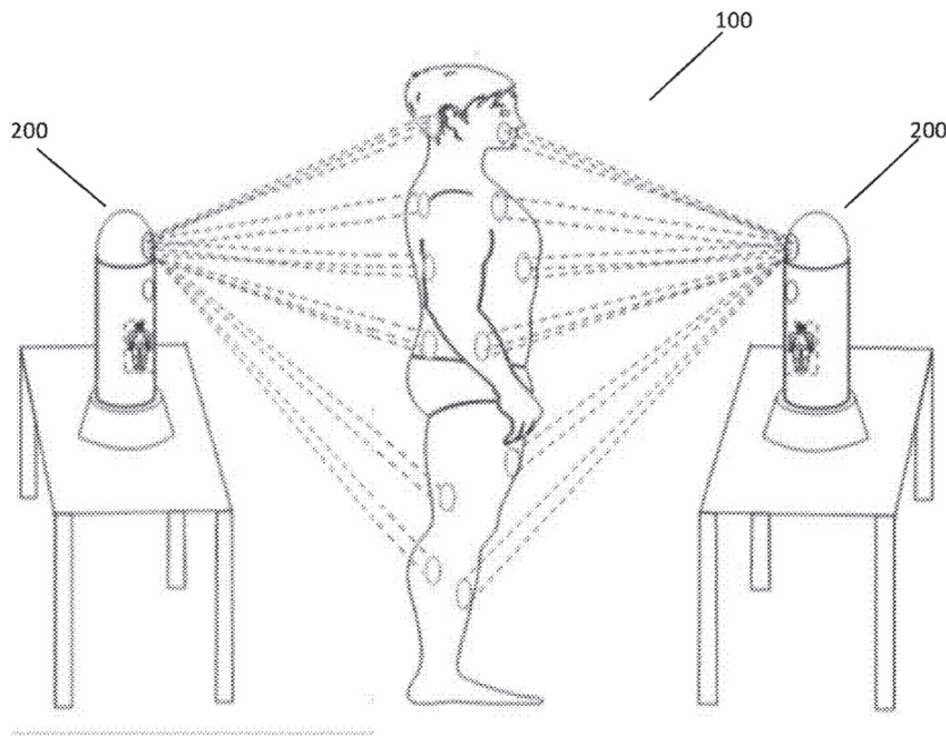


FIG. 8

148. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light. *See infra* ¶¶80-131.

149. In my opinion, the limitation 1[b] of claim 1 is met by the disclosure in *Dijkstra*.

4. 1[c] “communicatively coupling the first light therapy device directly to the second light therapy device;”

150. *Dijkstra* discloses communicatively coupling the first light therapy device directly to the second light therapy device. The '719 patent describes “the

light therapy system 10 having a second light therapy device 12b, which is communicatively coupled to the first light therapy device 12a.” Ex. 1001, 5:25-28. The ’719 patent explains that “the light therapy devices 12 are communicatively coupled to each other. In this regard, the first therapy device 12a may be communicatively coupled to the second light therapy device 12b whereby either of the devices 12 is able to control the other respective device 12. Such functionality may allow one or more light devices 12 to act as one cohesive system to more effectively provide treatment for a patient.” Ex. 1001, 5:39-46.

151. *Dijkstra* teaches that the second light therapy device is configured to communicatively couple to the first light therapy device via either a wired or wireless connection. Ex. 1004, [0099, 0101]. Like the ’719 patent, *Dijkstra* explicitly allows the devices to synchronize. Ex. 1004, [0096, 0099] (“The first and second device establish a connection through wired or wireless means with each other in order to work in synchronization.”) *Dijkstra* describes that the communicative coupling can be used to establish in master-slave operations where “[a]ll the light therapy devices including master light therapy device and slave light therapy devices are linked with each other and forming a peer to peer network. In this, the master light therapy device has a controlling unit which is controlling the all [*sic*] other slave light therapy devices, each of the slave light therapy devices is

having a communication module to communicate with the master light therapy device and a light projection unit works as per the master light therapy device input.” Ex. 1004, [0099)].

152. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses communicatively coupling the first light therapy device directly to the second light therapy device. *See infra* ¶¶80-131.

153. In my opinion, the limitation 1[c] of claim 1 is met by the disclosure in *Dijkstra*.

5. 1[d] “emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights.”

154. *Dijkstra* discloses emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights. The ’719 patent describes that “the first plurality of lights 16 a may be red lights, near infrared lights, or some combination of red lights and near infrared lights.” Ex. 1001, 5:16-20.

155. *Dijkstra* also teaches the emission of both red and infrared light therapy wavelengths for treatment. Ex. 1004, [0063, 0067]. In particular, *Dijkstra* discloses that the light therapy device can emit light in a range of 100-1600 nm wavelength. Ex. 1004 [0063, 0067]. Red and near-infrared light fall within the

disclosed 100-1600 nm range. Indeed, a POSITA would understand that the 100-1600 nm wavelength range includes red light and near-infrared light. For examples, wavelengths in the range of 800-1072 nm disclosed in paragraph [0037] of *Dijkstra* is in the near-infrared spectrum. Wavelengths in the range of 632-904 nm and 660nm-905 nm disclosed in paragraph [0129] of *Dijkstra* includes the red light spectral range and the near-infrared range. Ex. 1004, [0129]. *Dijkstra* also discloses using a light wavelength of 1072 nanometers in paragraph [0130] which is in the near-infrared spectrum. Ex. 1004, [0130]. Finally, *Dijkstra* teaches that each light device is identical and as such each light device would have the capability to emit light in the above ranges. Ex. 1004, [0096].

156. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights. *See infra* ¶¶80-131.

157. In my opinion, the limitation 1[d] of claim 1 is met by the disclosure in *Dijkstra*.

6. **1[e] “placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.”**

158. *Dijkstra* discloses placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device. The '719 patent describes that “[t]o ensure that the light therapy devices 12 operate in the same way, some embodiments feature a lead mode 70 and a follow mode 80. A light therapy device 12 that is configured to be in the lead mode 70 may send operation instructions to all other light therapy devices 12 in the system 10. A light therapy device 12 that is configured to be in the follow mode 80 may receive operation instructions from a light therapy device 12 that is in the lead mode 70.” Ex. 1001, 7:51-58. The '719 patent states “a light therapy system 10 may comprise a first light therapy device 12 a configured to be in the lead mode 70, while all other light therapy devices 12 are in the follow mode 80. Configuring the light therapy system 10 in this way may force the light therapy devices 12 to operate in the same way.” Ex. 1001, 7:64-8:2. The '719 patent contemplates “that any number of light therapy devices may be in the follow mode 80.” Ex. 1001, 8:11-12;

159. *Dijkstra* teaches a “master-slave model” where any of the therapy devices (200) can act as the lead/master or the follow/slave device. Ex, 1004 [0101]. For example, “the two or more light therapy devices are used in which one light therapy device acts as a master light therapy device and the rest of the light therapy devices acts as a slave to the master light therapy device. All the light therapy devices including master light therapy device and slave light therapy devices are linked with each other and forming a peer to peer network.” Ex. 1004 [0099]. *Dijkstra* discloses that “the master light therapy device has a controlling unit” that instructs all other slave light therapy devices “per the master light therapy device input” via a wired or wireless connection” with the slave light therapy devices. Ex. 1004 [0099].

160. *Dijkstra* teaches that the user places the first light therapy device in a lead mode and the second light therapy device(s) in follow mode. “To use this, the user activates the master light therapy device and the master light therapy device establishes a wired or wireless connection with other slave light therapy devices.” Ex. 1004, [0099]. The user can activate the light device by using a touchscreen or remote device to turn on the light therapy system and “establish a connection through wired or wireless means with each other in order to work in synchronization.” Ex. 1004 [0096]. *Dijkstra* then describes how the

synchronization of the light therapy devices can be achieved using a master/slave model where “one light therapy device acts as a master light therapy device and the rest of the light therapy devices acts as a slave to the master light therapy device.” Ex. 1004 [0099]. Because “the first and second light devices are identical to each other,” either device may be place in master/lead mode with other device(s) in slave/follow mode. Ex. 1004 [0096, 0099].

161. As discussed above, a person of ordinary skill in the art would be highly motivated to design and manufacture the devices of Dijkstra so they could be switched between master or slave mode using a switch as such a configuration would simplify manufacturing and installation and also reduce production and installation costs.

162. Alternatively, it would be obvious based on a POSITA’s knowledge that the *Dijkstra* light therapy system is placed in lead/follow configuration when the connection between the light devices is established. *Dijkstra* teaches that user activates the first and second light therapy devices by turning ON the power button. Ex. 1004, [0096]. *Dijkstra* further discloses that upon activation, the first and second device “establish a connection through a wired or wireless connection with each other in order to work in synchronization.” Ex. 1004, [0096]. A POSITA would understand that synchronization means all the devices are acting in

concert which necessitates one of the devices issuing orders (leading) and the other devices following those orders (following). A POSITA would therefore understand that a synchronization of the first and second devices could take the form a “master-slave model” explicitly disclosed. Ex. 1004, [0099]. Thus, a POSITA would understand that the activation of the light therapy system would establish light device synchronization and initiate (e.g., place) the light therapy devices in master/lead and slave/follow operation.

163. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device. *See infra* ¶¶80-131.

164. In my opinion, the limitation 1[e] of claim 1 is met by the disclosure in *Dijkstra*.

165. In my opinion, Claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge.

- C. Dependent Claim 2: “wherein the emitting at least one of red light and near infrared light from at least the portion of the first plurality of lights and at least the portion of the second plurality of lights is accomplished using a control panel coupled to the first housing of the first light therapy device.”**

166. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge. *See infra* ¶¶137-165.

167. *Dijkstra* discloses the dependent claim limitation of claim 2: wherein the emitting at least one of red light and near infrared light from at least the portion of the first plurality of lights and at least the portion of the second plurality of lights is accomplished using a control panel coupled to the first housing of the first light therapy device. The ’719 patent describes that “a first control panel 100a located on the first housing 14a and communicatively coupled to the first communication module 24a. The first control panel 100a may allow a user to control a treatment time and cause at least a portion of the first plurality of lights 16a to either emit or not emit red light or near infrared light.” Ex. 1001, 8:27-33

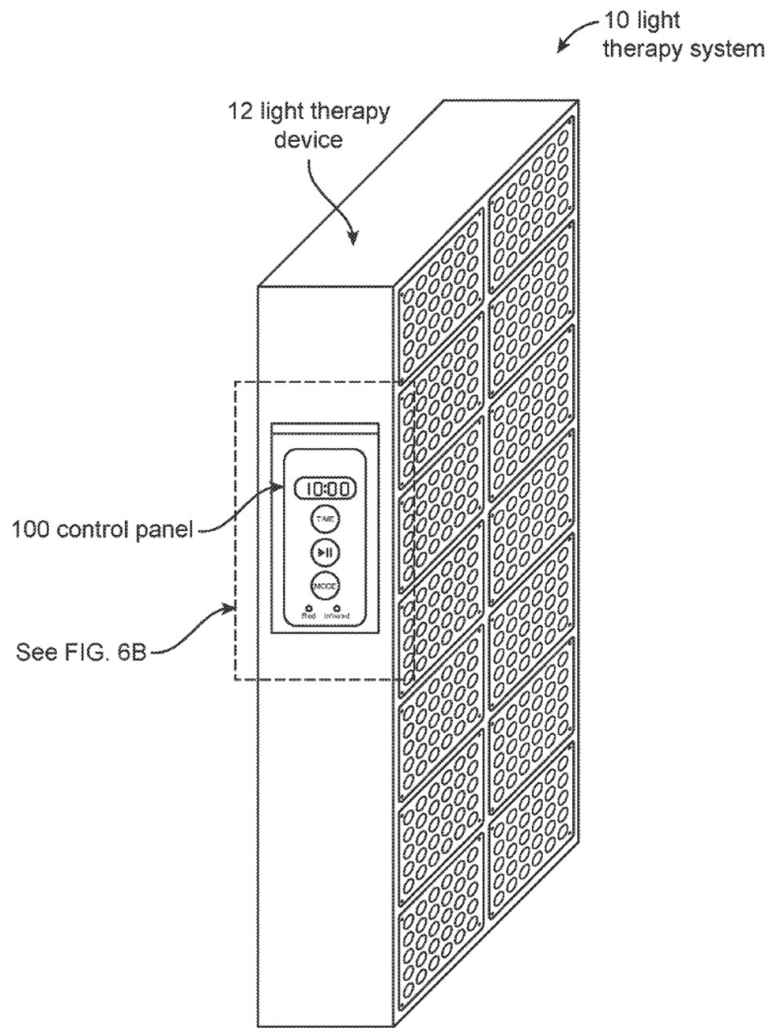


FIG. 6A

168. *Dijkstra* also describes the display unit 160 is a touchscreen display mounted on the outer surface of the light therapy device acting as an input unit, in which the user can manually select and prioritize the external body condition and/or the internal body condition based upon his/her own intellect.” Ex. 1004, [0090]. This touchscreen control panel allows “the user can determine the type of

treatment required for a particular body condition and can also determine the time and intensity required for the treatment.” Ex. 1004, [0090].

