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(71) Applicant: **FLORIAN KÖNIG ENTERPRISES GMBH** [DE/DE]; Finkenstraße 1, 82110 Germering (DE).

(72) Inventor: **KÖNIG, Florian**; Finkenstraße 1, 82110 Germering (DE).

(74) Agent: **DE ANNA, Pier Luigi**; Schubertstr. 10, 80336 München (DE).

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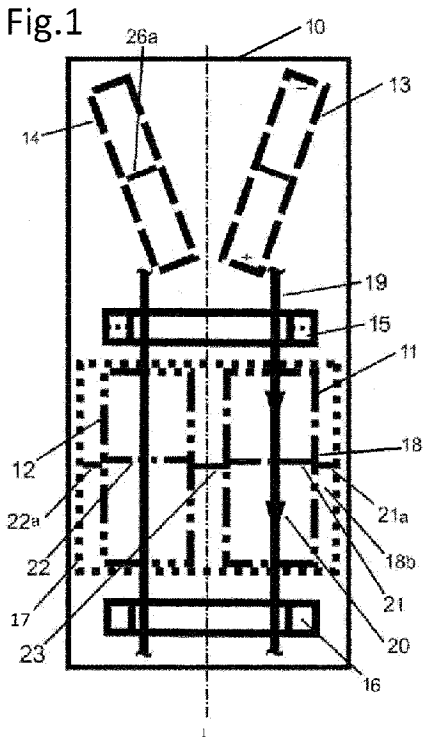
[Continued on next page]

(54) Title: APPARATUS AND SYSTEM FOR REDUCING EMF CAUSED STRESS ON ORGANISMS ORIGINATING FROM ELECTRIC LOADS

Fig.1



(57) Abstract: The invention concerns an apparatus for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one-or two-phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, said apparatus comprising a first and a second tube out of electrically conductive material per current phase, wherein the first tube is axially pervaded with the AC phase conductor, wherein the second tube is axially pervaded with the AC neutral conductor, and wherein the first and the second tubes are filled with quartz material. The invention further concerns a system for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one-or two-phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, comprising a plurality apparatuses of the kind defined above, axially pervaded by one and the same AC phase conductor.

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— *with amended claims (Art. 19(1))*

Apparatus and system for reducing EMF caused stress on organisms originating from electric loads

The invention is related to an apparatus and system for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one- or two-phase alternating current mains network via at least one phase conductor and a neutral conductor.

Each electric load supplied with 230V / 50Hz power emits alternating electromagnetic fields (EMF). Such electromagnetic fields may interact with organisms, thereby impairing the organisms. It is known that the EMF of WLAN, DECT-phones, mobile devices etc. cause such impairment. Concerning the discussion of health impacts caused by electromagnetic fields and waves there is often to report the tendency to dismiss those impacts as pointless. However, in the meantime the biological effectiveness of even weak fields can hardly be denied on the background of plural findings. On cell level, there exist numerous publications proving DNA damage to cultivated cells in addition to oxidative stress. Such publications comprise inter alia:

- Agarwal A et al. (2009): Effects of radiofrequency electromagnetic waves (RF-EMW) from cellular phones on human ejaculated semen: an in vitro pilot study. Fertility and sterility 92:13181325
- Diem E et al. (2005): Non-thermal DNA breakage by mobile-phone radiation (1800 MHz) in human fibroblasts and in transformed GFSH-R17 rat granulosa cells in vitro. Mutation Research / Genetic Toxicology and Environmental Mutagenesis 583:178-183.
- Blank M and Goodman R (2009): Electromagnetic fields stress living cells. Pathophysiology 16:71-78
- Kundi M and Hutter HP (2009): Mobile phone base stations - Effects on wellbeing and health. Pathophysiology 16:123-135).

Various embodiments of the apparatus for reducing stress on organisms caused by EMF are disclosed in the DE19635913A1, DE19618493A1 and DE19713097A1. This known apparatus for reducing EMF caused stress on organisms comprises a tube consisting out of electrically conductive material filled with quartz granules and sands, respectively, additionally partially comprising quartz stones. To allow the apparatus taking effect, one end of the tube is fed with electromagnetic alternating fields the impact of which is be reduced, whereas the other end of the tube being adapted to be directed towards the organisms to reduce the EMF caused stress thereon.

