

First pages of 15 granted US patents



(12) **United States Patent**
Fine et al.

(10) **Patent No.:** **US 10,952,622 B2**
(45) **Date of Patent:** **Mar. 23, 2021**

(54) **METHOD AND APPARATUS FOR HEMODYNAMICALLY CHARACTERIZING A NEUROLOGICAL OR FITNESS STATE BY DYNAMIC LIGHT SCATTERING (DLS)**

(58) **Field of Classification Search**
CPC A61B 5/0205; A61B 5/02108; A61B 5/02116; A61B 5/0261; A61B 5/0285; A61B 5/165; A61B 5/7253
(Continued)

(71) Applicant: **ELFI-TECH LTD.**, Rehovot (IL)

(56) **References Cited**

(72) Inventors: **Ilya Fine**, Rehovot (IL); **Alexander Kaminsky, II** (IL)

U.S. PATENT DOCUMENTS

(73) Assignee: **ELFI-TECH LTD.**, Rehovot (IL)

6,805,673 B2 * 10/2004 Dekker A61B 5/0205
600/324
2004/0082842 A1 * 4/2004 Lumba A61B 5/0011
600/338

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 40 days.

(Continued)

FOREIGN PATENT DOCUMENTS

(21) Appl. No.: **15/770,590**

WO 2015022583 A2 2/2015

(22) PCT Filed: **Aug. 15, 2016**

(86) PCT No.: **PCT/IB2016/001240**

OTHER PUBLICATIONS

§ 371 (c)(1),

(2) Date: **Apr. 24, 2018**

Geyer M. J. et al. "Using wavelet analysis to characterize the thermoregulatory mechanisms of sacral skin blood flow" (2004) Journal of rehabilitation research and development, vol. 41, No. 6A, pp. 797-805, Dec. 2014 (Dec. 31, 2004). Dec. 31, 2004 (Dec. 31, 2004).

(87) PCT Pub. No.: **WO2017/072568**

PCT Pub. Date: **May 4, 2017**

(Continued)

(65) **Prior Publication Data**

US 2019/0008397 A1 Jan. 10, 2019

Primary Examiner — Christopher A Flory

(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

Related U.S. Application Data

(60) Provisional application No. 62/295,138, filed on Feb. 14, 2016, provisional application No. 62/249,303, filed on Nov. 1, 2015.

(57) **ABSTRACT**

(51) **Int. Cl.**

A61B 5/0205 (2006.01)

A61B 5/026 (2006.01)

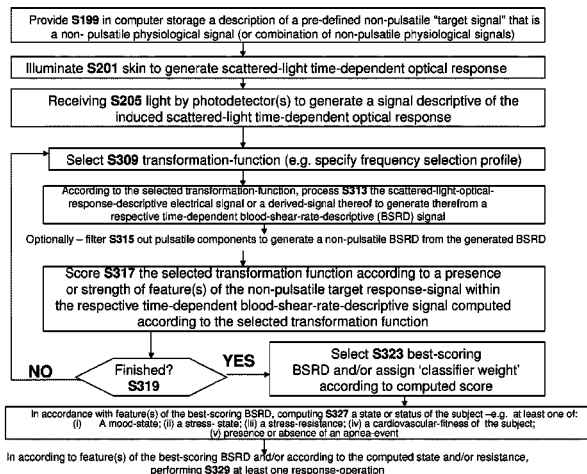
(Continued)

A method and apparatus for hemodynamically characterizing a neurological or fitness state by dynamic scattering light (DLS) is disclosed herein. In particular, a non-pulsatile blood-shear-rate-descriptive (BSRD) signal(s) is optically generated and analyzed. In some embodiments, the BSRD signal is generated dynamically so as to adaptively maximize (i.e. according to a bandpass or frequency-selection profile) a prominence of a predetermined non-pulsatile physiological signal within the BSRD. In some embodiments, the BSRD is subjected to a stochastic or stationary-

(52) **U.S. Cl.**

CPC **A61B 5/0205** (2013.01); **A61B 5/0261** (2013.01); **A61B 5/0285** (2013.01); **A61B 5/165** (2013.01); **A61B 5/7253** (2013.01)

(Continued)





US008868149B2

(12) **United States Patent**
Eisen et al.

(10) **Patent No.:** **US 8,868,149 B2**
(45) **Date of Patent:** **Oct. 21, 2014**

(54) **PHOTOPLETHYSMOGRAPHY DEVICE AND METHOD**

A61B 5/14551 (2013.01); *A61B 5/7257* (2013.01); *A61B 5/7246* (2013.01); *A61B 5/02416* (2013.01)

(71) Applicants: **Leon Eisen**, Ashdod (IL); **Alexander Kaminsky**, Rehovot (IL); **Ilya Fine**, Rehovot (IL)

USPC **600/324**

(58) **Field of Classification Search**

USPC **600/324**
See application file for complete search history.

(72) Inventors: **Leon Eisen**, Ashdod (IL); **Alexander Kaminsky**, Rehovot (IL); **Ilya Fine**, Rehovot (IL)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,284,149	A *	2/1994	Dhadwal et al.	600/476
5,598,841	A *	2/1997	Taniji et al.	600/342
6,754,515	B1 *	6/2004	Pologe	600/322
7,254,432	B2 *	8/2007	Fine	600/335
2004/0260165	A1 *	12/2004	Cho et al.	600/365
2006/0063995	A1 *	3/2006	Yodh et al.	600/323
2009/0209834	A1 *	8/2009	Fine	600/316

* cited by examiner

Primary Examiner — Clayton E Laballe

Assistant Examiner — Linda B Smith

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(73) Assignee: **Oxitone Medical Ltd.**, Ashkelon (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/653,233**

(22) Filed: **Oct. 16, 2012**

(65) **Prior Publication Data**

US 2013/0131475 A1 May 23, 2013

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/847,048, filed on Jul. 30, 2010, now abandoned, and a continuation-in-part of application No. PCT/IL2010/000616, filed on Aug. 1, 2010.

(60) Provisional application No. 61/229,741, filed on Jul. 30, 2009.

(51) **Int. Cl.**

<i>A61B 5/00</i>	(2006.01)
<i>A61B 5/145</i>	(2006.01)
<i>A61B 5/1455</i>	(2006.01)
<i>A61B 5/024</i>	(2006.01)

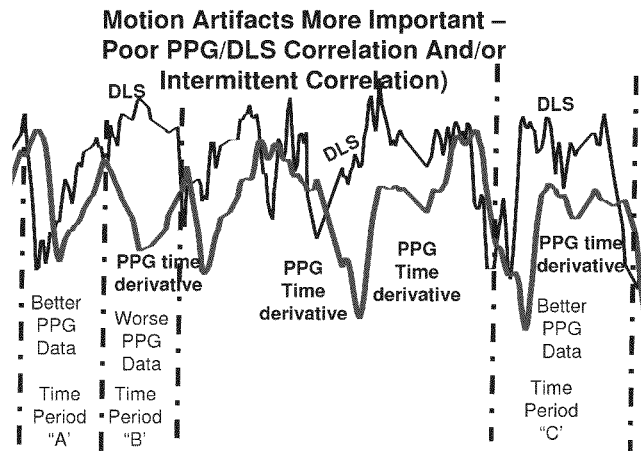
(52) **U.S. Cl.**

CPC *A61B 5/14552* (2013.01); *A61B 5/7207* (2013.01); *A61B 5/681* (2013.01); *A61B 5/14546* (2013.01); *A61B 5/7285* (2013.01);

(57) **ABSTRACT**

A system and method for measuring one or more light-absorption related blood analyte concentration parameters of a mammalian subject, is disclosed. In some embodiments, the system comprises: a) a photoplethysmography (PPG) device configured to effect a PPG measurement by illuminating skin of the subject with at least two distinct wavelengths of light and determining relative absorbance at each of the wavelengths; b) a dynamic light scattering measurement (DLS) device configured to effect a DLS measurement of the subject to rheologically measure a pulse parameter of the subject; and c) electronic circuitry configured to: i) temporally correlating the results of the PPG and DLS measurements; and ii) accordance with the temporal correlation between the PPG and DLS measurements, assessing value(s) of the one or more light-absorption related blood analyte concentration parameter(s).