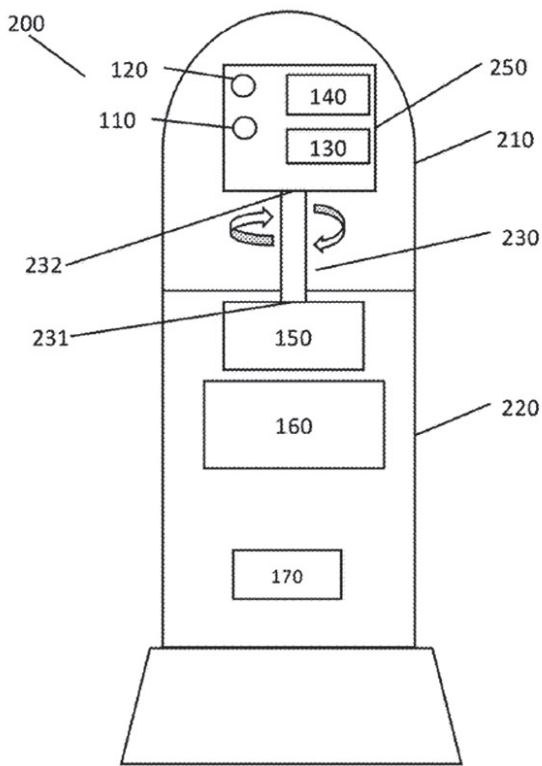


FIG. 2

169. *Dijkstra* discloses that the type of treatment required can include emitting “light in a range of 100-1600 nm wavelength” which includes red light (620 to 750 nm) and near infrared light (800 to 2,500 nm). Ex. 1004, [0063, 0067, 0090]. *Dijkstra* teaches that each light therapy devices can emit different wavelengths because the first and second light therapy devices have separate treatment areas for body conditions. Ex. 1004, [0096]. Thus, a POSITA would understand that each of the light therapy devices can be configured to emit red or

near infrared light. In my opinion, the touchscreen control panel disclosed in *Dijkstra* could be used to control the individualized emission of specific light wavelengths from each light therapy device.

170. A person of ordinary skill in the art would understand that a single touchscreen control panel being used to control the individualized emission of specific light wavelengths from each light therapy device would be highly desirable as the alternative require a user to access control panels on each and every light therapy device which would complicate operation and increase the chances for erroneous settings to be emitted. For this reason alone, a person of ordinary skill in the art would be motivated to design the devices of *Dijkstra* to operate in this manner.

171. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses wherein the emitting at least one of red light and near infrared light from at least the portion of the first plurality of lights and at least the portion of the second plurality of lights is accomplished using a control panel coupled to the first housing of the first light therapy device. *See infra* ¶¶ ____.

172. In my opinion, Claim 2 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge.

D. Dependent Claim 3: “pressing a first input button on the control panel of the first light therapy device, wherein the emitting occurs in response to the pressing”

173. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge. *See infra* ¶¶137-165.

174. Dependent claim 2 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge. *See infra* ¶¶166-172.

175. *Dijkstra* discloses the dependent claim limitation of claim 3: pressing a first input button on the control panel of the first light therapy device, wherein the emitting occurs in response to the pressing.

176. The ’719 patent describes that “a first control panel 100 a located on the first housing 14a and communicatively coupled to the first communication module 24a. The first control panel 100a may allow a user to control a treatment time and cause at least a portion of the first plurality of lights 16a to either emit or not emit red light or near infrared light,” Ex. 1001, 8:30-34, “the control panel 100 having a plurality of input buttons 110, a time button 112, a play/pause button 114, a mode button 116, and a pair of indication lights 120.” Ex. 1001, 8:42-47. The ’719 patent teaches that the control features of the light therapy device may be actuated by “pressing” the button. Ex. 1001, 8:49-56.

177. *Dijkstra* teaches that user activates the first and second light therapy devices by turning ON the power button. Ex. 1004, [0096]. “[A] user switches on the light therapy device 200 by using a power button (not shown) mounted on an outer surface of the light therapy device 200 and puts at least one portion of the user body in front of the camera unit 120.” Ex. 1004, [72]. After activation of the power button, the light devices synchronize, scan and identify treatment areas and “project light on their respective treatment portions.” Ex. 1004, [0096]. “A user can choose individual configuration and use with all available power, wavelengths frequencies and functions.” Ex. 1004, [0119].

178. A POSITA would understand that touching the touchscreen would amount to pressing one finger to the touchscreen to activate the light therapy system. Moreover, it would be an obvious choice in engineering design to those of ordinary skill in the art before the invention to have configured *Dijkstra* to be controlled by a conventional analog button panel rather than the more advanced touchscreen panel.

179. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses pressing a first input button on the control panel of the first light therapy device, wherein the emitting occurs in response to the pressing. *See infra* ¶¶80-131.

180. Claim 3 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge.

E. Dependent Claim 9: “pausing the emitting in response to pressing a first input button on the control panel of the first light therapy device”

181. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge. *See infra* ¶¶137-165.

182. Dependent claim 2 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge. *See infra* ¶¶166-172.

183. *Dijkstra* discloses the dependent claim limitation of claim 9: pausing the emitting in response to pressing a first input button on the control panel of the first light therapy device. The '719 patent describes that “a first control panel 100a located on the first housing 14a and communicatively coupled to the first communication module 24a. The first control panel 100a may allow a user to control a treatment time and cause at least a portion of the first plurality of lights 16a to either emit or not emit red light or near infrared light,” Ex. 1001, 8:30-34, “the control panel 100 having a plurality of input buttons 110, a time button 112, a play/pause button 114, a mode button 116, and a pair of indication lights 120.” Ex. 1001, 8:42-47. The '719 patent teaches that the control features of the light therapy device may be actuated by “pressing” the button. Ex. 1001, 8:49-56.

184. While *Dijkstra* does not explicitly disclose pausing the emission of light by pressing a control button explicitly, *Dijkstra* describes the display unit 160 is a touchscreen display mounted on the outer surface of the light therapy device acting as an input unit.” Ex. 1004, [0090]. This touchscreen control panel allows “the user can determine the type of treatment required for a particular body condition and can also determine the time and intensity required for the treatment.” Ex. 1004, [0090]. *Dijkstra* teaches that user activates the first and second light therapy devices by turning ON the power button. Ex. 1004, [0096]. The touchscreen display acts as an input unit and a POSITA would understand from *Dijkstra* that the touchscreen control panel could be used to pause or turn off the emission of light after treatment. Ex. 1004, [0090]. Indeed, a person of ordinary skill in the art would understand that one of the highly desirable features of touchscreen displays is that they can be configured to allow simple actions such as turning a function (or device) on or off by the simple action of a user pressing an indicated area of the touchscreen display via the operating software of the touchscreen display.

185. A POSITA would understand that touching the touchscreen would amount to pressing one finger to the touchscreen to pause the light therapy system’s emission of light. Moreover, in the alternative, it would have amounted

to an obvious choice in engineering design to those of ordinary skill in the art before the invention to have configured *Dijkstra* to be controlled by a conventional mechanical or electrical button panel rather than the more advanced touchscreen panel.

186. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses pausing the emitting in response to pressing a first input button on the control panel of the first light therapy device. *See infra* ¶¶80-131.

187. Claim 9 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge.

F. Dependent Claim 10: “selecting the lead mode via a first switch coupled to the first light therapy device, wherein the first light therapy device is placed in the lead mode via the first switch; and selecting the follow mode via a second switch coupled to the second light therapy device, wherein the second light therapy device is placed in the follow mode via the second switch.”

188. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge. *See infra* ¶¶137-165.

189. *Dijkstra* discloses the dependent claim limitations of claim 10: selecting the lead mode via a first switch coupled to the first light therapy device, wherein the first light therapy device is placed in the lead mode via the first switch; and selecting the follow mode via a second switch coupled to the second light

therapy device, wherein the second light therapy device is placed in the follow mode via the second switch.

190. The parties have agreed that switch should be construed as an “interactive interface.” Moreover, the Patent Owner has asserted that “[Petitioner’s] Manuals, promotional videos and social media posts instruct users to configure and use the therapy systems using 2 LED panels and configure them in a lead or follow mode via a respective switch on each LED panel.” Ex. 1014 at 51. The Patent Owner contends that “[t]he switch is either software or mechanical or the Mode control on the LED panel.” Ex. 1014 at 51.

191. *Dijkstra* specifically discloses a touchscreen control panel used to provide input to a controlling unit that can control the synchronization and configuration of master/slave operation. In particular, *Dijkstra* discloses that “the master light therapy device has a controlling unit” that instructs all other slave light therapy devices “per the master light therapy device input” via a wired or wireless connection” with the slave light therapy devices. Ex. 1004 [0099]. *Dijkstra* teaches that the user places the first light therapy device in a lead mode and the second light therapy device(s) in follow mode. “To use this, the user activates the master light therapy device and the master light therapy device establishes a wired or wireless connection with other slave light therapy devices.” Ex. 1004, [0099].

The user can activate the light device by using a touchscreen or remote device to turn on the light therapy system and “establish a connection through wired or wireless means with each other in order to work in synchronization.” Ex. 1004 [0096]. *Dijkstra* then describes how the synchronization of the light therapy devices can be achieved using a master/slave model where “one light therapy device acts as a master light therapy device and the rest of the light therapy devices acts as a slave to the master light therapy device.” Ex. 1004 [0099]. *Dijkstra* states that “in some systems, a master is elected from a group of eligible devices, with the other devices acting in the role of slaves.” Ex. 1004 [1010]. A POSITA would have understood this to mean that there is a switch to enable the preferred mode. Because “the first and second light devices are identical to each other,” all the light devices have a switch which allows the user to select lead/follow operation. Ex. 1004 [0096, 0099].

192. *Dijkstra* describes controlling unit 130 as “having a processor in order to control the lighting unit 110.” Ex. 1004, [0062]. A POSITA would understand that the controlling unit would receive input signals from the touchscreen control panel 160. “The controlling unit 130 allows the light projection unit 110 to project a light on the at least one external body condition and/or the at least one internal body condition according to the treatment profile.” Ex. 1004, [0077] *Dijkstra*

describes how the treatment profile can be accomplished via a “master/slave model.” Ex. 1004, [0099, 0101].

193. In order to configure “the master light therapy device” which controls “all other slave light therapy devices” as taught by *Dijkstra*, a POSITA would understand that one would need to designate and select a master device and designate and select the slave device and that this is accomplished via the touchscreen control panel located on each light therapy device.

194. During the '635 patent reexamination, Examiner found that *Dijkstra* teaches that the first light therapy device and the second light therapy device are each configured to operate in one of a lead mode and a follow mode (master and slave at [0099]), wherein when the first light therapy device operates in the lead mode and the second light therapy device operates in the follow mode the second light therapy device performs operations as instructed by the first light therapy device” and only distinguished *Dijkstra* on the neutral mode limitation. Ex. 1008 at 106; *see infra* ¶¶82-96.

195. In my opinion, *Dijkstra* discloses an interactive interface that allows the user to select a lead mode on the first light therapy device and select a follow mode on the second light therapy device within the context of claim 10. Indeed, a touchscreen display is the epitome of an interactive interface.

196. In my opinion, claim 10 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge.

G. Dependent Claim 11: “indicating, via a first pair of indication lights on the first light therapy device, whether at least one of red light and near infrared light is being emitted from at least the portion of the first plurality of lights”

197. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge. *See infra* ¶¶137-165.

198. *Dijkstra* discloses the dependent claim limitation of claim 11: indicating, via a first pair of indication lights on the first light therapy device, whether at least one of red light and near infrared light is being emitted from at least the portion of the first plurality of lights.

199. Indeed, indicator lights would have been well known and understood by a person of ordinary skill in the art to be desirable features. They would be especially desirable for devices that emit near infrared light which is not within the visible spectrum. Without at least an indication light to notify a user that a device was emitting near infrared light, a user would have no indication of whether or not a device was emitting near infrared light. Even without the special considerations involving near infrared light, a person of ordinary skill in the art would understand that therapy systems provide medical treatment and that use of indicator lights would help to ensure operators that the proper therapy is being delivered. For this

reason alone, a POSITA would be highly motivated to incorporate indication lights in any therapy device that designed to emit red and/or near infrared light.

200. The '719 patent teaches that “[t]o make it easier to determine which lights are active, some embodiments feature a pair of indication lights 120 located on the control panel 100. One light of the pair of indication lights 120 may be labeled red and the other may be labeled near infrared or simply infrared. The pair of indication lights 120 may indicate to a user the typed of light that will be emitted when the treatment starts or continues by illuminating one or both indication lights 120.” Ex. 1001, 9:59-66.

201. *Dijkstra* describes a touchscreen display for selecting type of treatment, time and intensity. “To use this, the user activates the master light therapy device and the master light therapy device establishes a wired or wireless connection with other slave light therapy devices.” Ex. 1004, [0099]. The user can activate the light device by using a touchscreen or remote device to turn on the light therapy system and “establish a connection through wired or wireless means with each other in order to work in synchronization.” Ex. 1004 [0096]. A POSITA would understand that that such a display would indicate the types of light used in the treatment. Indeed, *Dijkstra* discloses many light wavelengths for treatment. Ex-1004 [0063, 0067]. In my opinion, *Dijkstra*’s display would inherently include an

indication of the types of lights used in the treatment. Moreover a POSITA would consider the addition of indicator lights to be an obvious design choice because “on” lights are typical on electronics in general to signal when a device is operating.

202. I note that the Examiner in the reexaminations of the ’495 and ’635 patents concluded that *Dijkstra* taught a pair of indication lights indicating whether a red light and near infrared light is being emitted. *See infra* ¶¶82-114.

203. In my opinion, claim 11 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge.

H. Dependent Claim 16: “communicatively coupling the first light therapy device directly to the second light therapy device comprises coupling the first light therapy device and the second light therapy device via a wired connection”

204. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge. *See infra* ¶¶137-165.

205. *Dijkstra* discloses the dependent claim limitation of claim 16: communicatively coupling the first light therapy device directly to the second light therapy device comprises coupling the first light therapy device and the second light therapy device via a wired connection. The ’719 patent describes that the “the light therapy devices 12 may be communicatively coupled in any combination of series and parallel wired connections.” Ex. 1001, 7:48-50.

206. *Dijkstra* teaches that the first light therapy device and the second light therapy device are configured to communicate directly via a wired connection. Ex. 1004, [0096]. “The first and second device establish a connection through wired or wireless means with each other in order to work in synchronization.” Ex. 1004, [0096]. In my opinion, *Dijkstra* explicitly discloses that the first light device is communicatively coupled directly to the second light therapy device via a wired connection.