For years field studies have demonstrated the essentially positive effect of the use of t this known apparatus, which essentially is a multi-chamber system comprising different fillings of crystal

material for reducing EMF caused stress on organisms resulting in ameliorating the subjective well-being of test persons subjected to EMF caused stress of various origin. It therefore can be assumed that the EMF stress on organisms is reduced by this known apparatus. There is however no scientific proof for the positive effect of the known apparatus.

A recent development of the above discussed known apparatus provides for a substantial increase of the reduction of EMF caused stress by dividing the tube out of electrically conductive material into a plurality of chambers filled with different quartz materials, and by additionally providing at least one magnet element and / or at least one copper element outside of the chambers, preferably at the tube end or ends.

Based on this multi-chamber apparats the inventor surprisingly succeeded in proposing an alternative advantageous use of the tube filled with quartz materials featuring an indirect positive effect of the tube to organisms by acting with the tube onto an electric load connected to a one- or two-phase alternating current mains network for reducing EMF caused stress onto the organisms instead of using the direct positive effect of the tube to the organisms by directing the tube thereon.

It is an object of the present invention to provide for an apparatus and a system for reducing stress on organisms caused my electromagnetic alternating fields (EMF) indirectly acting on the organisms, that is via an electric load connected to a one- or two-phase alternating current mains network.

This object is attained by the apparatus of claim 1 and the system of claim 13, respectively.

The present invention provides for an apparatus for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one- or two-phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, said apparatus comprising a first and a second tube out of electrically conductive material per current phase, wherein the first tube is axially pervaded with the AC phase conductor, wherein the second tube is axially pervaded with the AC neutral conductor, and wherein the first and the second tubes are filled with quartz material.

A widespread example for an electric load emitting electromagnetic alternating fields (EMF) is the DECT telephone emitting high frequency EMFs. Further examples are GSM- and UTMs mobile phones, tablets etc., as well as devices communicating via WLAN.

Further advantageous developments of the apparatus of the invention provide for

- both tubes being positioned close together, preferably in parallel disposition;

- at one end of the first and second tubes there is positioned at least one ring magnet, and at the other end of the first and second tubes there is positioned at least one quartz ring, preferably a rose quartz ring, in such a kind that the ring magnet and the quartz ring are pervaded with the AC phase conductor and the AC neutral conductor;

- both tubes being axially anisotropically filled with different and / or differently sized quartz material, preferably in a respectively different concentration, said filling preferably being identical in both tubes, and both tubes being oriented oppositely to one another with respect to their anisotropy;

- both tubes, preferably including the ring magnet and the ring quartz, being surrounded all-round by a sheathing preferably out of a steel / zinc / iron sheet, and the space between the tubes and the ring magnet, quartz ring and sheath being filled with quartz sand;

- the fillings of quartz material comprising quartz sand and / or quartz granules and / or small quartz stones, the quartz preferably comprising rose quartz;

- the fillings of quartz material comprising metal elements, preferably such elements in the form of rings and / or of wire windings or coils, preferably including copper;

- the fillings of quartz material comprising metal elements, preferably such elements in the form of rings and / or of wire windings or coils, preferably including copper;

- the tubes being axially separated into individual chambers by means of partition walls;

- the partition walls consisting out of copper, iron, zinc or aluminum;

- the partition walls comprise layers of coal / carbon material or ash,

- the metal elements as well as the magnet elements and the quartz rings being covered by nano coatings covered themselves by CO_2-based materials and / or graphene particles, and

- the AC phase conductor in the first tube and the AC neutral conductor in the second tube comprising a coil winding of opposite winding direction, and each coil winding preferably comprising a folded portion of identical or opposite winding.

The present invention further provides for a system for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one- or two-phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, comprising a plurality apparatuses of one of claims 1 to 13, axially pervaded by one and the same AC phase conductor.

In the following the invention will be described in more detail along the drawing:

Fig. 1 shows a schematic longitudinal section view of a first embodiment of the apparatus according to the invention;

Fig. 2 shows a front view of the apparatus (in Fig. 1 from bottom to top),

Fig. 3 shows block diagrams of different experimental setups including the apparatus of the invention for proving the effective strength of the apparatus in reducing EMF caused stress on cells of connective tissue, particularly EMF caused stress originating from DECT phones, and

Fig. 4a, 4b and 5 show diagrams of the results of different experiments performed by means of the experimental setups of Fig. 3.