1 Claim, 27 Drawing Sheets





US009433774B2

(12) **United States Patent**
Dar et al.

(10) **Patent No.:** **US 9,433,774 B2**
(45) **Date of Patent:** **Sep. 6, 2016**

(54) **HEADSET FOR TREATMENT AND ASSESSMENT OF MEDICAL CONDITIONS**

1/0476; A61N 1/0492; A61N 1/36014;
A61N 1/0456; A61B 5/6803; A61B 5/6802;
A61B 5/6814; A61B 5/683; A61B 5/6831;
A61B 5/0478; A41F 1/008

(71) Applicant: **NEUROLIEF LTD.**, Yokneam Illit (IL)

See application file for complete search history.

(72) Inventors: **Amit Dar**, Kfar Hess (IL); **Jonathan Bar-Or**, Pardes Hana Karkur (IL); **Amir Cohen**, Ra'anana (IL); **Ron Belson**, Tel Aviv (IL)

(56) **References Cited**

U.S. PATENT DOCUMENTS

(73) Assignee: **NEUROLIEF LTD.**, Yokneam Illit (IL)

3,659,614	A	5/1972	Jankelson	
5,495,853	A	3/1996	Yasushi	
6,077,237	A *	6/2000	Campbell G06F 3/011 600/587
2001/0039444	A1	11/2001	Bar-Or et al.	
2007/0093706	A1 *	4/2007	Gevins A61B 5/0478 600/383
2010/0324441	A1 *	12/2010	Hargrove A61B 5/04004 600/544
2011/0301486	A1 *	12/2011	Van Hek A61B 5/6814 600/544
2011/0319975	A1 *	12/2011	Ho A61N 1/0408 607/139
2013/0079659	A1 *	3/2013	Akhadov A61B 5/0476 600/544

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/849,868**

(22) Filed: **Sep. 10, 2015**

(65) **Prior Publication Data**

US 2015/0374971 A1 Dec. 31, 2015

(Continued)

Related U.S. Application Data

FOREIGN PATENT DOCUMENTS

(63) Continuation-in-part of application No. PCT/IB2014/059858, filed on Mar. 15, 2014.

WO	WO9743954	A1	11/1997
WO	WO2012079778	A1	6/2012
WO	WO2013001526	A2	1/2013

(60) Provisional application No. 61/786,701, filed on Mar. 15, 2013.

OTHER PUBLICATIONS

(51) **Int. Cl.**

A61N 1/00 (2006.01)
A61N 1/04 (2006.01)
A61N 1/36 (2006.01)
A61B 5/0478 (2006.01)
A61B 5/00 (2006.01)

International Search Report for PCT/IB2014/059858 dated Jul. 22, 2014.

(Continued)

(52) **U.S. Cl.**

CPC **A61N 1/0484** (2013.01); **A61N 1/0476** (2013.01); **A61N 1/0488** (2013.01); **A61N 1/0492** (2013.01); **A61N 1/36014** (2013.01); **A61B 5/0478** (2013.01); **A61B 5/6803** (2013.01)

Primary Examiner — Robert N Wieland
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

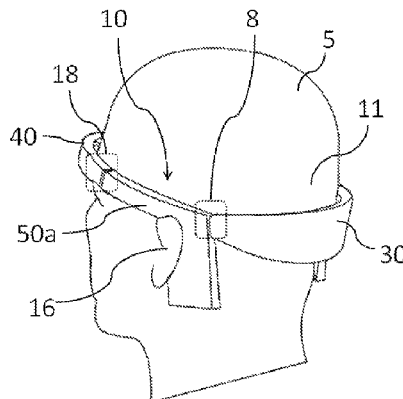
(57) **ABSTRACT**

A circumferential headset for use in delivering electrical stimulation to the skin surface of the head.

(58) **Field of Classification Search**

CPC A61N 1/0484; A61N 1/0472; A61N

46 Claims, 15 Drawing Sheets



(12) **United States Patent**
Geisinger et al.

(10) **Patent No.:** **US 10,548,805 B2**
(45) **Date of Patent:** **Feb. 4, 2020**

(54) **VIRTUAL REALITY APPARATUS AND METHODS THEREFOR**

(71) Applicant: **LIBRA AT HOME LTD**, Givat Shmuel (IL)

(72) Inventors: **Dario Geisinger**, Givat Shmuel (IL); **Saul Alberto**, Jerusalem (IL)

(73) Assignee: **LIBRA AT HOME LTD**, Givat Shmuel (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/398,525**

(22) Filed: **Jan. 4, 2017**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. PCT/IB2015/055071, filed on Jul. 5, 2015.
(Continued)

(51) **Int. Cl.**

A61B 3/02 (2006.01)
A61H 5/00 (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC **A61H 5/00** (2013.01); **A61B 3/0025** (2013.01); **A61B 3/0041** (2013.01); **A61B 3/113** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC A61H 5/00; A61H 2201/0157; A61H 2201/5007; A61H 2201/1604;

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,494,507 B1 7/2013 Tedesco et al.
8,585,589 B1 11/2013 Cinberg

(Continued)

FOREIGN PATENT DOCUMENTS

WO 2009/129222 A2 10/2009

OTHER PUBLICATIONS

International Search Report for PCT/IB2015/055071, dated Nov. 4, 2015.

Written Opinion for PCT/IB2015/055071, dated Nov. 4, 2015.

Primary Examiner — William R Alexander

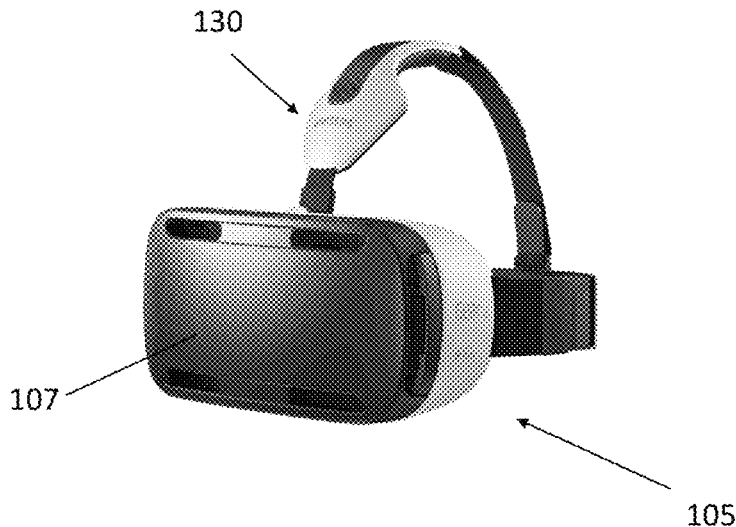
Assistant Examiner — Henry A Duong

(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

A method for treating vestibular impairment, comprising: (a) providing a virtual reality apparatus comprising: a headset; a smartphone having a computer processor, a camera, and a display screen; a case holding the smartphone attaching to the headset; a first optical arrangement, for focusing a field of view of the camera on the user's eye; a second optical arrangement for viewing the display screen; and an application and the processor adapted to display a stimulation exercise on the screen; wherein, the application records movements of the eye, during the exercise, using the camera; wherein the application determines user response competence to the exercise, based upon the movements; and accordingly modifies exercise degree of difficulty; (b) placing the headset on the user's head; (c) focusing the field of view onto the eye; (d) displaying the exercise; and (e) recording eye movements, using the camera.