207. In all three related patent prosecutions, the Examiners found that *Dijkstra* discloses that communicatively coupling the first light therapy device directly to the second light therapy device comprises coupling the first light therapy device and the second light therapy device via a wired connection. *See infra* ¶¶80-131.

208. In my opinion, claim 16 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge.

- I. **Claim 17: “coupling the first light therapy device and the second light therapy device via the wired connection comprises: inserting a first end of a communication cable into a first communication port on the first light therapy device; and inserting a second end of the communication cable into a second communication port on the second light therapy device.”**

209. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge. *See infra* ¶¶137-164.

210. Dependent and underlying claim 16 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge. *See infra* ¶¶204-208.

211. *Dijkstra* discloses the limitations of claim 17: coupling the first light therapy device and the second light therapy device via the wired connection comprises: inserting a first end of a communication cable into a first communication port on the first light therapy device; and inserting a second end of the communication cable into a second communication port on the second light therapy device.

212. The '719 patent describes that the “the light therapy devices 12 may be communicatively coupled in any combination of series and parallel wired connections.” Ex. 1001, 7:48-50. It teaches that “the first communication cable 28 a may be inserted into the first plurality of communication ports 26a and the second plurality of communications ports 26b,” Ex. 1001, 7:48-50, and that “a communication cable 28 may be inserted into the pluralities of communication ports 26 to communicatively couple the light therapy devices 12.” Ex. 1001, 6:57-60.

213. *Dijkstra* teaches that the first light therapy device and the second light therapy device are configured to communicate directly via a wired connection and that the master-slave relationship with the slave devices having a communication

module to communicate with the master, where the wired communication would include the recited communication cable. Ex. 1004, [0096, 0099].

214. In my opinion, a POSITA would have understood that the wired connection embodiment described in *Dijkstra* inherently includes a cable and ports on each device. A POSITA would also have understood that it was commonplace to design a cable port interface where the respective ends of the communication cable are inserted in the respective ports of the communication modules of each light therapy device.

215. A POSITA would understand that use of cables and ports for wired connections would be the most practical and feasible means of creating such a system as the alternative would complicate manufacture and installation. Further, devices with permanent wired communication cables would need to include a sufficient length of wire for the largest designed separation. However, since most installations would not require the maximum length of communication wire, the surplus wire would add to the production or manufacturing cost and the personnel installing units would need to coil and secure the surplus length of wire. This would increase the time and effort for installation, further increasing costs.

216. Indeed, a POSITA would be well aware of and motivated to use standard communication cables such as USB, CAT5, or other industry standard

cables which would be readily available at low cost in various lengths. Such wires would already have standardized connectors which means that a POSITA would merely have to select a standard connection or communication port during the design phase. These reasons by themselves provide sufficient motivation for a POSITA to use standard communication cables and ports.

217. Further, a POSITA would understand that the term “hard-wired” refers to communication over physical wires with standardized plug connectors and ports on devices rather than permanently connected wires.

218. This understanding of a POSITA is reinforced by the fact that the other means of sending signals from a master to a slave unit (*i.e.*, infrared signals, radio signals) do not require wires or cables for transmission.

219. I note that the Examiner in the reexamination of the ‘495 patent concluded that *Dijkstra* taught that the first light therapy device comprises a first plurality of communication ports and the second light therapy device comprises a second plurality of communication ports, the light therapy system further comprising a communication cable having a first end coupled to a first port of the first plurality of communication ports, and a second end coupled to a second port of the second plurality of communication ports. Ex. 1011 at 108. In my opinion, a communication cable having a first end coupled to a first port corresponds to

“inserting a first end of a communication cable into a first communication port”

which is taught in *Dijkstra*.

220. In my opinion, claim 17 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge.

J. Dependent Claim 19: “providing a third light therapy device comprising a third housing and a third plurality of lights configured to emit at least one of red light and near infrared light; providing a fourth light therapy device comprising a fourth housing and a fourth plurality of lights configured to emit at least one of red light and near infrared light; communicatively coupling each of the third light therapy device and the fourth light therapy device directly to at least one of the first light therapy device and the second light therapy device; and emitting at least one of red light and near infrared light from at least a portion of the third plurality of lights and at least a portion of the fourth plurality of lights.”

221. Independent and underlying claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge. *See infra* ¶¶137-165.

222. *Dijkstra* discloses the limitations of claim 19: providing a third light therapy device comprising a third housing and a third plurality of lights configured to emit at least one of red light and near infrared light; providing a fourth light therapy device comprising a fourth housing and a fourth plurality of lights configured to emit at least one of red light and near infrared light; communicatively coupling each of the third light therapy device and the fourth light therapy device directly to at least one of the first light therapy device and the

second light therapy device; and emitting at least one of red light and near infrared light from at least a portion of the third plurality of lights and at least a portion of the fourth plurality of lights.

223. The '719 patent describes that “a light therapy system 10b may comprise two or more light therapy devices communicatively coupled together” and describes how multiple light devices can be interconnected using communication modules via wired or wireless connection. Ex. 1001, 5:55-56; 6:3-34; 7:48-50.

224. *Dijkstra* discloses Fig. 9 that shows four communicatively coupled therapy devices. Ex. 1004, Fig. 9.

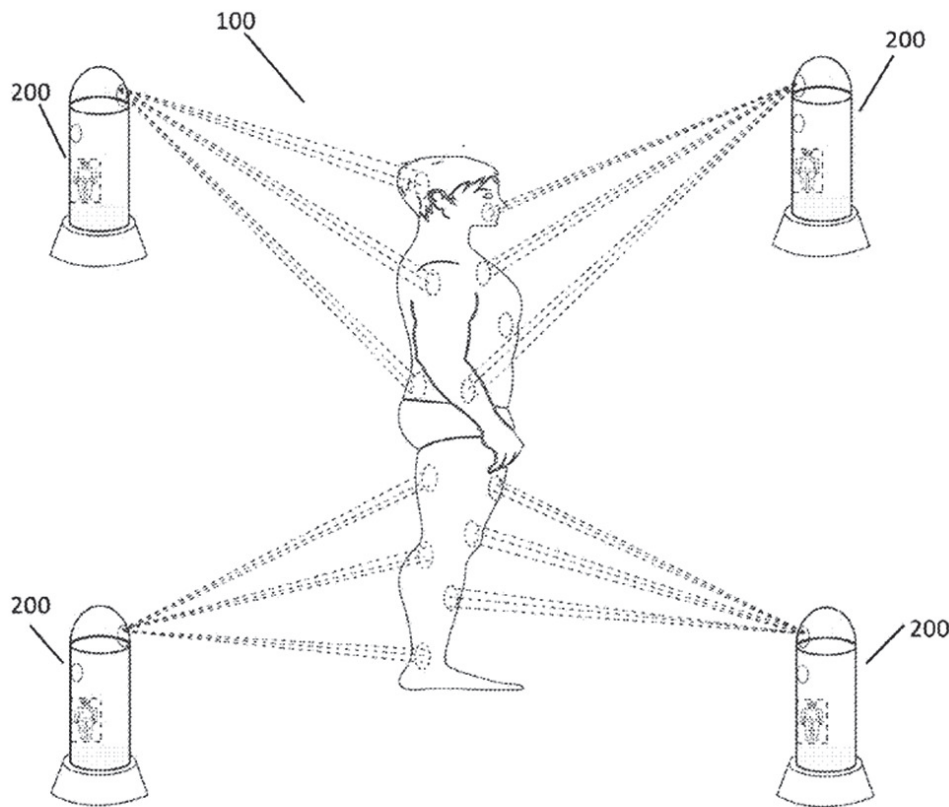


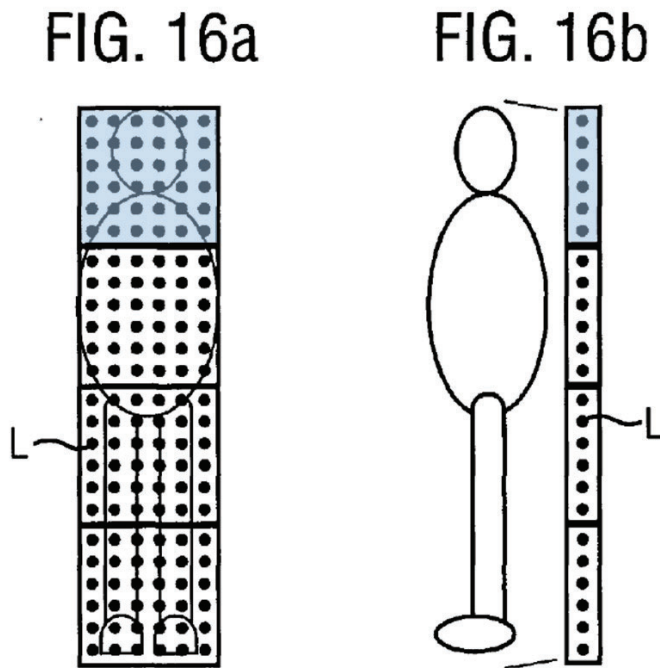
FIG. 9

225. Additionally, a POSITA would understand that the design of a phototherapy device would depend on the target area for the therapy. In a system designed to treat the entire body, a rectangular shape with a high aspect (length to width) ratio would be desirable. For such a system, it would be highly desirable to design the system using multiple panels, more specifically in some cases this would mean the use of four panels.

226. As discussed above, this motivation is evidenced by *Whitehurst* who taught a four panel phototherapy unit. In the annotated reproduction of FIGS. 16a

and 16b of *Whitehurst* below, I have highlighted one of the panels in light blue.

Such a configuration is merely one of a limited number of choices available to a POSITA in designing a phototherapy system.



227. *Dijkstra* teaches a third light therapy device (200) comprising a third housing (210), a third plurality of lights. Ex. 1004, [0019, 0129, 0133]. The third devices is arranged and configured to emit red light or near-infrared light. Ex. 1004 , [0063,0067]. Because *Dijkstra* teaches that each light device is identical, *Dijkstra* discloses a fourth light therapy device similarly configured. Ex. 1004, [0096]. The third and fourth light therapy device are configured to communicatively couple to the first and second light therapy device using a wired or wireless communication. Ex. 1004, [0021, 0099, 0101].

228. I note that the Examiner in the prosecution of the '172 patent concluded that *Dijkstra* taught a third and fourth light therapy devices communicative coupled to the first and second light therapy devices. Ex. 1013, at 21-22.

229. In my opinion, Claim 19 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge.

XI. GROUND 2: CLAIMS 1, 2, 3, 9, 10, 11, 16, 17, 19 ARE OBVIOUS IN VIEW OF *DIJKSTRA*, POSITA'S KNOWLEDGE AND *NORWOOD*

A. Overview of *Norwood*

230. *Norwood* discloses in an analogous art of lighting a plurality of illuminated diffusers and addressed the “problem is that conventional diffusers typically do not have suitable controllability for varying the emission of light and/or fragrance. Ex. 1005, [0013]. *Norwood* teaches that the diffusers can include “a light array 542 including a plurality of different color LEDs. In particular, light array 542 includes a plurality of red LEDs 540 a, blue LEDs 540 b, and green LEDs 540 c. The plurality of LEDs can be individually activated and controlled to adjust their respective colors and intensities.” Ex. 1005, [0110]. *Norwood* further describes that individual diffusers can be used together and communicatively coupled together. Ex. 1005, [0136]. *Norwood* teaches that the connected diffusers

are controlled using control logic that “may first be controlled via a master/slave switch 642. When switch 642 is set in the slave position, control logic 640 is provided with external signals for setting operation of the diffusers 600. For instance, if a plurality of individual diffusers 600 are being used together, one can be designated a master, and the rest slaves.” Ex. 1005, [0135]. In this operational scheme, “the slave devices receive signals from the master dictating the operation of each slave. The signals may be provided from the master to the slaves through any one of a number of systems, including infrared signals, hard-wired connections, radio signals, and the like. In the control embodiment shown in FIG. 17, an RF transceiver 648 is provided to send and to receive radio signals.” Ex. 1005, [0136]. In the reproduction of FIG. 17 of Norwood below, I have highlighted the RF transceiver in orange.

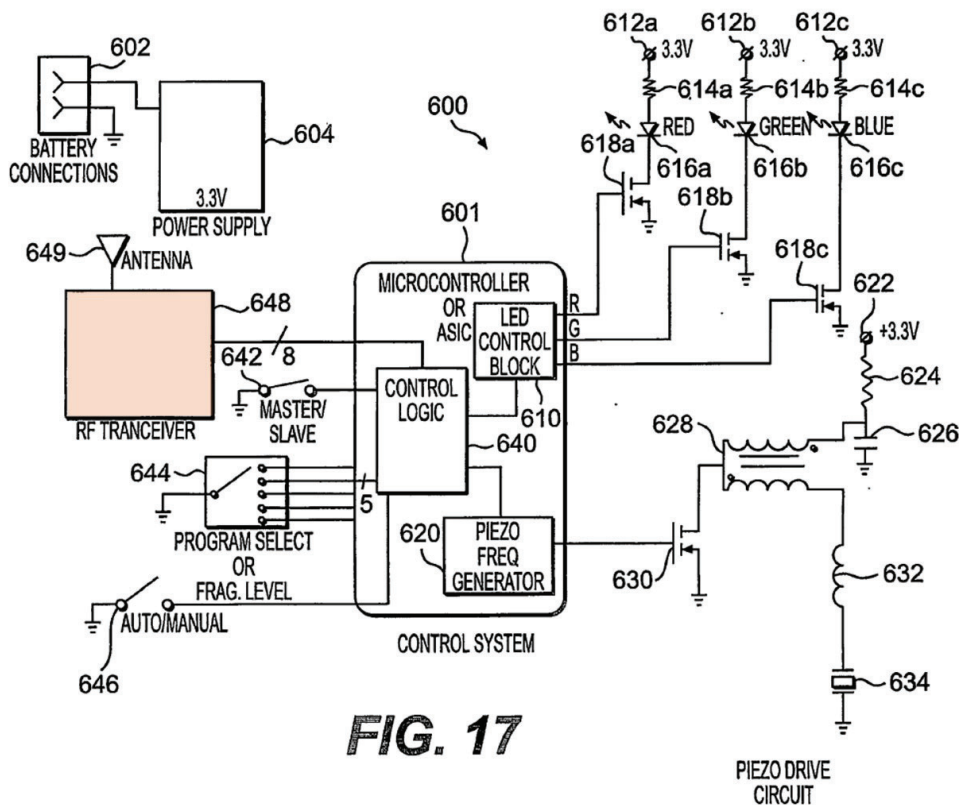


FIG. 17

B. Independent Claim 1

231. Independent claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA's knowledge and *Norwood*.

1. [1Preamble] "A method for providing a light therapy treatment, comprising:"

232. To the extent the preamble is limiting, *Dijkstra* discloses this limitation [1Preamble] as noted in Ground 1. *See infra* ¶¶138-141.