The embodiment of the apparatus shown in Fig. 1 and 2 is adapted for reducing the stress on organisms caused by electromagnetic alternating fields (EMF), emitted by an electric load connected to a one-phase or a two-phases mains network. More particularly the apparatus comprises an elongated tube-shaped housing 10 consisting of an electrically isolating material, such as a rigid plastic. Within the housing 1o there is positioned a first tube 11 filled with a quartz material, and a second tube 12, filled with a quartz material, a third tube 13, filled with quartz material and a fourth tube 14, filled with a quartz material. Each of the tubes 11-14 consists of an electrically conductive material.

The third and fourth tubes 13 and 14 for instance are about the same size concerning their diameter and length, and these tubes are divided into a plurality of chambers filled with different quartz materials, and comprise at least one magnet element and / or at least one copper element outside of the chambers, preferably at the tube end or ends as described above for a recent development of the prior art apparatus. In the apparatus 10 the third and fourth tubes 13, 14 are oriented in a V-arrangement with their longitudinal axes defining the V with the intersection point of the axes being directed towards the first and second tubes 11 and 12 and being positioned in front of those tubes 11, 12. The ends of the third and fourth tubes 13, 14 directed to the first and second tubes 11 and 12 are the tubes ends directed in the apparatus described above to the organisms for reducing EMF caused stress thereon.

The third and fourth tubes 13 and 14 for instance are about the same size concerning their diameter and length, and they extend with their axes in parallel and spaced from to one another as well as equally spaced from the longitudinal center line 13 of the housing 10. Axially in front of as well as behind the ends of the first and second tubes 11 and 12 there is provided in the environment of the intersection point of the longitudinal axes of the third and fourth tubes 13, 14, directed towards these tubes, a ring magnet 15 at one of said tube end and at the other of said tube ends a quartz ring, preferably a rose quartz ring 16. In the shown embodiments, the ring magnet 15 and the rose quartz ring 16 are of the same size, that is, the same outer diameter, they are positioned at a predetermined distance from the respective ends of the first and second tubes 11 and 12, and their longitudinal axes are aligned with respect to one another, coinciding with the longitudinal center line 13 of the housing 10. Further, the surface lines of the outer surfaces of the ring magnet 15 and the identically sized rose quartz ring coincide with the surface line of both tubes 11, 12.

Both tubes, the first and second tubes 11 and 12, plus preferably the rings 15, 16 are coated all-round with an outer sheath 17, preferably out of a steel / zinc / iron sheet, and the space between the two tubes 11, 12 and the rings 15, 16 within the housing 10 is filled with a quartz material, preferably quartz sand.

Both tubes 11, 12 as well as the ring magnet 15 and the rise quartz ring 16 are adapted to be prevailed by the AC phase conductor 19 and the AC neutral conductor 20, respectively, to which conductors there is connected a load, for example, as shown in Fig. 3, a DECT telephone and an incubator for receiving cell samples, said load emitting electromagnetic alternating fields (EMF) stressing the organisms, the apparatus being adapted to reduce EMF stress on the organisms. In the shown embodiment of a mains network comprising a single-phase conductor 19 and a neutral

conductor 20 the network is a single-phase mains network. In the case of a multi-phase mains network, for instance a three-phase mains network, for reducing EMF caused stress on organisms, there have to be used an apparatus 10 of the kind defined above including multiple tubes 11, each being prevailed by a respective AC phase conductor, in case of the three-phase mains network three tubes 11, each prevailed by one of the three phase conductors being included in the apparatus 10 in addition to the one tube 12, prevailed by the neutral conductor of the three-phase mains network.

The AC phase conductor as well as the AC neutral conductor are preferably running in a coiled configuration (not shown) through their respective tube 11, 12, the direction of winding of both conductors being opposite with respect to one another, a portion of one or both coiled conductors having a folded back portion of identical or opposite direction of winding.

The first and second tubes 11 and 12 each includes an axially anisotropic filling of quartz material, preferably differently sized quartz material of different concentration. “Axially anisotropic“ means that the tubes do not contain different and / or differently sized quartz material in a mixed state, for instance isotropically mixed, but distributed along the axis of each tube in such a kind that different axial portions of each tube contain different and/or differently sized quartz material.

The fillings of quartz material comprise quartz sand and / or quartz granules and / or small quartz stones, wherein the quartz preferably used is rose quartz. Within the flings of quartz material at predetermined positions there are provided metal elements, preferably in ring shape or wire coils, wherein the wire preferably is made from copper. Also at predetermined positions of said fillings there are provided magnet elements, also preferably in ring shape.