20 Claims, 7 Drawing Sheets



(12) **United States Patent**
Fine et al.

(10) **Patent No.:** **US 10,720,755 B2**
(45) **Date of Patent:** **Jul. 21, 2020**

(54) **ENSEMBLE-AVERAGED MEASUREMENT OF STOCHASTIC MOTION BY CURRENT-MODULATING OF VCSEL WAVELENGTH**

(71) Applicants: **Ilya Fine, Rehovot (IL); Alexander Kaminsky, Tbilisi (GE)**

(72) Inventors: **Ilya Fine, Rehovot (IL); Alexander Kaminsky, Tbilisi (GE)**

(73) Assignee: **ELFI-TECH LTD., Rehovot (IL)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/890,388**

(22) Filed: **Feb. 7, 2018**

(65) **Prior Publication Data**
US 2019/0312411 A1 Oct. 10, 2019

(51) **Int. Cl.**
H01S 5/183 (2006.01)
G01N 15/14 (2006.01)
G01N 33/86 (2006.01)

(52) **U.S. Cl.**
CPC **H01S 5/183** (2013.01); **G01N 15/1434** (2013.01); **G01N 33/86** (2013.01); **G01N 2015/1445** (2013.01)

(58) **Field of Classification Search**
CPC H01S 5/183; G01N 33/86; G01N 15/1434; G01N 2015/1445
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,495,850	A *	3/1996	Zuckerman	A61B 5/14555
				356/41
5,522,389	A *	6/1996	Fischer	A61B 5/14539
				356/41
6,784,981	B1 *	8/2004	Roche	G01N 1/38
				356/336
7,356,364	B1 *	4/2008	Bullock	A61B 5/14532
				600/310
7,688,427	B2 *	3/2010	Cox	G01N 15/1456
				356/39
7,911,617	B2 *	3/2011	Padmanabhan ...	G01N 15/1484
				356/246
9,091,625	B2 *	7/2015	Wu	G01N 21/6428
9,103,759	B2 *	8/2015	Wu	G01N 15/147
2007/0009386	A1 *	1/2007	Padmanabhan ...	B01L 3/502776
				422/68.1
2007/0116347	A1 *	5/2007	Hong	G06T 7/143
				382/131
2008/0247429	A1 *	10/2008	Colbourne	H01S 5/0622
				372/26
2009/0054767	A1 *	2/2009	Telischak	A61B 5/0071
				600/431

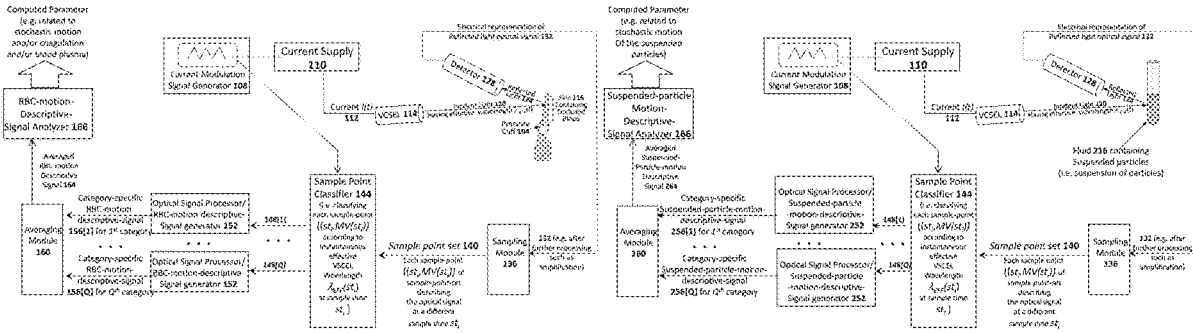
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Primary Examiner — Mohamed K Amara
(74) Attorney, Agent, or Firm — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Embodiments of the invention relate to a method and apparatus for measuring at least one parameter that is (i) descriptive of stochastic motion of suspended particles within a fluid; and/or (ii) is a rheological property of the fluid or of the suspension; (iii) describes a concentration of suspended particles within the fluid; and/or (iv) is a diffusion coefficient of the suspended particles and/or (v) is a viscosity of the fluid or of the suspension; and/or (vi) is a food aging or spoilage parameter and/or (vii) is an in-vivo or in-vitro blood coagulation parameter.

5 Claims, 24 Drawing Sheets





US009532923B2

(12) **United States Patent**
Shohat et al.

(10) **Patent No.:** **US 9,532,923 B2**
(45) **Date of Patent:** **Jan. 3, 2017**

(54) **METHOD OF OPERATING A GASTROINTESTINAL CAPSULE**
(71) Applicant: **VIBRANT LTD.**, Migdal Haemek (IL)
(72) Inventors: **Shaul Shohat**, Kfar Hoaranim (IL); **Alexander Belenky**, Hod Hasharon (IL); **Roni Shabat**, Kibbutz Izrael (IL)
(73) Assignee: **VIBRANT LTD.**, Yokneam (IL)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/732,733**
(22) Filed: **Jun. 7, 2015**

(65) **Prior Publication Data**
US 2015/0313792 A1 Nov. 5, 2015

Related U.S. Application Data
(63) Continuation of application No. 12/310,201, filed as application No. PCT/IL2007/001139 on Sep. 17, 2007, now Pat. No. 9,078,799.
(60) Provisional application No. 60/845,200, filed on Sep. 18, 2006.

(51) **Int. Cl.**
A61H 23/00 (2006.01)
A61H 23/02 (2006.01)
(52) **U.S. Cl.**
CPC **A61H 23/02** (2013.01); **A61H 23/0263** (2013.01); **A61H 2205/083** (2013.01)

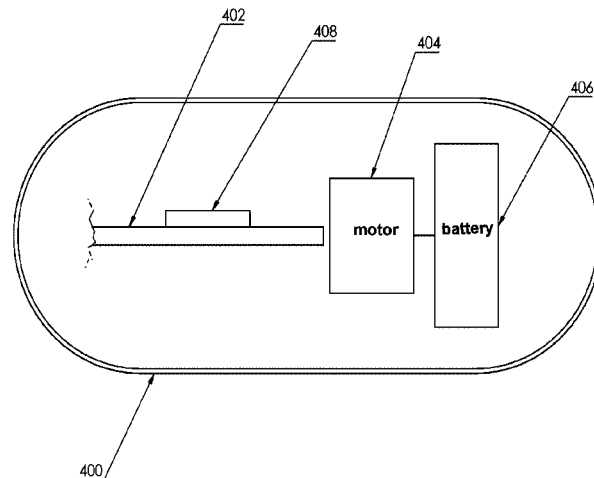
(58) **Field of Classification Search**
CPC **A61H 23/00**; **A61H 23/02**; **A61H 23/0254**; **A61H 23/0263**; **A61H 2205/083**; **A61H**
1/00

See application file for complete search history.