233. In my opinion, the preamble of claim 1 is met by the disclosure of *Dijkstra* in combination with a POSITA's knowledge and *Norwood*.

2. [1a] **“providing a first light therapy device comprising a first housing and a first plurality of lights configured to emit at least one of red light and near infrared light”**

234. *Dijkstra* discloses this limitation [1a] as noted in Ground 1. *See infra* ¶¶142-145.

235. *Norwood* teaches that the diffusers can include “a light array 542 including a plurality of different color LEDs. In particular, light array 542 includes a plurality of red LEDs 540 a, blue LEDs 540 b, and green LEDs 540 c. The plurality of LEDs can be individually activated and controlled to adjust their respective colors and intensities.” Ex. 1005, [0110].

236. A person of ordinary skill in the art would be aware that LEDs capable of emitting different wavelengths were readily available. Indeed, a POSITA would know that the first LEDs were developed in the early 1960s emitted infrared light and that shortly thereafter, LEDs that emitted red light had been developed. It is well within the capabilities of a POSITA to modify a given LED device to use LEDs that emit light at a different range of wavelengths.

237. Further, a POSITA would be well aware of the use of both red light and near infrared light for phototherapy and would be motivated to design LED therapy systems that emitted red light, near infrared light, or both red and near

infrared light. This understanding is evidence by Table 1 of *Whitehurst* which is reproduced below. Ex. 1016 at Table 1.

TABLE 1			
Photosensitizer	Red absorption band (nm)	Red Peak (nm)	Blue/Green Peak (nm)
Naphthalocyanines	780–810		
Chalcogenopyriliium dyes	780–820		
Phthalocyanines (e.g. ZnII Pc)	670–720	690	
Tin etiopurpurin (SnET ₂)	660–710	660–665	447
Chlorins (e.g. N-Aspartyl chlorin e6 or NPe6)	660–700	664	
Benzoporphyrin derivative (BPD)		685/690	456
Lutetium texaphrin (Lu-Tex)		735	
Al(S ₁ /S ₂ /S ₃ /S ₄) Pc	660–710	670/685	410, 480
Photofrin		625/630	405
Protoporphyrin IX (PpIX) - from 5/δAminolaevulinic Acid (5ALA)		635	410, 505, 540, 580
Tetra m-hydroxyphenyl Chlorin (mTHPC)		650	440, 525

238. In my opinion, the limitation [1a] is met by the disclosure of *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*.

3. 1[b] “providing a second light therapy device comprising a second housing and a second plurality of lights configured to emit at least one of red light and near infrared light”

239. *Dijkstra* discloses this limitation [1b] as noted in Ground 1. *See infra* ¶¶146-149.

240. *Norwood* teaches that the diffusers can include “a light array 542 including a plurality of different color LEDs. In particular, light array 542 includes a plurality of red LEDs 540 a, blue LEDs 540 b, and green LEDs 540 c. The

plurality of LEDs can be individually activated and controlled to adjust their respective colors and intensities.” Ex. 1005, [0110].

241. Further, as discussed above, a POSITA would understand the determining the suitable number of panels would be a matter of simple and well known manufacturing considerations along with the desired target for phototherapy.

242. In my opinion, the limitation [1b] is met by the disclosure of *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*.

4. 1[c] “communicatively coupling the first light therapy device directly to the second light therapy device;”

243. *Dijkstra* discloses this limitation [1c] as noted in Ground 1. *See infra* ¶¶150-153.

244. *Norwood* further describes that individual diffusers can be used together and communicatively coupled together. Ex. 1005, [0136]. “The signals may be provided from the master to the slaves through any one of a number of systems, including infrared signals, hard-wired connections, radio signals, and the like. In the control embodiment shown in FIG. 17, an RF transceiver 648 is provided to send and to receive radio signals.” Ex. 1005, [0136].

245. In my opinion, the limitation [1c] is met by the disclosure of *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*.

5. 1[d] “emitting at least one of red light and near infrared light from at least a portion of the first plurality of lights and at least a portion of the second plurality of lights.”

246. *Dijkstra* discloses this limitation [1d] as noted in Ground 1. *See infra* ¶¶154-157.

247. In my opinion, the limitation [1d] is met by the disclosure of *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*.

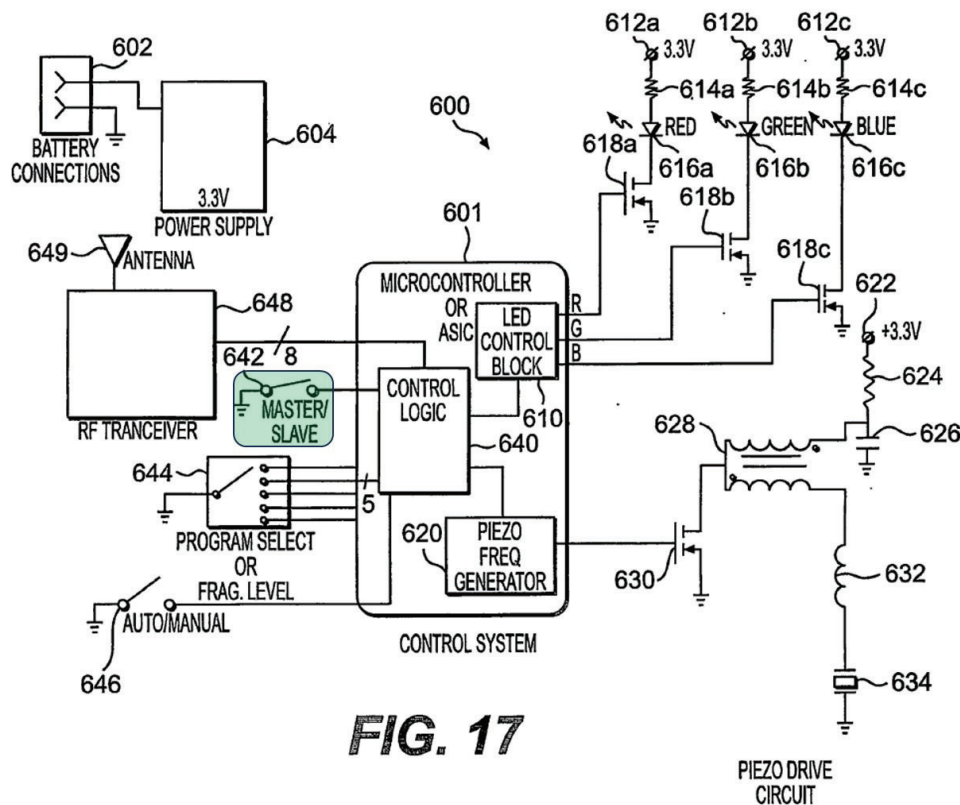
6. 1[e] “placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device.”

248. *Dijkstra* discloses this limitation [1e] as noted in Ground 1. *See infra* ¶¶158-165.

249. *Norwood* describes placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device. *Norwood* discloses in an analogous art of lighting a plurality of illuminated diffusers (600) in which each diffuser includes a switch (642) and circuitry that allows each diffuser (600) to operate in either a lead/master mode or a follow/slave mode. Ex. 1005, [0135]. *Norwood* teaches that the connected diffusers are controlled using control logic that “may first be controlled via a master/slave switch 642. When switch 642 is set in the slave position, control logic

640 is provided with external signals for setting operation of the diffusers 600. For instance, if a plurality of individual diffusers 600 are being used together, one can be designated a master, and the rest slaves.” Ex. 1005, [0135]. In this operational scheme, “the slave devices receive signals from the master dictating the operation of each slave. The signals may be provided from the master to the slaves through any one of a number of systems, including infrared signals, hard-wired connections, radio signals, and the like. In the control embodiment shown in FIG. 17, an RF transceiver 648 is provided to send and to receive radio signals.” Ex. 1005, [0136]. “When switch 642 is in the slave position, the RF transceiver 648 receives an external signal, through an antenna 649, from a remote control, a master-designated diffuser 600, or the like. That signal is transmitted from the RF transceiver 648 to control logic 640 to set the presentation of light and sound through the LED control block 610 and the piezo frequency generator 620. When switch 642 is in the master position, the operation of the control logic is set by an internal program at this diffuser 600, such that microcontroller 601 acts as the master. In this case, the operational program from control logic 640 is sent to the RF transceiver 648 and broadcast to slave devices via the antenna 649.” Ex. 1005, [0137].

250. Figure 17 discloses master/slave switch 642. In the reproduction of FIG. 17 of Norwood below, I have highlighted the master/slave switch in green.



251. Figure 18 describes how the master/slave switch 642 controls the operation of the individual diffusers based on one's designation as either a master or a slave. "If it is set as a master, the program proceeds to step S7 to enable the RF transceiver to transmit the program to slave devices. In step S8, a program selection is checked from among five different programs to be selected." Ex. 1005, [0141]. "In step S9, the set program is transmitted to RF transceiver 648 to be sent to the slave devices, and LED control block 610 and piezo frequency generator

620, to set the presentation. In step S10, the piezo duty cycle is set in piezo frequency generator 620. In step S11, the LED duty cycles are set in LED control block 610, based on the set presentation.” Ex. 1005, [0143]. “If the slave setting is set at step S6, the program proceeds to step S13, in which RF transceiver 648 is enabled to receive a signal from a master device. In step S14, the piezo frequency generator 620 sets a duty cycle in accordance with a signal received from the master device. In step S15, the LED control block 610 sets duty cycles for the LEDs based on the received signal from the master device. In step S16, the piezo frequency generator 620 and LED control block 610 turn off if the RF transceiver 448 times out.” Ex. 1005, [0143].

252. In my opinion, *Norwood* explicitly discloses “placing the first light therapy device in a lead mode; and placing the second light therapy device in a follow mode whereby the second light therapy device performs operations as instructed by the first light therapy device” utilizing the disclosed switch.

253. In view of the teachings of *Norwood*, it would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to modify *Dijkstra* by adding a switch (642) and circuitry to each of the light therapy devices (200) since this would allow each of the light therapy devices (200) to act as either the lead or the follower which makes the system of light

therapy devices more flexible, in that any of the devices can be a lead or a follower. Moreover, the addition of the switch (642) and circuitry of *Norwood* to each of the light therapy devices of *Dijkstra* would allow for easier and quicker selection of the lead mode and the follow mode of each light therapy device. Given the combined teachings, those having ordinary skill in the art before the invention would have understood how to implement the switching that is inherent in the *Dijkstra* device, by incorporating the master/slave switch of *Norwood* in order to enable the switching capabilities in *Dijkstra* as a mere substitution of well-established switching arrangements for selection of a master or slave mode.

254. Further, as described above, a person of skill in the art would understand that use of a switch to determine whether a unit operates as a master or slave simplifies both manufacturing and installation while simultaneously reducing time and costs for both. For this reason alone, a POSITA would be motivated to use a switch to determine the master/slave functionality of a unit.

255. This exact combination of *Dijkstra* and *Norwood* was applied to the very similar claim in during the prosecution of the related '172 patent. Ex. 1013 at 18. In response, the Patent Owner admitted that “Dijkstra and Norwood both disclose a ‘master/slave mode.’” Ex. 1013 at 41.

256. In my opinion, the limitation [1e] is met by the disclosure of *Dijkstra* in combination with a POSITA's knowledge and *Norwood*

257. In my opinion, claim 1 is rendered obvious by *Dijkstra*, a POSITA's knowledge and *Norwood*.

C. Dependent Claim 2: “wherein the emitting at least one of red light and near infrared light from at least the portion of the first plurality of lights and at least the portion of the second plurality of lights is accomplished using a control panel coupled to the first housing of the first light therapy device.”

258. Independent and underlying claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA's knowledge and *Norwood*. *See infra* ¶¶231-257.

259. *Dijkstra* discloses Claim 2 as noted in Ground 1. *See infra* ¶¶166-172.

260. Dependent claim 2 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge and *Norwood*.

261. In my opinion, claim 2 is rendered obvious by *Dijkstra*, a POSITA's knowledge and *Norwood*.

D. Claim 3: “pressing a first input button on the control panel of the first light therapy device, wherein the emitting occurs in response to the pressing”

262. Independent claim 1 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge and *Norwood*. *See infra* ¶¶231-257.

263. Dependent claim 2 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge and *Norwood*. See *infra* ¶¶258-261.

264. *Dijkstra* discloses Claim 3 as noted in Ground 1. See *infra* ¶¶173-188.

265. In my opinion, claim 3 is rendered obvious by *Dijkstra*, a POSITA's knowledge and *Norwood*.

E. Claim 9: “pausing the emitting in response to pressing a first input button on the control panel of the first light therapy device”

266. Independent claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA's knowledge and *Norwood*. See *infra* ¶¶231-257.

267. Dependent claim 2 is rendered obvious by *Dijkstra* alone or in combination with a POSITA's knowledge and *Norwood*. See *infra* ¶¶258-261.

268. *Dijkstra* discloses Claim 9 as noted in Ground 1. See *infra* ¶¶181-187.