Further, the first and second tubes 11 and 12 are axially subdivided into segments or chambers by means of partition elements, preferably partition wall elements. In Fig. 1a single partition wall element 21, 22 is provided in an axially central position of the first and second tubes 11 and 12. The partition wall elements preferably consist either of electrically conductive material, for instance copper, iron or aluminum, or of electrically isolating material, for instance, carbon material, as coal or ash.

The metal and magnet elements as well as the ring magnets contained in the filling of quartz material of the tubes 11, 12 preferably are provided with a nano coating coated covered themselves by CO_2-based materials and / or graphene particles.

In the preferred case that both tubes 11 and 12 are provided with the same axially anisotropic filling of quartz material, that is the same sequence of different and / or differently sized quartz material, to let observe the current flowing in each conductor prevailing the two tubes the same anisotropic sequence of different and / or differently sized quartz material, the tubes 11 and 12 are disposed in antiparallel orientation. This results in an optimized reduction of the EMF caused stress on organisms present in the environment of the load connected to the mains network by means of the apparatus 10.

In the following the setup and the implementation of experiments to prove the effect of the apparatus of the invention (referred to as MHF) in reducing EMF stress for organisms will be described along Figs. 3, 4 and 5, together with the results attained thereby.

Setup and Implementation of Experiments

Basis for comparative cell tests were the premises of Dartsch Scientific GmbH in 86956 Schongau, which had been tested during previous radiation / site research projects and turned out to be suitable as low / high-frequency low-radiation sites for the present experiments. For example, near a few hundred meters there are no mobile radio transponders (<1 microwaves / cm^2) and / or low-frequency alternating-field emitters, as represented by transformers or 50 Hz mains power lines.

A standardized setup was used, which had been developed and successfully used for previous studies. For this purpose, connective tissue fibroblasts (cell line L-929, standard cell line for cytotoxicity tests) from 80 to 90% confluent mass cultures at a cell density of 50,000 cells / well were seeded into 14 centrals wells of a 96 well plate (200 µl / well) and incubated in a gassing incubator at 37 °C with 95% air and 5% CO^2 for 24 hours. The culture medium used was RPMI 1640 with 5% fetal calf serum and the usual amounts of penicillin / streptomycin. After 24 hours, the culture medium was suctioned off and replaced by a pH-stable culture medium (Leibowitz L-15) under normal ambient conditions (250 µl / well). The culture plates were then placed in a Cultura M Mini-Incubator and incubated at 37 ± 1 ° C. The irradiation-active base station of a Gigaset 4010 Classic DECT telephone (- 46 dBm, 1.885 GHz) was put into continuous operation directly on the culture plate in the incubator. A second Mini Incubator was placed in the same premises at least 10 m apart and the corresponding control culture was incubated at 37 ± 1 ° C with minimal influence of the DECT telephone. Reference is made to FIG. 3 for an overview of the various experimental setups including the additive multi-chamber cavity resonators (MHRs and SHLSs) as well as of the DC LED light. Further details are shown below together with the test results.

After an exposure time of 24 hours, the culture medium of the cells was sucked off and replaced by 120 µl of fresh RPMI culture medium with 10% by volume of XTT and incubated for 120 minutes in the incubator at 37 ° C. XTT is the sodium salt of 2,3-bis [2-methoxy-4-nitro-5-sulfophenyl] -2H-tetrazolium-5-carboxyanilide and has a yellowish color. Mitochondrial dehydrogenases cleave the tetrazolium ring of XTT and form orange-colored and water-soluble formazan crystals whose optical density can be measured at a defined wavelength. After the incubation time of 120 min, the optical density was measured as a differential measurement AOD = 450 -690 nm in an Elisareader (BioTek Slx808) after a 4-second shaking period. The values obtained were recorded and statistically evaluated.

Results of the Experiments

The results of studies conducted in the period from December 2015 to January 2016 and their results are summarized and discussed below regarding the diagrams of Figs. 4 and 5. In these diagrams, each measuring point of the measured cell vitality corresponds to a depression of the 96-hole plate. For each single experiment, 14 wells for the exposed cells and the control cells were measured and evaluated.

The results of the experiments are shown in Fig. 4a, b and 5. Indicated is respectively the mean value of the 14 indentations of the experiments (#) ± standard deviation.