(56) **References Cited**
U.S. PATENT DOCUMENTS
2004/0050394 A1* 3/2004 Jin A61B 1/00158
128/899
2005/0177069 A1* 8/2005 Takizawa A61B 1/041
600/573
(Continued)
Primary Examiner — Quang D Thanh
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**
An ingestible gastrointestinal capsule (GIC) for mechanically stimulating a segment of the gastrointestinal (GI) wall by alternately and repeatedly pressurizing, and/or vibrating it is provided. The GIC is programmed to being activated following a predefined time delay. The activated GIC agitates, shakes, rattles, jolts, vibrates and/or moves in a reciprocal expanding and contracting motion thereby mechanically stimulating the adjacent segment of the GI wall at a targeted location. Activation of the GIC may include a number of automatically accomplished partial activations, such as when the time elapsed from the moment of setting the GIC on equals a predefined time delay; when the mechanical load applied onto the GIC exceeds, and/or gets lower than a respective predefined level of mechanical load; when the ambient pH reaches a predefined level, or changes, and/or a temperature associated with the user reaches a predefined threshold. Agitation is accomplished by means of agitation means embedded in the GIC. Such agitation means includes an unbalanced weight attached to the shaft of an electric motor, an actuator implemented by, such as an electric solenoid, an electro-active polymer (EAP), a dielectric elastomer actuator (DEA), embedded in a GIC of the invention.

18 Claims, 2 Drawing Sheets





US010806234B2

(12) **United States Patent**
Miklatzky et al.

(10) **Patent No.:** **US 10,806,234 B2**

(45) **Date of Patent:** **Oct. 20, 2020**

(54) **APPARATUS AND METHOD FOR ANALYZING HAIR AND/OR PREDICTING AN OUTCOME OF A HAIR-COLORING TREATMENT**

(71) Applicant: **COLORIGHT LTD.**, Rehovot (IL)

(72) Inventors: **Efraim Miklatzky**, Neve Ilan (IL); **Daniel Mandelik**, Rehovot (IL); **Gilad Davara**, Rehovot (IL); **Eliyahu Benny**, Rishon-LeZion (IL); **Oded Livneh**, Holon (IL); **Tal Marcu**, Mevaseret Zion (IL); **Thierry Wasserman**, Tel Aviv (IL)

(73) Assignee: **COLORIGHT LTD.**, Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 906 days.

(21) Appl. No.: **15/303,727**

(22) PCT Filed: **Mar. 25, 2015**

(86) PCT No.: **PCT/IB2015/000724**

§ 371 (c)(1),

(2) Date: **Oct. 12, 2016**

(87) PCT Pub. No.: **WO2015/166340**

PCT Pub. Date: **Nov. 5, 2015**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. PCT/IL2014/050850, filed on Sep. 28, 2014. (Continued)

(30) **Foreign Application Priority Data**

Sep. 24, 2014 (WO) PCT/IB2014/064809

(51) **Int. Cl.**
A45D 44/00 (2006.01)
G01J 3/50 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *A45D 44/005* (2013.01); *A61B 5/1032* (2013.01); *A61B 5/448* (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,643,313 A 2/1987 Robson
5,205,837 A 4/1993 Andean et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CA 2828363 A1 3/2015
CN 1665444 A 9/2005
(Continued)

OTHER PUBLICATIONS

European Office Action dated Mar. 5, 2018 in Patent Application No. 15 729 219.4, 5 pages.
(Continued)

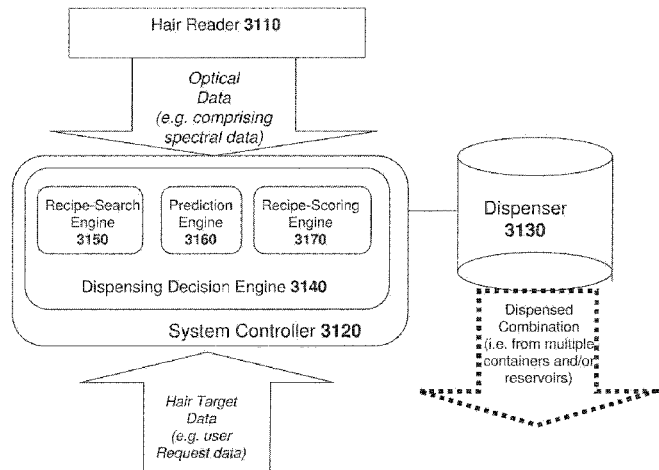
Primary Examiner — Shawn Decenzo

(74) *Attorney, Agent, or Firm* — Oblon, McClelland, Maier & Neustadt, L.L.P.

(57) **ABSTRACT**

The present disclosure relates to devices and methods for analyzing hair and/or predicting an outcome of hair-coloring treatment. disclosed is method of predicting a result of a hair-color-modifying treatment on a sample of hair, the method comprising: a. for each given region of a plurality of distinct regions, respectively measuring a region-specific spectrum of respective material of the hair-sample respec-

(Continued)



(12) **United States Design Patent**
Hefetz et al.

(10) **Patent No.:** **US D732,736 S**
(45) **Date of Patent:** **** Jun. 23, 2015**

(54) **HAIR READER**

(71) Applicant: **ColoRight Ltd.**, Rehovot (IL)

(72) Inventors: **Joseph Hefetz**, Tel-Aviv (IL); **Yuri Movshovich**, Ramat-Gan (IL)

(73) Assignee: **COLORIGHT LTD.**, Rehovot

(**) Term: **14 Years**

(21) Appl. No.: **29/433,309**

(22) Filed: **Sep. 27, 2012**

(51) **LOC (10) Cl.** **28-03**

(52) **U.S. Cl.**
USPC **D28/10**

(58) **Field of Classification Search**
USPC D28/9-10; D24/133, 144, 209-210;
235/462.44-462.49; 132/200
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,256,866 A * 10/1993 Conversano et al. 235/472.03
5,424,525 A * 6/1995 Rockstein et al. 235/462.31

(Continued)

Primary Examiner — Jennifer Rivard

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **CLAIM**

The ornamental design for an hair reader, as shown and described.