269. In my opinion, claim 9 is rendered obvious by *Dijkstra*, a POSITA's knowledge and *Norwood*.

F. Claim 10: “selecting the lead mode via a first switch coupled to the first light therapy device, wherein the first light therapy device is placed in the lead mode via the first switch; and selecting the follow mode via a second switch coupled to the second light therapy device, wherein the second light therapy device is placed in the follow mode via the second switch.”

270. Independent claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA's knowledge and *Norwood*. See *infra* ¶¶231-257.

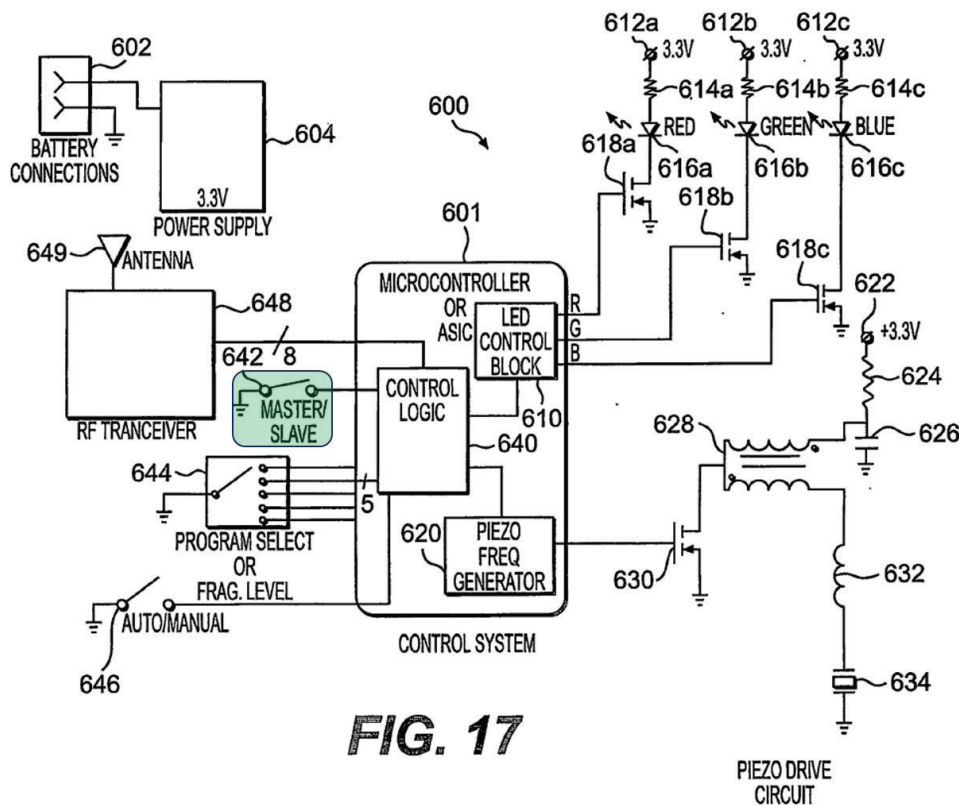
271. *Dijkstra* discloses Claim 10 as noted in Ground 1. *See infra* ¶¶188-196.

272. *Dijkstra* in combination with *Norwood* disclose selecting the lead mode via a first switch coupled to the first light therapy device, wherein the first light therapy device is placed in the lead mode via the first switch; and selecting the follow mode via a second switch coupled to the second light therapy device, wherein the second light therapy device is placed in the follow mode via the second switch.

273. *Norwood* teaches that the connected diffusers are controlled using control logic that “may first be controlled via a master/slave switch 642. When switch 642 is set in the slave position, control logic 640 is provided with external signals for setting operation of the diffusers 600. For instance, if a plurality of individual diffusers 600 are being used together, one can be designated a master, and the rest slaves.” Ex. 1005, [0135]. In this operational scheme, “the slave devices receive signals from the master dictating the operation of each slave. The signals may be provided from the master to the slaves through any one of a number of systems, including infrared signals, hard-wired connections, radio signals, and the like. In the control embodiment shown in FIG. 17, an RF transceiver 648 is provided to send and to receive radio signals.” Ex. 1005, [0136]. “When switch

642 is in the slave position, the RF transceiver 648 receives an external signal, through an antenna 649, from a remote control, a master-designated diffuser 600, or the like. That signal is transmitted from the RF transceiver 648 to control logic 640 to set the presentation of light and sound through the LED control block 610 and the piezo frequency generator 620. When switch 642 is in the master position, the operation of the control logic is set by an internal program at this diffuser 600, such that microcontroller 601 acts as the master. In this case, the operational program from control logic 640 is sent to the RF transceiver 648 and broadcast to slave devices via the antenna 649.” Ex. 1005, [0137]. *See infra* discussion re Ground 2, limitation [1e].

274. Figure 17 discloses master/slave switch 642.



275. The parties have agreed that switch should be construed as an interactive interface. *Norwood's* disclosure of master/slave switch 624 meets this construction. The control logic coupled with the master/slave switch 624 is an interactive interface within the meaning of the '719 patent. For all reasons discussed above with respect to Ground 2, claim limitation [1e], it would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to modify *Dijkstra et al.* by adding a switch (642) and circuitry as taught by *Norwood* to each of the light therapy devices (200).

276. This exact combination of *Dijkstra* and *Norwood* was applied to the very similar claim in during the prosecution of the related '172 patent. Ex. 1013 at 18. In response, the Patent Owner admitted that “Dijkstra and Norwood both disclose a ‘master/slave mode.’” Ex. 1013 at 41.

277. In my opinion, claim 10 is rendered obvious by *Dijkstra*, a POSITA’s knowledge and *Norwood*.

G. Claim 11: “indicating, via a first pair of indication lights on the first light therapy device, whether at least one of red light and near infrared light is being emitted from at least the portion of the first plurality of lights”

278. Independent claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*. *See infra* ¶¶231-257.

279. *Dijkstra* discloses Claim 11 as noted in Ground 1. *See infra* ¶¶197-203.

280. In my opinion, claim 11 is rendered obvious by *Dijkstra*, a POSITA’s knowledge and *Norwood*.

H. Claim 16: “communicatively coupling the first light therapy device directly to the second light therapy device comprises coupling the first light therapy device and the second light therapy device via a wired connection”

281. Independent claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*. *See infra* ¶¶231-257.

282. *Dijkstra* discloses Claim 16 as noted in Ground 1. *See infra* ¶¶204-208.

283. *Norwood* teaches that the individual diffusions may be communicatively coupled “through any one of a number of systems, including infrared signals, hard-wired connections, radio signals, and the like. In the control embodiment shown in FIG. 17, an RF transceiver 648 is provided to send and to receive radio signals.” Ex. 1005, [0136]. Clearly, a POSITA understands that a hard-wired connection is necessarily a wired connection.

284. In my opinion, claim 16 is rendered obvious by *Dijkstra*, a POSITA’s knowledge and *Norwood*.

- I. Claim 17: “coupling the first light therapy device and the second light therapy device via the wired connection comprises: inserting a first end of a communication cable into a first communication port on the first light therapy device; and inserting a second end of the communication cable into a second communication port on the second light therapy device.”**

285. Independent claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*. *See infra* ¶¶231-257.

286. Dependent and underlying claim 16 is rendered obvious by *Dijkstra* alone or in combination with a POSITA’s knowledge and *Norwood*. *See infra* ¶¶281-284.

287. *Dijkstra* discloses Claim 17 as noted in Ground 1. *See infra* ¶¶209-220.

288. *Norwood* teaches that the individual diffusions may be communicatively coupled “through any one of a number of systems, including infrared signals, hard-wired connections, radio signals, and the like. In the control embodiment shown in FIG. 17, an RF transceiver 648 is provided to send and to receive radio signals.” Ex. 1005, [0136].

289. In my opinion and as described above, a POSITA would have understood that the “hard-wired” connection embodiment describe in *Norwood* inherently includes a cable and ports on each device. A POSITA would also have understood that it was commonplace to design a cable port interface where the respective ends of the communication cable are inserted in the respective ports of the communication modules of each light therapy device.

290. In my opinion, claim 17 is rendered obvious by *Dijkstra*, a POSITA’s knowledge and *Norwood*.

- J. Claim 19: “providing a third light therapy device comprising a third housing and a third plurality of lights configured to emit at least one of red light and near infrared light; providing a fourth light therapy device comprising a fourth housing and a fourth plurality of lights configured to emit at least one of red light and near infrared light; communicatively coupling each of the third light therapy device and the fourth light therapy device directly to at least one of the first light therapy device and the second light therapy device; and emitting at least one of red light and near infrared light from at least a portion of the third plurality of lights and at least a portion of the fourth plurality of lights.”**

291. Independent claim 1 is rendered obvious by *Dijkstra* in combination with a POSITA’s knowledge and *Norwood*. *See infra* ¶¶231-257.

292. *Dijkstra* discloses Claim 19 as noted in Ground 1. *See infra* ¶¶221-229.

293. *Norwood* teaches that “a plurality of individual diffusers 600 are being used together.” Ex. 1005, [0135].

294. In my opinion, claim 19 is rendered obvious by *Dijkstra*, a POSITA’s knowledge and *Norwood*.

Skills Summary

- Successful Management and Team building with personnel at levels ranging from Sr. Scientists and Engineers to Technicians/Operators. Maximum Department size >100; Budget >\$25 million/yr.
- Strong New Product Development background; over 100 new SSL products taken from concept to manufacturing, including regulatory, Energy Star certification and DLC certification.
- Excellent communication skills sales and sale support experience as evidenced by development of new 8+ figure accounts for LED die, packages and applications. Proven ability to match customer demands/needs/desires with existing products.
- Comprehensive technical background in the full range of LED production technologies including MOCVD hardware/process, fabrication, LED chip/package test/reliability, optical design, thermal management, color conversion, SSL fixture/lamp design/integration and reliability.
- Direct Design and Development experience of LEDs (structures, die, packages) and SSL fixtures/components using TracePro and SolidWorks.
- Extensive experience in development of industry test and measurement standards.

Employment**CTO; EB Designs & Technology Flower Mound, TX****2014 –**

- Design and development of innovative solid-state lighting technology and designs, with a primary focus on optical design, thermal design and production/assembly technologies.
- Manage technology roadmap and draft IP disclosures/patent filings.
- Provide technical support and conduct research/technology development for clients in the field of solid-state lighting. This work additionally includes serving as an expert witness.
- Developed the first method able to predict chromaticity shift of LED products over time. Method is being used as the basis for a new industry standard: IES TM-35-19 "Projecting Long-Term Chromaticity Coordinate Shift of LED Packages, Arrays and Modules."
- Developed the method for interpolating between drive currents for flux maintenance lifetime for LED based products that is being implemented in IES TM-21-19 "Projecting Long Term Lumen, Photon and Radiant Flux Maintenance of LED Light Sources."

CTO; QuarkStar, LLC Las Vegas, NV**2016 – 2023**

- Manage technology roadmap and draft IP disclosures/patent filings.
- Developed technology to stabilize color shift over time of LED lighting products.
- Negotiated first IP licensing technology with a major European lighting company. Technology was used to develop a premium downlight product line.
- Managed transition from R&D to manufacturing. Products provided the majority of artificial lighting for a \$500 million expansion at the Museum of Fine Art Houston.
- Developed technology and oversaw product design for L-Prize concept phase. Resulting design was one of four winners at this stage of the L-Prize competition.

Director of Engineering; HeathCo, LLC Bowling Green, KY**2013 – 2014**

- Managed Engineering Department Staff (11 domestic, 14 international); Responsibilities included preparation and administration of the department budget (\$3.5 million annual). The department was charged with developed advanced technology/products related to: Solid State Lighting, Sensors, Notifications and Control Products and included regulatory/certifications for UL, FCC, Energy Star and DLC.
- Developed technology, IP and product roadmaps for all three business units (Lighting, Sensors, Notifications). Provided solid state lighting technology support for The Chamberlain Group.
- Additional responsibilities included establishing career development paths and training goals for all members of the department.
- Key accomplishments:

- Led team for product recall issue dating back to 2006. Reduced recall scope (# units) by >80% and financial exposure by >85% through detailed investigation and analysis of production records and analysis of excess and obsolete inventory.
- Completed review for entire product portfolio to comply with new cUL bi-lingual language requirements. Project required warning requirement changes to physical components (tooling), warning labels, documents and packaging on >400 products.

Elec Tech International Zhuhai, Guangdong Province, P.R. China

Chief Engineer ETi Lighting Research Institute

VP Research & Development ETi Solid State Lighting

2011 – 2013

- Managed Engineering and R&D staff for newly formed vertically integrated LED company (107 Engineering, Scientists, Designers); responsibilities included preparation and administration of the department budget (>\$25 million annual)
- Worked directly with President and CEO of the company to develop IP and product roadmaps for all LED based lighting products/projects for markets in the US, Europe, Japan and China.
- Key accomplishments:
 - Developed capability for fast turn functional prototypes (<2 weeks from concept to operating units). This was an improvement over the prior process that required 6+ weeks for a working prototype. Prior to this the company lost ~50% of all opportunities that required functional prototypes.
 - Supported product development and production ramps that enabled the company to increase sales from ~\$10 million to >\$40 million in one year.
 - Developed proprietary linear lamp technology capable of >1000 lumens/ft with a wall plug efficacy >100 lm/W, CRI>80 and L70>50,000 hrs (Ta = 25°C). Technology allows the same base units to be installed in fixtures as a replacement tube or used as individual luminaires with transverse spacing criteria ranging from 1.6 – 2.9.

