(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 December 2020 (10.12.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/244751 A1

(51) International Patent Classification:
A61N 5/06 (2006.01)

(21) International Application Number:
PCT/EP2019/064642

(22) International Filing Date:
05 June 2019 (05.06.2019)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **BIOFRONTERA BIOSCIENCE GMBH** [—/DE]; Hemmelrather Weg 201, 51377 Leverkusen (DE).

(72) Inventors: **LUEBBERT, Hermann**; Biofrontera AG, Hemmelrather Weg 201, 51377 Leverkusen (DE). **NOVAK, Ben**; Biofrontera Bioscience GmbH, Hemmelrather Weg 201, 51377 Leverkusen (DE). **OSTERLOH, Markus**; Biofrontera Pharma GmbH, Hemmelrather Weg 201, 51377 Leverkusen (DE).

(74) Agent: **SCHMIDT, Christian**; Zwicker Schnappauf & Partner PartG mbB, Hansastr. 32, 80686 Munich (DE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(54) Title: ILLUMINATION FOR PHOTODYNAMIC THERAPY

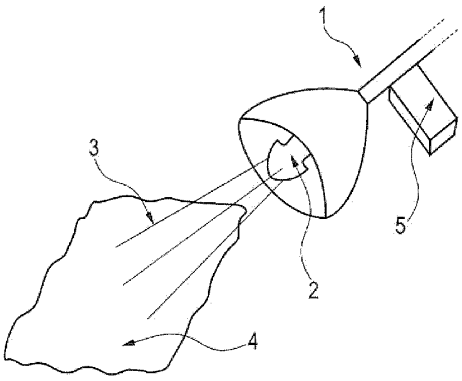


Fig. 1

(57) Abstract: An illumination system (1) for photodynamic therapy is provided, the illumination system comprising an illumination source (2), which is configured to emit an electromagnetic radiation (3) to illuminate a target surface (4) during operation, and an electronic control unit (5), wherein the illumination source is configured such that the intensity of the electromagnetic radiation emitted by the illumination source can be varied, wherein the electronic control unit is operatively connected to the illumination source and configured to control operation of the illumination source according to an illumination protocol during an illumination session performed with the illumination system, and wherein the illumination protocol comprises instructions to operate the illumination source during the illumination session in a plurality of different modes, the modes comprising: a) a first mode, wherein, in the first mode, the electronic control unit controls operation of the illumination source such that the intensity of the electromagnetic radiation emitted by the illumination source is increased continuously or quasi-continuously from a base intensity B to a target intensity T within a first mode time interval, b) a second mode, wherein, in the second mode, the electronic control unit controls operation of the illumination source such that the intensity of the electromagnetic radiation emitted by the illumination source is constant or substantially constant for a second mode time interval, and c) a third mode, wherein, in the third mode, the electronic control unit controls operation of the illumination source such that the illumination source is operated such that darker phases and illumination phases alternate for a third mode time interval, wherein the intensity of the electromagnetic radiation emitted by the illumination source is lower in the darker phases than in the illumination phases, or wherein, in the darker phases the illumination source does not emit electromagnetic

WO 2020/244751 A1

[Continued on next page]

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

radiation whereas the illumination source emits electromagnetic radiation in the illumination phases. Furthermore, a computer program product and a kit for treating a disease are provided and a method for operating an illumination source and a method for treating a skin disease.