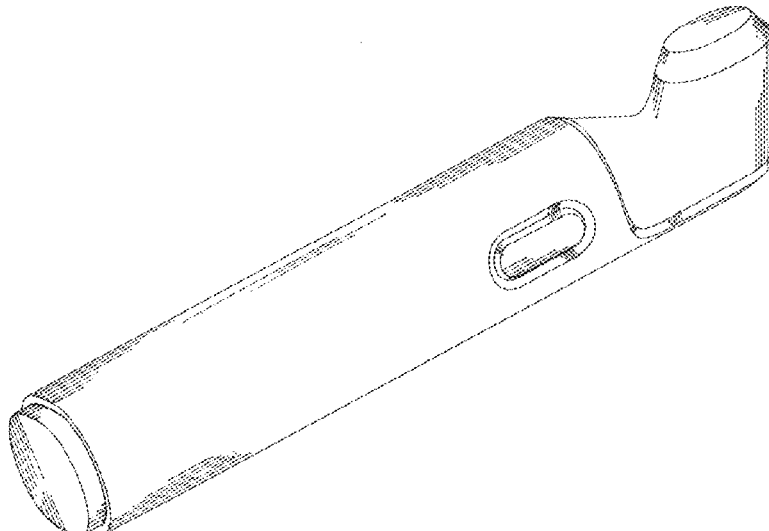
DESCRIPTION

FIG. 1 is a right side view of a hair reader according to a first embodiment;

FIG. 2 is a rear view of the hair reader shown in FIG. 1; FIG. 3 is a left side view of the hair reader shown in FIG. 1; FIG. 4 is a front view of the hair reader shown in FIG. 1; FIG. 5 is a top view of the hair reader shown in FIG. 1; FIG. 6 is a bottom view of the hair reader shown in FIG. 1; FIG. 7 is a first perspective view of the hair reader shown in FIG. 1; FIG. 8 is a second perspective view of the hair reader shown in FIG. 1; FIG. 9 is a right side view of a hair reader according to a second embodiment; FIG. 10 is a rear view of the hair reader shown in FIG. 9; FIG. 11 is a left side view of the hair reader shown in FIG. 9; FIG. 12 is a front view of the hair reader shown in FIG. 9; FIG. 13 is a top view of the hair reader shown in FIG. 9; FIG. 14 is a bottom view of the hair reader shown in FIG. 9; FIG. 15 is a first perspective view of the hair reader shown in FIG. 9; FIG. 16 is a second perspective view of the hair reader shown in FIG. 9; FIG. 17 is a right side view of a hair reader according to a third embodiment; FIG. 18 is a rear view of the hair reader shown in FIG. 17; FIG. 19 is a left side view of the hair reader shown in FIG. 17; FIG. 20 is a front view of the hair reader shown in FIG. 17; FIG. 21 is a top view of the hair reader shown in FIG. 17; FIG. 22 is a bottom view of the hair reader shown in FIG. 17; FIG. 23 is a first perspective view of the hair reader shown in FIG. 17; and, FIG. 24 is a second perspective view of the hair reader shown in FIG. 17.

The claimed design is shown in solid lines. The broken lines illustrate portions of the hair reader and form no part of the claimed design.

1 Claim, 6 Drawing Sheets





US010863816B2

(12) **United States Patent**
Miklatzky et al.

(10) **Patent No.:** **US 10,863,816 B2**

(45) **Date of Patent:** **Dec. 15, 2020**

(54) **METHOD AND SYSTEM FOR CUSTOMIZED HAIR-COLORING**

(58) **Field of Classification Search**

CPC A45D 44/005; A45D 19/0008; A45D 2019/0066; A45D 2044/007;

(Continued)

(71) Applicant: **COLORIGHT LTD.**, Rehovot (IL)

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,877,294 B2 * 1/2011 Inzinna, Jr. G01J 3/46 705/26.1

9,316,580 B2 * 4/2016 Landa G01N 21/27 (Continued)

(72) Inventors: **Efraim Miklatzky**, Neve Ilan (IL); **Sagiv Lustig**, Ramat Hasharon (IL); **Elena Ishkov**, Rehovot (IL); **Eliyahu Benny**, Rehovot (IL); **Hila Sela**, Ramle (IL); **Roy Frenkel**, Kfar Menachem (IL)

FOREIGN PATENT DOCUMENTS

CN 1339947 A 3/2002
CN 1440503 A 9/2003

(Continued)

(73) Assignee: **COLORIGHT LTD.**, Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 361 days.

OTHER PUBLICATIONS

Japanese Office Action dated Jul. 16, 2019 in Japanese Patent Application No. 2018-522945, 4 pages.

(Continued)

(21) Appl. No.: **15/770,549**

Primary Examiner — Michael Collins

(74) *Attorney, Agent, or Firm* — Oblon, McClelland, Maier & Neustadt, L.L.P.

(22) PCT Filed: **Nov. 4, 2016**

(86) PCT No.: **PCT/IB2016/056649**

§ 371 (c)(1),

(2) Date: **Apr. 24, 2018**

(87) PCT Pub. No.: **WO2017/077498**

PCT Pub. Date: **May 11, 2017**

(65) **Prior Publication Data**

US 2019/0059560 A1 Feb. 28, 2019

Related U.S. Application Data

(60) Provisional application No. 62/251,099, filed on Nov. 4, 2015.

(51) **Int. Cl.**

A45D 44/00 (2006.01)

A45D 19/00 (2006.01)

(Continued)

(57) **ABSTRACT**

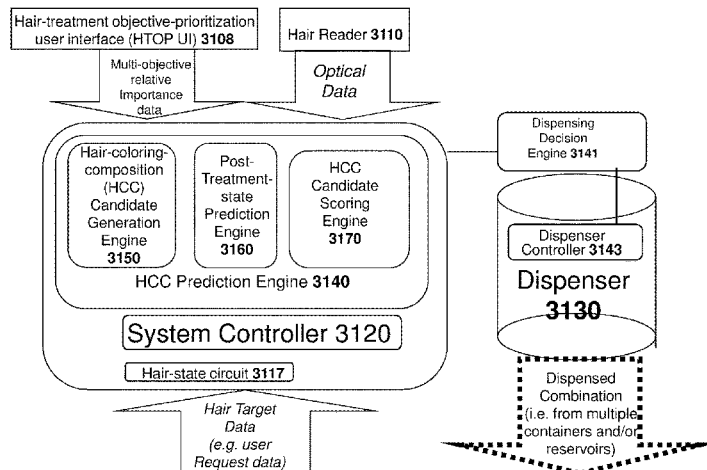
Systems and methods for computing a hair-coloring composition (HCC) or for dispensing ingredients for the HCC are disclosed herein. In some embodiments, the system comprises a hair-treatment objective-prioritization user interface (HTOP UI) for receiving multi-objective relative-importance data describing a relative importance of different hair-treatment objectives (e.g. immediate post-treatment accuracy versus auxiliary goals, or one auxiliary goal versus another) for a potential hair-coloring treatment. In some embodiments, a hair-coloring-composition (HCC) prediction-engine is responsive to input received via the HTOP UI to compute, from the initial hair-state data and from the target color-state, a customized hair-coloring composition

(Continued)

(52) **U.S. Cl.**

CPC **A45D 44/005** (2013.01); **A45D 19/0008** (2013.01); **G01J 3/50** (2013.01);

(Continued)



(12) **United States Patent**
Miklatzky et al.

(10) **Patent No.:** **US 10,292,482 B2**
(45) **Date of Patent:** **May 21, 2019**

(54) **HAIR-HOLDER, HAIR-READER COMPRISING THE SAME, AND METHODS FOR OPTICALLY ACQUIRING DATA FROM HAIR**

FOREIGN PATENT DOCUMENTS

DE 10 2007 055 100 B3 12/2008
JP 2000-205959 A 7/2000

(Continued)

(71) Applicant: **COLORIGHT LTD.**, Rehovot (IL)

OTHER PUBLICATIONS

(72) Inventors: **Efraim Miklatzky**, Nevellan (IL); **Tal Marcu**, Mevaseret Zion (IL)

International Search Report and Written Opinion dated May 23, 2018 in PCT/IB2018/000040, citing documents AA, AB, AC, AD, AO, AP and AQ therein, 15 pages.

(73) Assignee: **COLORIGHT LTD.**, Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 161 days.