Lighting Science Group Corporation Satellite Beach, FL

2010 - 2011 VP of Research

- Assembled and managed research and development teams for projects related to solid state lighting.
- Direct responsibility for design/development of customized photometric and radiometric characterization equipment.
- Direct responsibility for modeling and determining product and component lifetimes based on optical, thermal, mechanical and electrical analysis with respect to intended operating environments.
- Served as company representative on industry standards committees related to SSL technology (LM79, LM80, TM21, etc.)
- Key accomplishments:
 - Developed advanced LED models for product development and production control; including advanced color control schemes for multi-color applications. Methods capable of predicting average chromaticity to within a combined $\Delta xy \leq 0.02$; production variation < 2 step MacAdam ellipse.
 - Developed and characterized wavelength conversion materials, methods and technology. Work included development of optics and materials for L-Prize entry.

2008 – 2010 Product Development Manager

- Tasked with developing Solid State Lighting products including: optical, mechanical and thermal design, design and process FMEA, oversight of initial production, development of quality system documents and requirements for internal production and out-sourced components. Projects ranged from individual efforts to team of 10+ employees
- Served as the primary technical resource for all OEM customers.
- Managed group responsible for all product certifications and standards requirements including UL, FCC, CE, Energy Star and DLC as well as IES lighting requirements for outdoor products.
- Responsible for development, calibration and maintenance of photometric equipment in development and production areas.
- Key accomplishments:
 - Completed fast track development and launch of OEM SSL acorn retrofit product (<5 months). Product exceeded all customer requirements including: lumen output, efficacy, thermal resistance and size. Developed second generation product with >100% increase in light output with now cost increase.

- Completed design of Streetlight family (4 products) in 4 month time span. Products achieved >90 lumens/Watt efficacy at thermal stability with projected L₇₀ lifetimes >80,000 hours at T_a=40°C (continuous).
- Development replacement lamp family line (6 primary lamp types, 100+ variations). Product family included the first replacement LED lamps to achieve Energy Star certification. Product variations developed for LSG brand name and 3 OEM customers. Altogether the family accounted for >50% of the Energy Star certified LED lamps as of December 2011.

2004 - 2008 Toyoda Gosei North America Troy, MI

Sales Manager

- Primary responsibility for developing new and managing existing LED die and package customers for the Eastern region of North America. This required extensive communications with existing and potential customers to determine best fit products for their applications/requirements.
- Additional responsibility for search for and identifying new market opportunities for existing or newly developed products.
- Served as the primary technical resource for all customers in North/South America and Europe; provide engineering support for customers developing LED packages and LED lighting products.
- Key accomplishments:
 - Secured two new 8 figure accounts in a new market niche. These customers designated as the only two priority customers for Toyoda Gosei world-wide. Sales ramped from \$0 to >\$100 million/yr in less than 18 months.
 - Secured sole supplier status for LED backlights in Apple - 9.9" (iPad), 15.4", 17" and 22" displays. This was the culmination of an 18 month campaign with the Apple Display group to find the best fit product for their requirement and to train Apple personnel on potential technical barriers/issues with their application.
 - Addressed Microsoft concerns about blue light hazards related to development of a next generation optical mouse. After three months, I was able to conclusively show to Microsoft that it would be impossible for 14mil die products to present a photo-biological hazard under both IEC 62471 and IEC 60825.
 - Awarded business for all passenger lighting on the B787 Dreamliner. This award was made by Diehl which controls all lighting for Boeing, Airbus and Embraer and was achieved within 4 months of first contact with Diehl. At the time of first contact Diehl had no knowledge of Toyoda Gosei and had been working with 4 LED companies for over 12 months on the project.

2003 – 2004 Beeman Lighting Sarasota, FL

Director of Solid-State Lighting Engineering

- Tasked with leading development of solid-state lighting systems and materials with primary focus on chip on board applications and devices. Product lines included RGB landscape lighting and minimal environmental impact fixtures and novel display/artwork fixtures.
- Managed all IP issues (competitor analysis, IP roadmap, patentability analysis).
- Worked with existing and potential customers to ensure new products meet or exceed requirements and expectations.
- Key accomplishment
 - Developed RGB LED based landscape light with minimal environmental impact. This was accomplished by establishing a research project with FAU and included studies that conclusively showed the products had no impact on the behavior of sea turtle hatchlings.

2003 University of South Florida Tampa, FL

Intellectual Property Manager

- Managed IP portfolio of over 100 active patents and applications for University faculty/staff. Key portfolio items included: anti-cancer bioactive compounds, dendrimer synthesis and application technology, and spectral analysis of biological materials (blood analysis, surface and soluble protein analysis).
- Tasked with enhancing University reputation and revenue through negotiation of licensing agreements for IP
- Key accomplishments:
 - Negotiated license agreement for evaluation of new anti-cancer compounds derived from cold water tunicates.

- Assembled team that included 3 corporate and 2 academic partners for the DARPA SUVOS program. This task was completed in one month and the resulting proposal was ranked 2nd overall out of a field of 34 entries and was noted by the reviewers as the only proposal to address each and every portion of the RFP.

1998 – 2003 Uniroyal Optoelectronics Tampa, FL

Director of Intellectual Property, University Relations & Government Contracts (2001 – 2003)

- Concurrent assignment as Sr. Epi Scientist.
- Tasked with establishing IP roadmap and track patent landscape related to MOCVD growth, chip/package design and applications for LED technology.
- Reviewed all production and R&D activities to identify potential IP. This included drafting initial disclosures and working with external counsel for patent filings and responses to office actions. Activities with external counsel further included development of opinions of non-infringement.
- Oversight and management of a \$3.4 million multi-campus research program.
- Monitor and track RFP notices for externally funded research related to the company's core technology development roadmap.
- Key accomplishments:
 - Developed opinions of non-infringement with external counsel for 10 LED patents that had been the subject of numerous infringement suits against Tier 1 LED companies.
 - Assembled team that included 3 corporate and 2 academic partners for the DARPA SUVOS program. This task was completed in one month and the resulting proposal was ranked 2nd overall out of a field of 34 entries and was noted by the reviewers as the only proposal to address each and every portion of the RFP.

Team Leader, Epitaxial Materials & Characterization (1999 – 2001)

- Concurrent assignment as Sr. Epi Scientist.
- Oversaw start up and qualification of Epitaxial Growth & Characterization areas; role included training of Sr. Scientists, Engineers and Technicians for both areas in theory, application, process and maintenance procedures.
- Managed Epitaxial Growth & Characterization areas for production of InGaN and AlInGaP LED wafers. This included preparation and administration of the department budget (~\$25 million annual) as well as setting department performance goals (total good wafers, wafer yield, performance improvements and unit production costs).
- Coordinate inventory levels with purchasing department to minimize value of inventory necessary to support production plan. Additionally, negotiated key raw material specifications and prices.
- Served as Sr. member of Quality Team responsible for ISO9001 certification. Certification was achieved within a 12 month time span.
- Key accomplishments:
 - Completed process qualifications for all MOCVD systems within 3 months of CapEx delivery and established initial production yields 15% higher than the benchmark process transferred to UOE.
 - Managed departmental expansion and quality system efforts that allowed >250% increase in production capacity.
- Managed start up and qualification of Epitaxial Growth & Characterization areas; role included training of Engineers and technicians for both areas in theory, application, process and maintenance procedures.

Sr. Epi Scientist (1999 – 2003)

- Primary responsibility for MOCVD hardware and process modifications necessary to support performance improvements, yield enhancements and cost reductions.
- Served as primary technology liaison with customers and investors. Provided support to customers on package and fixture design and integration.
- Tasked with technical oversight of all photometric/radiometric characterization.
- Responsible for LED chip and package optical/thermal design including wavelength conversion materials.
- Key accomplishments:
 - Resolved gold corrosion issue in Fab area. Also eliminated transparent contact failure mechanism. Combined efforts increased fabrication yield by >30%.
 - Modified hardware and epitaxial growth process to increase throughput of Epitaxial Growth & Characterization areas by 80% (9 hour to 5 hour cycle time), while cutting unit cost by >30%. Also reduced

surface and interfacial roughness by a factor of >3x while improving thickness uniformity from 4% to <2%, using DOE methods. Additional hardware modification increased throughput by another 20%.

- Developed new test methods to verify performance of LED structures prior to Fabrication. Methods allowed verification of optical power to within 15% and wavelength within 2 nm prior to beginning of fabrication.

Staff Engineer (1998 – 1999)

- Designed/specified Epitaxial Growth & Characterization areas. This responsibility included specification and selection of all CapEx equipment for the Epitaxial Growth and Characterization areas and managing the construction, CapEx equipment installation and start up.
- Additional responsibilities included determining initial product cost and throughput based on installed CapEx tool base.
- Key accomplishments:
 - Implemented and validated new ammonia delivery system that allowed multiple MOCVD systems to draw from the same cylinder and eliminated downtime for cylinder changes. Implemented new exhaust management process for arsine/phosphine waste stream, extending maintenance interval by >300%.
 - Developed zero assumption cost and throughput models for LED facility. Cost estimate for 18 months post-start up proved accurate to within 10% of actual costs.

1996 – 1998 Emcore Corporation Somerset, NJ

Process Engineer

- Responsible for installation, materials demonstration and production process qualification and transition into manufacturing of MOCVD systems in an ISO9000 manufacturing environment (6 systems in 18 months).
- Tasked with identifying cost reduction and throughput/yield enhancements for epitaxial growth processes.
- Member of internal Quality System audit team.
- Key accomplishments:
 - Developed MOCVD Tool Qualification Procedure for benchmarking and qualifying all MOCVD systems installed for internal corporate use as well as at customer locations world-wide.
 - Completed Manufacturing Readiness Review for AlGaAs/Ge solar cell process in ~25% of standard time. Resulted in 3 year, \$15 million supply contract for company.
 - Scaled up and transferred of InSb magneto resistor process to a higher throughput system (single wafer D-180 to five wafer E-300). Increased wafer yield by from 65% to >95%.
 - Developed industry's first comprehensive cost and throughput model for epitaxial growth processes. The model typically allowed cost reductions of 10-20% and throughput increases of >10%.

1990 AT&T Bell Labs

Holmdel, NJ

Visiting Researcher

- Designed and built custom MOCVD/Mass spec system. System allowed tracking of precursor molecules, reaction intermediates and products over 12+ orders of magnitude of concentration.
- Implemented program to evaluate novel precursors for use in growth and doping of III-V and II-VI compound semiconductors. Data used to determine reaction and decomposition mechanisms for metal-organic sources. Successfully identified grow conditions for novel carbon doping source (norbornadiene) for III-V materials.

1989 Shell Oil Norco, LA

Process Engineer

- Developed and implemented new system for determining optimal time to clean heat exchangers on crude oil distillation column based on global economic metrics of unit and detailed process simulations.
- System exceeded system cost savings target of \$50,000/year by ~3 orders of magnitude. Project resulted in corporate-wide savings of >\$100 million/year. Cumulative corporate savings exceed \$1 billion.

Education

Ph.D. in Chemical Engineering

University of Florida 1997

BSE in Chemical Engineering

Tulane University 1989

- Graduate work focused on development of optoelectronic devices, including novel silicon based visible LEDs and sulfide based TFELD structures.

- Developed the world's first crystalline silicon based visible light LED. Utilized DOE methods to identify process conditions to allow first growth of epitaxial silicon on ZnS epi layers.
- Tested and verified efficacy of novel precursors for p-type doping of ZnSe materials in LED structures.
- Responsible for modification, operation and maintenance of MOCVD system for growth of wide bandgap compound semiconductor materials.
- Trained incoming post docs and graduate students in theory, operation and maintenance of MOCVD systems. Group comprised ~20 students and 6 post docs.

References **Available on request**

Curricula Vitae

University of Florida, Department of Chemical Engineering Advisory Board

Member 1998 – 2023

Chair 2007 – 2009, 2017 – 2023

University of Florida, Dean's Advisory Board, College of Engineering

Member 2007 – 2009, 2017 - 2023

Professional Societies:

- SPIE
- OSA
- Materials Research Society
- Illuminating Engineering Society (Member of Science Advisory Panel, Member of Executive Board of Test Procedures Committee, Chair of Projection and Reliability Sub-Committee, Member of Light Sources Committee, Secretary of Color Committee)
- American Society of Horticultural Science (ASHS)
- American Society of Agricultural and Biological Engineers (ASABE)

Testing and Standards Development:

- 30+ years experience testing LED components and fixtures
- 16 years experience developing LED testing standards, technical coordinator ANSI/IES LM-86: Measuring Luminous Flux and Color Maintenance of Remote Phosphor components; technical coordinator: ANSI/IES TM-21: Projecting Long-Term Lumen, Photon, and Radiant Flux Maintenance of LED Light Sources; technical coordinator ANSI/IES TM-28: Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires ; co-technical coordinator ANSI/IES LM-79: Optical and Electrical Measurements of Solid-State Lighting Products
- Developed the modeling method that enabled prediction of color shift of LED based products that is used in ANSI/IES TM-35: Projecting Long-Term Chromaticity Shift of LED Packages, Arrays, and Modules
- Work Group member on over a dozen ANSI/IES Test standards (Test Procedures Committee, Color Committee, Photobiology Committee, Light Sources Committee)

Conference Chair

LED Measurement and Standards, San Diego, CA October 2-3 (2008).

Patents (Granted)

1 US Patent 7,093,956 "Method of Lighting for Protecting Sea Turtles." D. Miller, E. Bretschneider, issued August 22, 2006.

2 US Patent D650,519 "Pole for a Street Light Luminaire." F. Maxik, D. Henderson, E. Bretschneider, A. Widjaja, K. Bowen, J. Sundin, E. Peiniger, issued December 13, 2011.

3 US Patent 8,157,413 "Light Fixture and Associated LED Board and Monolithic Optic." F. Maxik, Z. Gibler, E. Bretschneider, D. Henderson, A. Widjaja, issued April 17, 2012.