Fig. 4a, b:

1008: DECT phone only. Reduction of the cell viability of the exposed cells by 45.8 ± 6.9%. # 1011: DECT telephone + SHLS 1. Reduction of cell viability by 21.4 ± 8.7%. # 1012: DECT telephone + SHLS 1 + crossed MHR with plus end toward cells at a distance of 30 cm from the cell plane. Reduction of cell viability by 3.3 ± 6.7%. # 1014: DECT telephone + crossed MHR with plus end toward cells at a distance of 30 cm to the cell plane. Reduction of cell viability by 5.2 ± 7.0%. # 1015: DECT telephone + SHLS 2 + crossed MHR with plus end toward cells at a distance of 30 cm to the cell plane. Reduction of cell viability by 5.9 ± 8.2%. Analog to # 1012. # 1017: DECT telephone + SHLS 2. Reduction of cell viability by 15.4 ± 10.9%. Analog to # 1011.

Fig. 5:

1018: No DECT phone, crossed MHR with positive end directed toward cells spaced 15 cm from the cell plane. Stimulation of cell viability by 4.0 ± 3.4%.

1019: No DECT telephone, crossed MHR with minus end directed toward cells at a distance of 15 cm to the cell plane. Stimulation of cell viability by 2.1 ± 2.9%. Analog # 1018.
1022: DECT phone + incubator in wall socket, SHLS 2 + LED table lamp with a weak magnetic rose quartz ring. Reduction of cell viability by 17.1 ± 5.6%.

The electromagnetic alternating fields of the Gigaset 4010 Classic DECT telephone reduced the vitality of the exposed connective tissue cells by 45.8 ± 6.9% (# 1008) compared to the untreated control.

Intermediate positioning of two additive MHRs (SHLS 1 or SHLS 2) reduced the cell activity of the electromagnetic alternating fields of the DECT telephone by more than one half (# 1011 and # 1017). The reduction in cell viability was only 21.4 ± 8.7% (# 1011) and 15.4 ± 10.9% (# 1017), respectively. The cellular effects of electromagnetic fields of the DECT telephone were completely neutralized (# 1012, # 1014, # 1015) using two MHRs crossed in the bearing direction on the cells at a distance of 30 cm from the cells. A statistically significant difference between the controls and the exposed cells in this experimental setup was not established (Wilcoxon-Mann-Whitney test). It did not matter whether an SHLS1 or SHLS2 was additionally used (# 1012 and # 1015).

The use of the crossed MHR without a DECT telephone resulted in a low and statistically not significant promotion of cell viability (# 1018 and # 1019). There was no difference between the center-side alignment of the plus and minus ends of the resonators. The DECT telephone without MHR, but an additional LED table lamp (light not covered) being placed before the incubator with MHR and magnetic rose quartz ring (# 1022) reduced the negative cell effect of the EMF by nearly the same amount as using the SHLS 1 and 2 in the Try # 1011 and # 1017.

In sum the experiments demonstrate that each time one or more MHRs (partially together with a SHLS) are used, negative effects of alternating magnetic fields on cell-biological samples are reduced and cell revitalization is observed over the entire spectrum of the used electromagnetic field or light.

Claims

1. An apparatus for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one- or two-phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, said apparatus comprising
a first and a second tube out of electrically conductive material per current phase, wherein the first tube is axially pervaded with the AC phase conductor, wherein the second tube is axially pervaded with the AC neutral conductor, and wherein the first and the second tubes are filled with quartz material.

2. Then apparatus of claim 1, wherein both tubes are positioned close together, preferably in parallel disposition.

3. The apparatus of claim 1 or 2, wherein at one end of the first and second tubes there is positioned at least one ring magnet, and wherein at the other end of the first and second tubes there is positioned at least one quartz ring, preferably a rose quartz ring, in such a kind that the ring magnet and the quartz ring are pervaded with the AC phase conductor and the AC neutral conductor.

4. The apparatus of one of claims 1 to 3, wherein both tubes are axially anisotropically filled with different and / or differently sized quartz material, preferably in a respectively different concentration, said filling preferably being identical in both tubes, and wherein both tubes are oriented oppositely to one another with respect to their anisotropy.

5. The apparatus of one of claims 1 to 4, wherein both tubes, preferably including the ring magnet and the ring quartz, are surrounded all-round by a sheathing preferably out of a steel / zinc / iron sheet, and wherein the space between the tubes and the ring magnet, quartz ring and sheath is filled with quartz sand.

6. The apparatus of one of claims 1 to 5, wherein the fillings of quartz material comprises quartz sand and / or quartz granules and / or small quartz stones, the quartz preferably comprising rose quartz.