Primary Examiner — Michael Collins

(74) *Attorney, Agent, or Firm* — Oblon, McClelland, Maier & Neustadt, L.L.P.

(21) Appl. No.: **15/399,796**

(22) Filed: **Jan. 6, 2017**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2018/0192764 A1 Jul. 12, 2018

A system for optically acquiring data from hair comprises a hair-holder including: upper and lower plate assemblies respectively having downward-facing and upward-facing opposing surfaces defining a gap therebetween, the lower plate assembly having a window-void therein, the upper plate assembly further comprising a sideward-facing sample-thickness-regulating surface above the gap; and an alignment-wall mechanically coupled to both plate assemblies and having a side-facing alignment surface within gap or sideward-facing into the gap, the alignment surface being straight along a longitudinal direction parallel to both of the opposing surfaces, the hair-holder being configured so that: when an externally-tensioned sample of hair is loaded onto the hair-holder by laterally moving the sample towards the alignment surface, a presence of the sideward-facing sample-thickness-regulating surface regulates an amount of hair permitted to enter the gap, thereby regulating a thickness of hair above the window-void to at least 0.5 mm and at most 2 mm, and after the loading and after release of the external tension, static friction applied by the side-facing alignment surface upon shafts of the hair sample maintain alignment of hair above the window-void.

(51) **Int. Cl.**

A45D 44/00 (2006.01)
A45D 8/00 (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC **A45D 44/005** (2013.01); **A45D 8/00** (2013.01); **G01N 21/25** (2013.01); **G01N 21/84** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC .. **A45D 44/005**; **A45D 8/00**; **A45D 2044/007**; **G01N 21/25**; **G01N 33/4833**; **G01N 21/84**

(Continued)

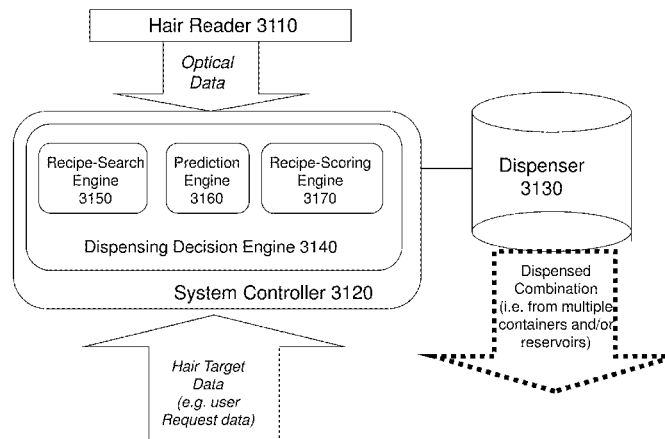
(56) **References Cited**

U.S. PATENT DOCUMENTS

9,205,283 B2* 12/2015 Miklatzky A45D 19/02
9,844,687 B2* 12/2017 Landa A45D 19/02

(Continued)

17 Claims, 25 Drawing Sheets





US008852254B2

(12) **United States Patent**
Moscovici

(10) **Patent No.:** **US 8,852,254 B2**
(45) **Date of Patent:** **Oct. 7, 2014**

(54) **APPARATUS AND METHOD FOR PROVIDING A MULTI-STAGE LIGHT TREATMENT**

FOREIGN PATENT DOCUMENTS

WO 2004/110305 12/2004
WO WO 2005/004948 1/2005

(75) Inventor: **Lucian Moscovici**, Ramat Gan (IL)

OTHER PUBLICATIONS

(73) Assignee: **Lucian Moscovici**, Ramat Gan (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1737 days.

“Practice Parameters for the Use of Light Therapy in the Treatment of Sleep Disorders”, Chesson et al.; SLEEP, vol. 22, No. 5, 1999.*
World Health Report 1999: Seven leading global health problems estimated by DELY’s lost. (The Double Burden: Emerging Epidemics and Persistent Problems) 13-27.

(21) Appl. No.: **11/884,299**

(Continued)

(22) PCT Filed: **Feb. 19, 2006**

Primary Examiner — Ahmed M Farah

(86) PCT No.: **PCT/IL2006/000212**

Assistant Examiner — William Cheng

§ 371 (c)(1),

(2), (4) Date: **Aug. 14, 2007**

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(87) PCT Pub. No.: **WO2006/087723**

PCT Pub. Date: **Aug. 24, 2006**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2008/0103561 A1 May 1, 2008

Apparatus and methods for treating psychiatric disorders, mood disorders and circadian rhythm disorders with a multi-stage light protocol are disclosed. The presently disclosed multi-stage light protocol provides a synergistic treatment including up to 4 types of therapies: bright light therapy, extended sleep deprivation therapy, dawn simulation therapy and short to medium wavelength light therapy. According to some embodiments, the first stage of the protocol includes a first time window of 20 minutes during which, for a majority of the time, the light intensity is between 50 lux and 2000 lux. According to some embodiments, the second stage of the protocol includes a second time window of at least 90 minutes during which, for every 10 minute period within the second time window, for a majority of the time, the light intensity is exceeds 100 lux. According to some embodiments, the third stage of the protocol includes a third time window of 60 minutes during which, for a majority of the time, the light intensity exceeds 2000 lux. In some embodiments, the light is provided by apparatus including a plurality of LEDs. Typically, the light includes white light having a broad spectrum. In some embodiments, the light further includes light having a medium wavelength, for example, wavelengths between 520 nm and 535 nm.

Related U.S. Application Data

(60) Provisional application No. 60/653,998, filed on Feb. 18, 2005.

(51) **Int. Cl.**
A61N 5/06 (2006.01)

(52) **U.S. Cl.**
USPC **607/88; 607/89; 607/90; 607/91; 607/92; 607/93; 607/94**

(58) **Field of Classification Search**
USPC 128/898; 607/88–94
See application file for complete search history.

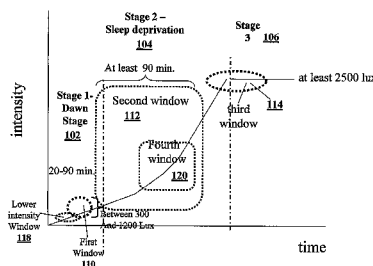
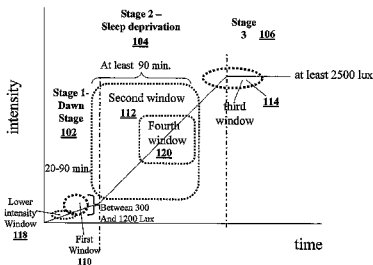
(56) **References Cited**

U.S. PATENT DOCUMENTS

4,858,609 A 8/1989 Cole
4,930,504 A 6/1990 Diamantopoulos et al.

(Continued)

39 Claims, 4 Drawing Sheets





US008708907B2

(12) **United States Patent**
Fine et al.

(10) **Patent No.:** **US 8,708,907 B2**
(45) **Date of Patent:** **Apr. 29, 2014**

(54) **METHOD AND APPARATUS FOR DETERMINING ONE OR MORE BLOOD PARAMETERS FROM ANALOG ELECTRICAL SIGNALS**

(75) Inventors: **Ilya Fine**, Rehovot (IL); **Alexander Kaminsky**, Rehovot (IL)

(73) Assignee: **Elfi-Tech**, Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 416 days.

(21) Appl. No.: **12/774,056**

(22) Filed: **May 5, 2010**

(65) **Prior Publication Data**

US 2010/0286497 A1 Nov. 11, 2010

Related U.S. Application Data

(60) Provisional application No. 61/175,981, filed on May 6, 2009.