- 4 US Patent D673,323 "Light Fixture." F. Maxik, D. Henderson, E. Bretschneider, A. Widjaja, K. Bowen, J. Sundin, E. Peiniger, issued December 25, 2012.
- 5 US Patent 8,360,607 "Lighting Unit with Heat Dissipating Chimney." E. Bretschneider, Z. Berkowitz, R. Sosnick, L. Pattison, P. Pattison, issued January 29, 2013.
- 6 US Patent 8,408,725 "Remote Wavelength Conversion Device and Associated Methods." F. Maxik, E. Bretschneider, R. Soler, D. Bartine, issued April 2, 2013.
- 7 US Patent D681,874 "Light Fixture." F. Maxik, D. Henderson, E. Bretschneider, A. Widjaja, K. Bowen, J. Sundin, E. Peiniger, issued May 7, 2013.
- 8 US Patent 8,439,515 "Remote Lighting Device and Associated Methods." F. Maxik, R. Soler, D. Bartine, E. Bretschneider, issued May 14, 2013.
- 9 US Patent 8,465,167 "Color Conversion Occlusion and Associated Methods." F. Maxik, E. Bretschneider, R. Soler, D. Bartine, issued June 18, 2013.
- 10 US Patent 8,491,165 "Lighting Unit Having Lighting Strips with Light Emitting Elements and a Remote Luminescent Material." E. Bretschneider, Z. Berkowitz, R. Sosnick, L. Pattison, P. Pattison, issued July 23, 2013.
- 11 US Patent 8,492,995 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued July 23, 2013.
- 12 US Patent 8,506,118 "Light Fixture and Associated LED Board and Monolithic Optic." F. Maxik, Z. Gibler, E. Bretschneider, D. Henderson, A. Widjaja, issued August 13, 2013.
- 13 US Patent 8,515,289 "Wavelength Sensing Lighting System and Associated Methods for National Security Application." F. Maxik, D. Bartine, P. Medelius, E. Bretschneider, issued August 20, 2013.
- 14 US Patent 8,547,391 "High Efficacy Lighting Signal Converter and Associated Methods." F. Maxik, R. Soler, D. Bartine, R. Zhou, V. Bastien, M. Regan, E. Grove, E. Bretschneider, issued October 1, 2013.
- 15 US Patent 8,616,715 "Remote Light Wavelength Conversion Device and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued December 31, 2013.
- 16 US Patent 8,680,457 "Motion Detection System and Associated Methods Having at Least One LED of a Second Set of LEDs to Vary Its Voltage." F. Maxik, issued March 25, 2014.
- 17 US Patent 8,686,641 "Tunable LED Lamp for Producing Biologically Adjusted Light." F. Maxik, D. Bartine, R. Soler, E. Grove, E. Bretschneider, issued April 1, 2014.
- 18 US Patent 8,684,566 "Light Emitting Unit With Indirect Light Source." E. Bretschneider, Z. Berkowitz, R. Sosnick, L. Pattison, M. Pattison, issued April 1, 2014.
- 19 US Patent 8,702,259 "Color Conversion Occlusion and Associated Methods." F. Maxik, E. Bretschneider, R. Soler, D. Bartine, issued April 22, 2014.
- 20 US Patent 8,818,202 "Wavelength Sensing Lighting System and Associated Methods for National Security Applications." F. Maxik, D. Bartine, P. Medelius, E. Bretschneider, issued August 26, 2014.
- 21 US D715467 "LED Linear Replacement Lamp Design." E. Bretschneider, Z. Berkowitz, R. Sosnick, issued October 14, 2014.

- 22 US 8,866,839 "High Efficacy Lighting Signal Converter and Associated Methods." F. Maxik, R. Soler, D. Bartine, M. Regan, E. Grove, E. Bretschneider, issued October 21, 2014.
- 23 US 8,941,329 "Tunable LED Lamp for Producing Biologically-Adjusted Light." F. Maxik, D. Bartine, R. Soler, E. Grove, E. Bretschneider, issued January 27, 2015.
- 24 US 9,024,536 "Tunable LED Lamp for Producing Biologically-Adjusted Light and Associated Methods." F. Maxik, D. Bartine, R. Soler, E. Grove, E. Bretschneider, issued May 5, 2015.
- 25 US 9,125,275 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued September 1, 2015.
- 26 US 9,172,199 "Electrical Fixture Connection." T. Birdwell, E. Bretschneider, J. Fitzgibbon, B. Moore, S. Tylicki, issued October 27, 2015.
- 27 US 9,289,574 "Three-channel Tuned LED Lamp for Producing Biologically-Adjusted Light." F. Maxik, D. Bartine, R. Soler, E. Grove, E. Bretschneider, issued March 22, 2016.
- 28 US 9,307,608 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued April 5, 2016.
- 29 US 9,578,710 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued February 21, 2017.
- 30 US 9,693,414 "LED Lamp for Producing Biologically-Adjusted Light." F. Maxik, D. Bartine, E. Bretschneider, issued June 27, 2017.
- 31 CA2845210 "Connexion de Luminaire Electrique." T. Birdwell, E. Bretschneider, J. Fitzgibbon, B. Moore, S. Tylicki, issued October 24, 2017.
- 32 EP2783549 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, D. Bartine, P. Medelius, E. Bretschneider, issued November 21, 2017.
- 33 US 9,839,092 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued December 5, 2017.
- 34 DK2783549 "Wave Detection Lighting System and Related Procedures." F. Maxik, D. Bartine, P. Medelius, E. Bretschneider, issued December 11, 2017.
- 35 US9,905,976 "Mounting Step Having a Connector to Connect an Electric Fixture to a Junction Box." T. Birdwell, E. Bretschneider, J. Fitzgibbon, B. Moore, S. Tylicki, issued February 27, 2018.
- 36 US 9,913,341 "LED Lamp for Producing Biologically-Adjusted Light Including a Cyan LED." F. Maxik, D. Bartine, E. Bretschneider, issued March 6, 2018.
- 37 US 10,054,290 "Movable Barrier Operator Light Distribution." T. Birdwell, E. Bretschneider, J. Fitzgibbon, issued August 21, 2018.
- 38 US 10,177,287 "Gamut Broadened Displays with Narrow Band Green Phosphors." J. Melman, R. Nordsell, K. Baroudi, Y. Bok Go, E. Bretschneider, A. Thomas, E. Thomas, issued January 8, 2019.
- 39 US 10,212,781 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued February 19, 2019.
- 40 US 10,297,584 "Chip on Board LED Device and Method." S. Makanoeich, N. Caldani. E. Bretschneider, issued May 21, 2019.

41 US 10,417,882 "Direction Sensitive Motion Detector Camera." E. Bretschneider, J. Fitzgibbon issued September 17, 2019.

42 US 10,462,874 "Wavelength Sensing Lighting System and Associated Methods." F. Maxik, E. Bretschneider, P. Medelius, D. Bartine, R. Soler, G. Flickinger, issued October 29, 2019.

43 US 10,679,476 "Method of Using a Camera to Detect Direction of Motion." E. Bretschneider, J. Fitzgibbon issued June 9, 2020.

44 US 11,337,282 "Lifetime Color Stabilization of Color-Shifting Artificial Light Sources." E. Bretschneider, L. Lerman, H. P. Stormberg issued May 17, 2022.

45 US 11,337,282 "Luminaire With Hollow Optical Systems." E. Bretschneider, L. Lerman, Ferdinand Schinagl issued July 19, 2022.

46 US 11,561,337 "Luminaire Having a Light Guide with Cladding." E. Bretschneider, F. Schinagl issued January 24, 2023.

Patents (Pending)

>40 US and International Patents pending

Publications

1. "Evaluation of $\text{Zn}[\text{N}[\text{Si}(\text{CH}_3)_2]_2]_2$ as a p-Type Dopant in OMVPE Growth of ZnSe" W. S. Rees, D. M. Green, T. J. Anderson, E. Bretschneider, B. Pathangey, C. Park and J. Kim, J. Elec. Mat., vol. 21, pp. 361-366 (1992).
2. "OMVPE Growth of ZnSe Utilizing Zinc Amides as Source Compounds: Relevance to the Production of p-type Material" W. S. Rees, D. M. Green, T. J. Anderson and E. Bretschneider, Wide Bandgap Semiconductors, eds. T. D. Moustakas, J. I. Pankove and Y. Hamakawa, MRS Pub., vol. 242 (1992).
3. "Characterization of ZnS Layers Grown by MOCVD for Thin Film Electroluminescence (TFEL) Devices" J. E. Yu, K. S. Jones, B. Pathangey, E. Bretschneider, T. J. Anderson, J. Fang, P. H. Holloway, Wide Bandgap Semiconductors, eds. T. D. Moustakas, J. I. Pankove and Y. Hamakawa, MRS Pub., vol. 243 (1992).
4. "A Study of Nucleation of ZnS Thin Layers Grown by Low-Pressure MOCVD for Thin Film Electroluminescence (TFEL) Devices" J. E. Yu, E. Bretschneider, B. Pathangey, T. J. Anderson, J. Fang, P. H. Holloway and K. S. Jones, Mechanisms of Heteroepitaxial Growth, eds. M. F. Chisholm, B. J. Garrison, R. Hull and L. J. Schowalter, MRS Pub., vol. 263 (1992).
5. "MOCVD Growth of Non-Epitaxial and Epitaxial ZnS Thin Films" J. Fang, P. H. Holloway, J. E. Yu, K. S. Jones, B. Pathangey, E. Bretschneider and T. J. Anderson, Appl. Surf. Sci., vols. 70-71, pp. 701-706 (1993).
6. "Temperature and Flow Modulation Doping of Manganese in ZnS Electroluminescent Films by Low Pressure Metalorganic Chemical Vapor Deposition" J. E. Yu, K. S. Jones, P. H. Holloway, B. Pathangey, E. Bretschneider and T. J. Anderson, J. Elec. Mat., vol. 23, pp. 299-305 (1994).
7. "Evidence for Quantum Confinement Effects in MOCVD-Grown Si/ZnS Nanostructures," E. Bretschneider, A. Davydov, J. E. Yu, B. Pathangey, K. S. Jones and T. J. Anderson, submitted to Applied Physics Letter (1994).

8. "Carrier Confinement Effects in Epitaxial Silicon Quantum Wells Prepared by MOCVD," H. P. Maruska, R. Sudharsanan, E. Bretschneider, A. Davydov, J. E. Yu, Z. Huang, B. Pathangey, K. S. Jones and T. J. Anderson, Microcrystalline and Nanocrystalline Semiconductors, eds. R. W. Collins, C. C. Tsai, M. Hirose, F. Koch and L. Brus, MRS Pub., vol. 358 (1994).
9. "Cost of Ownership Issues in Hydrogen Gas Purification," E. Bretschneider, Semiconductor Fabtech, 16th ed., pp. 127-30 (2002).
10. "Bi-Chromatic to Polychromatic Photo- Conversion LEDs." W. Kennedy, E. Bretschneider, Proceedings of the SPIE, the International Society for Optical Engineering, vol. 5941, SPIE, Bellingham, WA (2005).
11. "Solid-State Lighting: Where Are We Going, What Are We Doing?" B. Kennedy, E. Bretschneider, Photonics Spectra, vol. 40, pp58-66. (2006).
12. "Efficacy Limits for Solid-State White Light Sources." E. Bretschneider, Photonics Spectra, vol. 47 (2007).
13. "Chasing Rainbows – Does SPD hold the key to future LED Performance?" E. Bretschneider, LEDs Magazine. (2018).
14. "Recommended Method for Determining the Correlated Color Temperature and Distance from the Planckian Locus of a Light Source. K. Smet, M. Royer, D. Baxter, E. Bretschneider, T. Esposito, K. Hauser, W. Luedtke, K. Man, Y. Ohno, Leukos, published online 13 September 2023.

Presentations and Seminars

1. "Alternative Group V Precursors for CVD Applications," R. M. Lum*, J. K. Klingert, D. W. Kisker and E. Bretschneider. Presented at the Fifth International Conference on Metalorganic Vapor Phase Epitaxy and Workshop on MOMBE, CBE, GSMBE and Related Techniques, Aachen, Germany (1990).
2. "Synthesis and Characterization of New Compounds Useful in MOVPE of II-VI Compound Semiconductors," W. S. Rees*, Jr., D. Green, T. J. Anderson, E. Bretschneider and J. Kim. Presented at the Fifth Biennial Workshop on Organometallic Vapor Phase Epitaxy, Panama City, FL (1991).
3. "Initial Stages Deposition of OMCVD ZnS on BaTa₂O₅ and Si," E. Bretschneider*, J. E. Yu, B. Pathangey, T. J. Anderson and K. Jones. Presented at Annual AIChE Meeting, Los Angeles, CA (1991).
4. "Growth and Properties of ZnS Layers for Thin Film Electroluminescence (TFEL) Devices," E. Bretschneider*, J. E. Yu, J. Fang, B. Pathangey, K. S. Jones, P. H. Holloway and T. J. Anderson. Presented at 21st Ann. Symp. Appl. Vac. Sci. Technol., Clearwater, FL (1992).
5. "MOCVD Growth of Non Epitaxial and Epitaxial ZnS Thin Films," J. Fang, P. H. Holloway*, J. E. Yu, K. S. Jones, B. Pathangey, E. Bretschneider and T. J. Anderson. Presented at 12th Internatl. Vac. Congress, Netherlands (1992).
6. "Microstructure of ZnS Layers Grown by MOCVD for Thin Film Electroluminescent Displays," J. E. Yu, K. S. Jones*, E. Bretschneider, T. J. Anderson and P. H. Holloway. Presented at the 10th Annual Meeting of the Florida Chapter of Scanning Electron Microscopy Society, Crystal River, FL (1992).