(51) **Int. Cl.**

- A61B 5/02** (2006.01)
- A61B 5/14551** (2006.01)
- A61B 5/145** (2006.01)
- A61B 8/06** (2006.01)
- A61B 8/12** (2006.01)
- A61B 5/026** (2006.01)

(52) **U.S. Cl.**

USPC **600/369**; 600/301; 600/323; 600/324; 600/336; 600/364; 600/368; 600/465; 600/467; 600/468; 600/504

(58) **Field of Classification Search**

CPC A61B 5/026; A61B 5/0261; A61B 5/1455
USPC 600/368, 369, 301, 323, 324, 336, 364, 600/465, 467, 468, 504

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 4,476,875 A * 10/1984 Nilsson et al. 600/479
- 5,219,962 A 6/1993 McDaniel et al.
- 5,284,149 A * 2/1994 Dhadwal et al. 600/476
- 5,598,841 A * 2/1997 Taniji et al. 600/342

(Continued)

FOREIGN PATENT DOCUMENTS

- WO WO2007113804 10/2007
- WO WO2007144880 12/2007
- WO WO2008053474 5/2008

OTHER PUBLICATIONS

PCT Search report of PCT/US10/56282.

(Continued)

Primary Examiner — Jacqueline Cheng

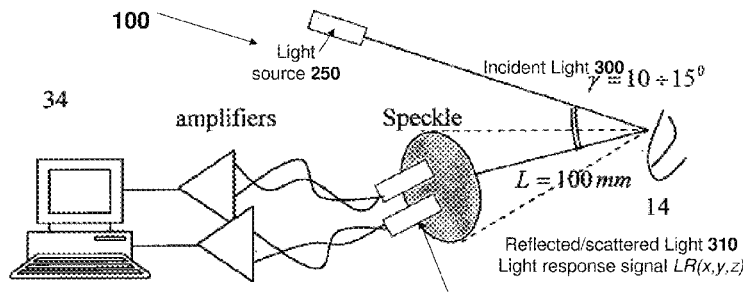
Assistant Examiner — Puya Agahi

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Embodiments of the present invention relate to a system and method for in vivo measurement of blood parameters by processing analog electrical signals from a plurality of photodetectors. In some embodiments, it is possible to determine one or more blood parameters according to (i) a first electrical signal from a first detector and (ii) a second electrical signal from a second photodetector. A difference analog electrical signal is generated, indicative of a difference between the light response signal at the first location and light response signal at the second location, is generated. One or more blood parameters may be detected according to the difference analog electrical signal.

12 Claims, 14 Drawing Sheets



Photodetector(s) 260 for detecting light field $LF(x_0, y_0, z_0, t)$ at a location (x_0, y_0, z_0) including light response signal

$$LF(x_0, y_0, z_0, t) = LF_{\text{SLOWLY_FLUCTUATING}}(x_0, y_0, z_0, t) + LF_{\text{RAPIDLY_FLUCTUATING}}(x_0, y_0, z_0, t) + LF_{\text{SLOWLY_FLUCTUATING}}(x_0, y_0, z_0, t) + [LF_{\text{REGULAR}}((x_0, y_0, z_0, t) + LF_{\text{STOCHASTIC}}(x_0, y_0, z_0, t))]$$

(12) **United States Patent**
Segman

(10) **Patent No.:** **US 8,335,550 B2**
(45) **Date of Patent:** **Dec. 18, 2012**

(54) **OPTICAL SENSOR DEVICE AND IMAGE PROCESSING UNIT FOR MEASURING CHEMICAL CONCENTRATIONS, CHEMICAL SATURATIONS AND BIOPHYSICAL PARAMETERS**

(75) Inventor: **Yosef Segman, Zichron Yaacov (IL)**

(73) Assignee: **Cnoga Holdings Ltd., Or Akiva (IL)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1344 days.

(21) Appl. No.: **11/909,158**

(22) PCT Filed: **Mar. 26, 2006**

(86) PCT No.: **PCT/IL2006/000379**

§ 371 (c)(1),

(2), (4) Date: **Sep. 20, 2007**

(87) PCT Pub. No.: **WO2006/100685**

PCT Pub. Date: **Sep. 28, 2006**

(65) **Prior Publication Data**

US 2009/0299154 A1 Dec. 3, 2009

Related U.S. Application Data

(60) Provisional application No. 60/664,957, filed on Mar. 25, 2005.

(51) **Int. Cl.**

A61B 5/1455 (2006.01)

G01N 33/00 (2006.01)

G06F 19/00 (2011.01)

(52) **U.S. Cl.** **600/310; 600/322; 600/476; 356/300; 702/23**

(58) **Field of Classification Search** **600/301, 600/322, 324, 407, 473, 476; 356/300; 702/23**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,655,225	A *	4/1987	Dahne et al.	600/316
5,198,977	A *	3/1993	Salb	600/310
5,321,265	A *	6/1994	Block	250/343
5,424,545	A *	6/1995	Block et al.	250/343
5,632,272	A	5/1997	Diab et al.	
5,722,398	A *	3/1998	Ishihara et al.	600/322
5,865,736	A	2/1999	Baker, Jr. et al.	
5,912,179	A	6/1999	Alvarez et al.	
5,974,338	A	10/1999	Asano et al.	
6,028,311	A *	2/2000	Sodickson et al.	250/343
6,040,578	A *	3/2000	Malin et al.	250/339.12
6,477,394	B2 *	11/2002	Rice et al.	600/318
6,556,853	B1 *	4/2003	Cabib et al.	600/318
6,628,975	B1	9/2003	Fein et al.	
6,631,289	B2	10/2003	Alfano et al.	
6,775,565	B1 *	8/2004	Wieringa	600/322
6,853,854	B1 *	2/2005	Proniewicz et al.	600/319

(Continued)

Primary Examiner — Eric Winakur

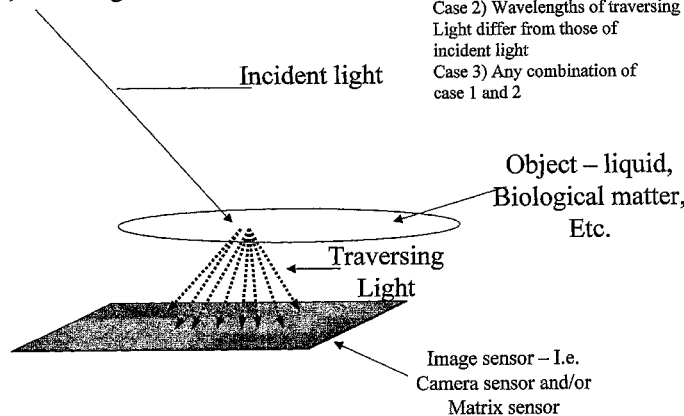
(74) *Attorney, Agent, or Firm* — Mark M Friedman

(57) **ABSTRACT**

Optical sensor devices, image processing devices, methods and computer readable code computer-readable storage media for detecting biophysical parameters, chemical concentrations, chemical saturations, vital signs and physiological information such as a malignant condition are provided. The optical sensor includes an array of photodetectors, where each photodetector is configured to detect a spectrum of light. Exemplary physiological parameters include but are not limited to a pulse rate, a biophysical or physiological property of skin, a cardiovascular property, a property related to an organ such as the liver or the kidneys, and a temperature fluctuation. Alternatively one or more parameters are detected from a food item such as food tissue, a consumable beverage such as an alcoholic beverage, a dairy product, wine, a baked good, a fruit and a vegetable.

324 Claims, 10 Drawing Sheets

From ambient light or from source—
source can be any distance from the
object, including “zero distance”



3 Cases

Case 1) Wavelengths of traversing Light are the same as those of incident light

Case 2) Wavelengths of traversing Light differ from those of incident light

Case 3) Any combination of case 1 and 2



US008277384B2

(12) **United States Patent**
Fine

(10) **Patent No.:** **US 8,277,384 B2**

(45) **Date of Patent:** **Oct. 2, 2012**

(54) **SYSTEM AND METHOD FOR IN VIVO MEASUREMENT OF BIOLOGICAL PARAMETERS**

6,889,075 B2 *	5/2005	Marchitto et al.	600/473
2004/0152989 A1 *	8/2004	Puttappa et al.	600/473
2006/0063995 A1	3/2006	Yodh et al.	

(75) Inventor: **Ilya Fine**, Rehovot (IL)

(73) Assignee: **Ilya Fine**, Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 626 days.

(21) Appl. No.: **12/431,469**

(22) Filed: **Apr. 28, 2009**

(65) **Prior Publication Data**
US 2009/0209834 A1 Aug. 20, 2009

Related U.S. Application Data
(63) Continuation of application No. PCT/IL2007/001317, filed on Oct. 30, 2007.
(60) Provisional application No. 60/855,143, filed on Oct. 30, 2006.

(51) **Int. Cl.**
A61B 5/02 (2006.01)
(52) **U.S. Cl.** **600/485; 600/502; 600/504; 600/481**
(58) **Field of Classification Search** **600/310, 600/322, 323, 324, 502, 481, 485, 504**
See application file for complete search history.

(56) **References Cited**
U.S. PATENT DOCUMENTS
5,058,596 A * 10/1991 Makino et al. 600/476
5,598,841 A 2/1997 Taniji et al.

OTHER PUBLICATIONS

International Search Report and Written Opinion, mailed Jun. 4, 2008, from International Application No. PCT/IL20071001317, filed Oct. 30, 2007.

EPO search report of EP 07827291 national phase of PCT/IL2007/001317 (related case in Europe)—mailed May 30, 2011.

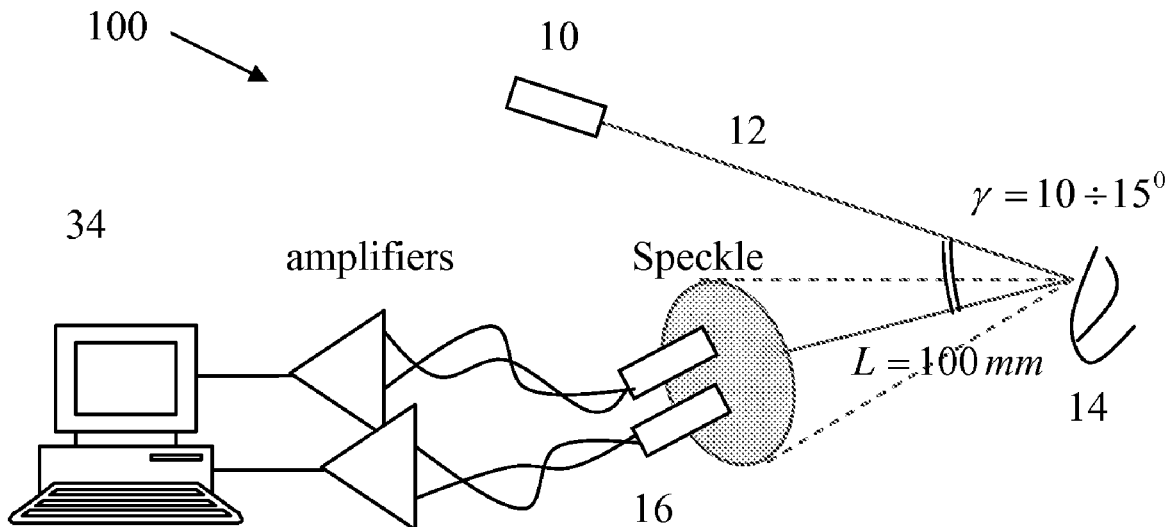
* cited by examiner

Primary Examiner — Eric Winakur

(57) **ABSTRACT**

A system, method and medical tool are presented for use in non-invasive in vivo determination of at least one desired parameter or condition of a subject having a scattering medium in a target region. The measurement system comprises an illuminating system, a detection system, and a control system. The illumination system comprises at least one light source configured for generating partially or entirely coherent light to be applied to the target region to cause a light response signal from the illuminated region. The detection system comprises at least one light detection unit configured for detecting time-dependent fluctuations of the intensity of the light response and generating data indicative of a dynamic light scattering (DLS) measurement. The control system is configured and operable to receive and analyze the data indicative of the DLS measurement to determine the at least one desired parameter or condition, and generate output data indicative thereof.

23 Claims, 11 Drawing Sheets





US009872979B2

(12) **United States Patent**
Dar et al.

(10) **Patent No.:** **US 9,872,979 B2**

(45) **Date of Patent:** ***Jan. 23, 2018**

(54) **HEADSET FOR TREATMENT AND ASSESSMENT OF MEDICAL CONDITIONS**

(71) Applicant: **NEUROLIEF LTD.**, Yokneam Illit (IL)

(72) Inventors: **Amit Dar**, Kfar Hess (IL); **Jonathan Bar-Or**, Pardes Hana Karkur (IL); **Amir Cohen**, Ra'anana (IL); **Ron Belson**, Tel Aviv (IL)

(73) Assignee: **NEUROLIEF LTD.**, Yokneam Illit (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/228,038**

(22) Filed: **Aug. 4, 2016**

(65) **Prior Publication Data**
US 2016/0339231 A1 Nov. 24, 2016

Related U.S. Application Data

(63) Continuation of application No. 14/849,868, filed on Sep. 10, 2015, now Pat. No. 9,433,774, which is a continuation-in-part of application No. PCT/IB2014/059858, filed on Mar. 15, 2014.

(60) Provisional application No. 61/786,701, filed on Mar. 15, 2013.

(51) **Int. Cl.**
A61N 1/00 (2006.01)
A61N 1/04 (2006.01)
A61N 1/36 (2006.01)
A61B 5/0478 (2006.01)
A61B 5/00 (2006.01)

(52) **U.S. Cl.**
CPC *A61N 1/0484* (2013.01); *A61B 5/0478* (2013.01); *A61B 5/6803* (2013.01); *A61N 1/0476* (2013.01); *A61N 1/0488* (2013.01); *A61N 1/0492* (2013.01); *A61N 1/36014* (2013.01)

(58) **Field of Classification Search**
CPC .. *A61N 1/0484*; *A61N 1/0476*; *A61N 1/0492*; *A61N 1/36014*; *A61B 5/6803*; *A61B 5/6814*; *A61B 5/683*; *A61B 5/6831*; *A61B 5/0478*
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2013/0079659 A1* 3/2013 Akhadov *A61B 5/0476* 600/544

* cited by examiner

Primary Examiner — Robert N Wieland

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

A circumferential headset for use in delivering electrical stimulation to the skin surface of the head.

46 Claims, 15 Drawing Sheets