7. "Research in Electroluminescent Thin Film Materials at the University of Florida," J. E. Yu, K. S. Jones, B. Pathangey, T. J. Anderson, E. Bretschneider and P. H. Holloway*. Presented at Planar Systems Inc, Beaverton, OR (1992).
8. "Microstructure and Properties of MOCVD Grown ZnS Undoped and Doped with Terbium or Manganese," P. H. Holloway*, J. Fang, J. E. Yu, K. S. Jones, E. Bretschneider, B. Pathangey and T. J. Anderson. Presented at Spring MRS Meeting, San Francisco, CA (1993).
9. "Effects of Substrate Preparation on the Interfacial Abruptness and Composition of ZnS/Si Heterostructures," J. E. Yu, E. Bretschneider, T. J. Anderson* and K. S. Jones. Presented at Spring MRS Meeting, San Francisco, CA (1993).
10. "Microstructure, Modulation Doping, and Epitaxial Growth of Electroluminescent Films of ZnS," J. E. Yu, J. Fang, K. S. Jones, P. H. Holloway*, E. Bretschneider, B. Pathangey and T. J. Anderson. Presented at the 40th Nat. Symp. and Topical Conf. of the Amer. Vac. Soc., Orlando, FL (1993).
11. "Blue and Green Light Emitting Phosphors for Thin Film Electroluminescent Displays," J. E. Yu, E. Bretschneider, B. Pathangey, S. Jones, T. Trottier, P. Rack, J. Sebastian, K. S. Jones, T. J. Anderson and P. H. Holloway*. Presented at Spring MRS Meeting, San Francisco, CA (1994).
12. "Quantum Confinement Effects in Heteroepitaxial Si/ZnS Nanostructures Produced by MOCVD." E. Bretschneider*, J. E. Yu, Z. Huang, B. Pathangey, K. S. Jones, T. J. Anderson, H. P. Maruska and R. Sudharsanan. Presented at the 41st National Symposium of the American Vacuum Society and 3rd International Conference on Nanometer-scale Science and Technology, Denver, CO (1994).
13. "MOCVD Growth of ZnS/Si Quantum Well Structures" E. Bretschneider*, A. Davydov, C. McCreary, J. E. Yu, L. Wang, K. S. Jones, T. J. Anderson and P. Maruska. Presented at the TMS 7th Biennial Workshop on Organometallic Vapor Phase Epitaxy, Fort Myers, FL (1995).
14. "MOCVD Growth of ZnS Using Methyl Mercaptan as an Alternate Sulfur Source." C. McCreary*, A. Davydov, E. Bretschneider and T. J. Anderson. Presented at the AIChE Conference on Electronic and Photonic Materials. Miami, FL (1995).
15. "ZnS/Si/ZnS Quantum Well Structures for Visible Light Emission." E. Bretschneider*, C. McCreary, A. Davydov, T. J. Anderson, H. P. Maruska and P. Norris. Presented at the Fall MRS Meeting, Boston, MA (1995).
16. "MOCVD Growth of Si/ZnS Quantum Well Structures." E. Bretschneider*, A. Davydov, C. McCreary, T. J. Anderson and H. P. Maruska. Presented at the TMS 8th Biennial Workshop on Organometallic Vapor Phase Epitaxy, Dana Point, CA (1997).
17. "Cost of Ownership Issues in Hydrogen Purification." E. Bretschneider*, Presented at CS-MAX 2001, Boston, MA (2001).
18. "MOCVD Growth of High Brightness Light Emitting Diodes." E. Bretschneider*, Invited Seminar, Department of Chemical Engineering, Tulane University, March 2002.
19. "Comparison of CDD and Photodiode Arrays for Measurement of High Brightness Light Emitting Diodes." E. Bretschneider*, C. Dodds, Presented at CS-MAX 2002, San Jose, CA (2002).
20. "Angular Variations in Spectroradiometric Characterization of High Brightness Light Emitting Diodes." E. Bretschneider*, C. Dodds, C. Narfgrén, J. Ngafoe, Presented at CS-MAX 2002, San Jose, CA (2002).
21. "Solid-State Lighting for the 21st Century." E. Bretschneider*, Invited Seminar, Department of Chemical Engineering, University of South Florida, September 2003.

22. "Bi-Chromatic to Polychromatic Photo-Conversion LEDs." W. Kennedy, E. Bretschneider*, Presented at Fifth International Conference on Solid-State Lighting, Sand Diego, CA, August 1-4 (2005).
23. "Introduction to High Brightness LEDs." E. Bretschneider*, Presented at SID-LEDs in Displays, Costa Mesa, CA (2006).
24. "High Brightness Side-View LEDs Review." E. Bretschneider*, Presented at SID-LEDs in Displays, Costa Mesa, CA (2007).
25. "High Brightness Side-View LEDs: What It Takes to Deliver LEDs Suitable for Mid-Size LCD BLUs in Mass Production." E. Bretschneider*, Presented at SID-LEDs in Displays, Costa Mesa, CA (2008).
26. "Color Rendering and Efficacy Limits for Solid State Lighting Technology." E. Bretschneider*. Presented at SPIE 8th International Conference on Solid State Lighting, Los Angeles, CA (2008).
27. Conference Chair: "LED Measurement and Standards", San Diego, CA October 2-3 (2008).
28. "Public Lighting Case: New York City", E. Bretschneider*, E. Peiniger, J. Sundin, Green Lighting 2009, Frankfurt, Germany, March 24-26 (2009).
29. "Honest Metrics for Energy Efficient Lighting", E. Bretschneider, Design Lights Consortium Stakeholders Meeting, Denver, CO August 2-3 (2016).
30. "Models for Predicting Color Point Stability", E. Bretschneider, Strategies in Light, Anaheim, CA February 28 - March 2 (2017).
31. "Models for Predicting LED Color Point Stability" - Invited paper, E. Bretschneider, CORM 2017, Troy, NY, July 31 - August 2 (2017).
32. "Chasing the Rainbow" Strategies in Light, Las Vegas, NV, February 27 – March 1 (2019).
33. "From Back Death to White Light: the LED Revolution that almost didn't happen." (Keynote speaker), Strategies in Light, Las Vegas, NV, February 27 – March 1 (2019).
34. "The Integrated System of Lighting: Paving a New Path to Profitability.", Strategies in Light, San Diego, CA, February 11 – 13 (2020).
35. "The Update of LM-79: Optical and Electrical Measurements of Solid State Lighting Products.", IES Educational Webinar Series, August 19 (2021).
36. "TM-21-21: Projecting Long-Term Luminous, Photon, and Radiant.", IES Educational Webinar Series, March 10 (2022).
37. "Everything about UVC that you didn't know to ask.", CSA Power Lunch, LightFair 2022, June 22, (2022).

Expert Witness:

- **ALSI Holdings LLC** v Current Lighting Solutions LLC, Western District of Texas 6:21-cv-01187 (declaration)
- **Mito Red Light Inc** v Platinum LED Lights LLC et al, 2:21-cv-01700 (declaration)
- Home Depot USA Inc v **Lynk Labs Inc**, IPR2021-01367, IPR2021-01368, IPR2021-01369, IPR2021-01370, IPR2021-01540 (declaration)
- Walmart et al v **Power Concepts LLC**, IPR2022-00534, IPR202200569, District of South Carolina 7:21-cv-00408 (declaration)
- **Everlight Electronics Co Ltd** v Amazon.com LLC, Western District of Texas 6:21-cv-906 (declaration)
- Brightplus Ventures LLC v **TCL Electronics et al**, Eastern District of Texas 2:22-cv-194 (declaration)
- Samsung Electronics Co Ltd v Ultravision technologies, LLC, IPR against U.S. Patent No. 8,870,410 & U.S. Patent No. 10,223,946 (declaration)
- OptoLum, Inc. v **Cree, Inc.**, Middle District of North Carolina, 1:17-cv-00687 (declaration, deposition, testimony)
- Cao Lighting, Inc. v **Feit Electric Company, Inc.**, Central District of California 2:20-cv-04926 (declaration)
- Arnold & Richter Cine Technik GmbH & Co. Betriebs v. **Rotolight Limited**, IPR2022-00099 (declaration)
- **Ideal Industries Lighting LLC** v RAB Lighting Inc IPR2021-00655, IPR against U.S. Patent No. 8,895,816
- **Texas Instruments, Inc.**, IPR against US Patent No. 6,554,907 (declaration)
- L&L Candle Company LLC v **Decoware Int'l Inc.** IPR2020-01233
- Ultravision technologies, LLC v **Samsung Electronics Co. Ltd. and Samsung Display Co. Ltd.** Eastern District of Texas 2:19-cv-00252
- Autronic Plastics, Inc. v **Apogee Lighting, Inc. et al** Eastern District of New York 2:19-cv-06268 (declaration)
- **Samsung Electronics Co., Ltd.**, v Ultravision Technologies, LLC., IPRs against US Patent No. 8,870,410 and US Patent No. 10,223,496 (declaration)
- Certain Filament Light-Emitting Diodes and Products Containing Same, ITC Investigation No. 337-TA-1172, declaration, deposition
- Seoul Semiconductor Co. Ltd; Seoul Viosys Co. Ltd v **Bed Bath and Beyond Inc.** Central District of California 2:18-cv-03837
- Nichia Corporation v. **Karimex Componentes Eletrônicos**, 2nd Business Court of Sao Paulo (lawsuit no. 1114629-97.2019.8.26.0100) (declaration)
- **Everlight Electronics Co., Ltd.** v Bridgelux, Inc. IPR2018-01482, IPR2018-01483, IPR2018-01484, IPR2018-01485, IPR2018-01493
- **Everlight Electronics Co., Ltd.** v Bridgelux, Inc. Northern District of California 4:17-cv-3363-JSW
- Blackbird Tech LLC d/b/a Blackbird Technologies v **ELB Electronics Inc.; Feit Electric Company Inc.** District Court of Delaware 1:15-cv-00058 (declaration)
- Veeco Instruments Inc. v **SGL Carbon, LLC** Eastern District of New York 17-cv-2217 (declaration, deposition)
- MSI Lighting Inc. and MSI LLC v **Cree**, California Southern District 2:2015-cv-01732 (declaration)
- **EiKO Global, LLC and Halco lighting Technologies, LLC** v Patent Owners of US 7,086,747; Inter Partes Review (report)

- **Woodforest Lighting Inc. D/B/A Forest Lighting USA** v Illumisys, Inc. D/B/A Toggled; IPR2017-00383 (report, deposition)
- Nichia Corporation v **TCL Multimedia Technology Holdings, LTD. and TTE Technology, Inc.**; Delaware District Court 1:2016-cv-00681; Inter Partes Review US 8,309,375; US 7,855,092; US 7,915,631; US 7,901,959 (report)
- **Everlight Electronics Co. Ltd., and Emcore Corporation** v Nichia Corporation and Nichia America Corporation Eastern District of Michigan 4:12-cv-11785 (declaration, deposition, testimony)
- **Lighting Science Group** v Satco Products, Inc d/b/a Nuvo Lighting, Middle District of Florida Orlando Division 6:16-cv-1256 (report, deposition)
- **Lighting Science Group** v Biological Innovation and Optimization Systems, LLC Eighteenth Judicial Circuit for Brevard County 05-2015-CA-024614 (retained, no reports)
- Nichia Corporation v **Everlight Electronics Co. Ltd.** Dusseldorf Higher Regional Court I-15 U 31/14
- **Everlight Electronics Co. Ltd** and Nichia Corporation, Japanese IP High Court Hei26(Ne)10032 (report)
- **Everlight Electronics Co Ltd** v Document Security Systems, Inc. IPR against U.S. Patent No. 7,524,087 (declaration)
- **Nitride Semiconductors Co. Ltd.** v RayVio Corporation, Northern District of California San Jose Division 5:17-cv-02952 (declaration, deposition)
- **Manuel Barajas** v Woodcreek Apartment Homes; Pennwood Partners, District Court Clark County Nevada, A-14-709992-C (report, deposition)
- Cao Lighting, Inc. v **Light Efficient Design**, Northern District of Illinois Eastern Division, 1:17-cv-07359 (declaration)
- Bridgelight, Inc. v **Everlight Electronics Co. Ltd. and Everlight Americas, Inc.** Northern District of California Oakland Division 4:17-cv-3363 (declaration)
- DMF, Inc, v **AMP Plus, Inc. d/b/a ELCO Lighting and ELCO Lighting, Inc.** Central District of California 2:18-cv-07090 (declaration, deposition)
- Current Lighting Solutions, LLC; General Electric Co.; and Consumer Lighting, LLC v **Cree, Inc.** Middle District of North Carolina, Durham Division 1:19-cv-394 (retained, no work)

Appendix B – List of Materials Considered

U.S. Patent No. 11,253,719 (“the ’719 patent”)
Prosecution History File Wrapper of the ’719 patent (excerpts)
U.S. Patent Pub. 2019/0030359 A1 (“ <i>Dijkstra</i> ”)
U.S. Patent Publication No. 2006/0237439A1 (“ <i>Norwood</i> ”)
Prosecution History File Wrapper of U.S. Patent No. 10,478,635 (excerpts)
<i>Ex Parte</i> Reexamination History of U.S. Patent No. 10,478,635 (excerpts)
Prosecution History File Wrapper of U.S. Patent No. 10,639,495 (excerpts)
<i>Ex Parte</i> Reexamination History of U.S. Patent No. 10,639,495 (excerpts)
Prosecution History File Wrapper of U.S. Patent No. 11,524,172 (excerpts)
Patent Owner’s Preliminary Infringement Contentions, Exhibit 5 (the ’719 patent) in <i>Joovv, Inc. v Mito Red Light, Inc.</i> , Civil Action No. Case 2:23-cv-01084-MTL (D. Ariz.) (October 20, 2023)
Complaint (ECF #1) in <i>Joovv, Inc. v Mito Red Light, Inc.</i> , Civil Action No. Case 2:23-cv-01084-MTL (D. Ariz.) (June 13, 2023)
Answer (ECF#018) in <i>Joovv, Inc. v Mito Red Light, Inc.</i> , Civil Action No. Case 2:23-cv-01084-MTL (D. Ariz.) (July 28, 2023)
U.S. Patent No. 6,314,699 B1 (<i>Tucker</i>)
U.S. Patent Publication No. 2004/0127961 A1 (“ <i>Whitehurst</i> ”)
U.S. Patent Publication No. US 2011/0054573 (“ <i>Mitchell</i> ”)