7. The apparatus of one of claims 1 to 6, wherein the fillings of quartz material comprise metal elements, preferably such elements in the form of rings and / or of wire windings or coils, preferably including copper.

8. The apparatus of one of claims 1 to 7, wherein the fillings of quartz material comprise pieces of rose quartz, magnet elements, preferably each in the form of rings.

9. The apparatus of one of claims 1 to 8, wherein the tubes are axially separated into individual chambers by means of partition walls.

10. The apparatus of claim 9, wherein the partition walls are consisting out of copper, iron, zinc or aluminum.

11. The apparatus of claim 9, wherein the partition walls comprise layers of coal / carbon material or ash.

12. The apparatus of one of claims 1 to 11, wherein the metal elements as well as the magnet elements and the quartz rings are covered by nano coatings covered themselves by CO_2-based materials and / or graphene particles.

13. The apparatus of one of claims 1 to 12, wherein the AC phase conductor in the first tube and the AC neutral conductor in the second tube comprise a coil winding of opposite winding direction, and wherein each coil winding preferably comprises a folded portion of identical or opposite winding.

14. A system for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one- or two-phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, comprising a plurality apparatuses of one of claims 1 to 13, axially pervaded by one and the same AC phase conductor.

AMENDED CLAIMS
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1. An apparatus for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by a one -phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, said apparatus comprising a first and a second tube, wherein the first tube is axially pervaded with the AC phase conductor, wherein the second tube is axially pervaded with the AC neutral conductor, characterized in that the first and the second tubes are filled with quartz material, the first and second tubes consist of electrically conductive material, an electrical load emitting the electromagnetic fields (EMF) causing stress on organism being connected to the at least one phase conductor and the neutral conductor, and the AC mains network alternatively being a two-phases network.

2. Then apparatus of claim 1, wherein both tubes are positioned close together, preferably in parallel disposition.

3. The apparatus of claim 1 or 2, wherein at one end of the first and second tubes there is positioned at least one ring magnet, and wherein at the other end of the first and second tubes there is positioned at least one quartz ring, preferably a rose quartz ring, in such a kind that the ring magnet and the quartz ring are pervaded with the AC phase conductor and the AC neutral conductor.

4. The apparatus of one of claims 1 to 3, wherein both tubes are axially anisotropically filled with different and / or differently sized quartz material, preferably in a respectively different concentration, said filling preferably being identical in both tubes, and wherein both tubes are oriented oppositely to one another with respect to their anisotropy.

5. The apparatus of one of claims 1 to 4, wherein both tubes, preferably including the ring magnet and the ring quartz, are surrounded all-round by a sheathing preferably out of a steel / zinc / iron sheet, and wherein the space between the tubes and the ring magnet, quartz ring and sheath is filled with quartz sand.

6. The apparatus of one of claims 1 to 5, wherein the fillings of quartz material comprises quartz sand and / or quartz granules and / or small quartz stones, the quartz preferably comprising rose quartz.

7. The apparatus of one of claims 1 to 6, wherein the fillings of quartz material comprise metal elements, preferably such elements in the form of rings and / or of wire windings or coils, preferably including copper.

8. The apparatus of one of claims 1 to 7, wherein the fillings of quartz material comprise pieces of rose quartz, magnet elements, preferably each in the form of rings.

9. The apparatus of one of claims 1 to 8, wherein the tubes are axially separated into individual chambers by means of partition walls.

10. The apparatus of claim 9, wherein the partition walls are consisting out of copper, iron, zinc or aluminum.

11. The apparatus of claim 9, wherein the partition walls comprise layers of coal / carbon material or ash.

12. The apparatus of one of claims 1 to 11, wherein the metal elements as well as the magnet elements and the quartz rings are covered by nano coatings covered themselves by CO_2-based materials and / or graphene particles.

13. The apparatus of one of claims 1 to 12, wherein the AC phase conductor in the first tube and the AC neutral conductor in the second tube comprise a coil winding of opposite winding direction, and wherein each coil winding preferably comprises a folded portion of identical or opposite winding.

14. A system for reducing stress on organisms caused by (alternating) electromagnetic fields (EMF) emitted by an electric load connected to a one- or two-phase alternating current (AC) mains network via at least one phase conductor and a neutral conductor, comprising a plurality apparatuses of one of claims 1 to 13, axially pervaded by one and the same AC phase conductor.

Fig.1

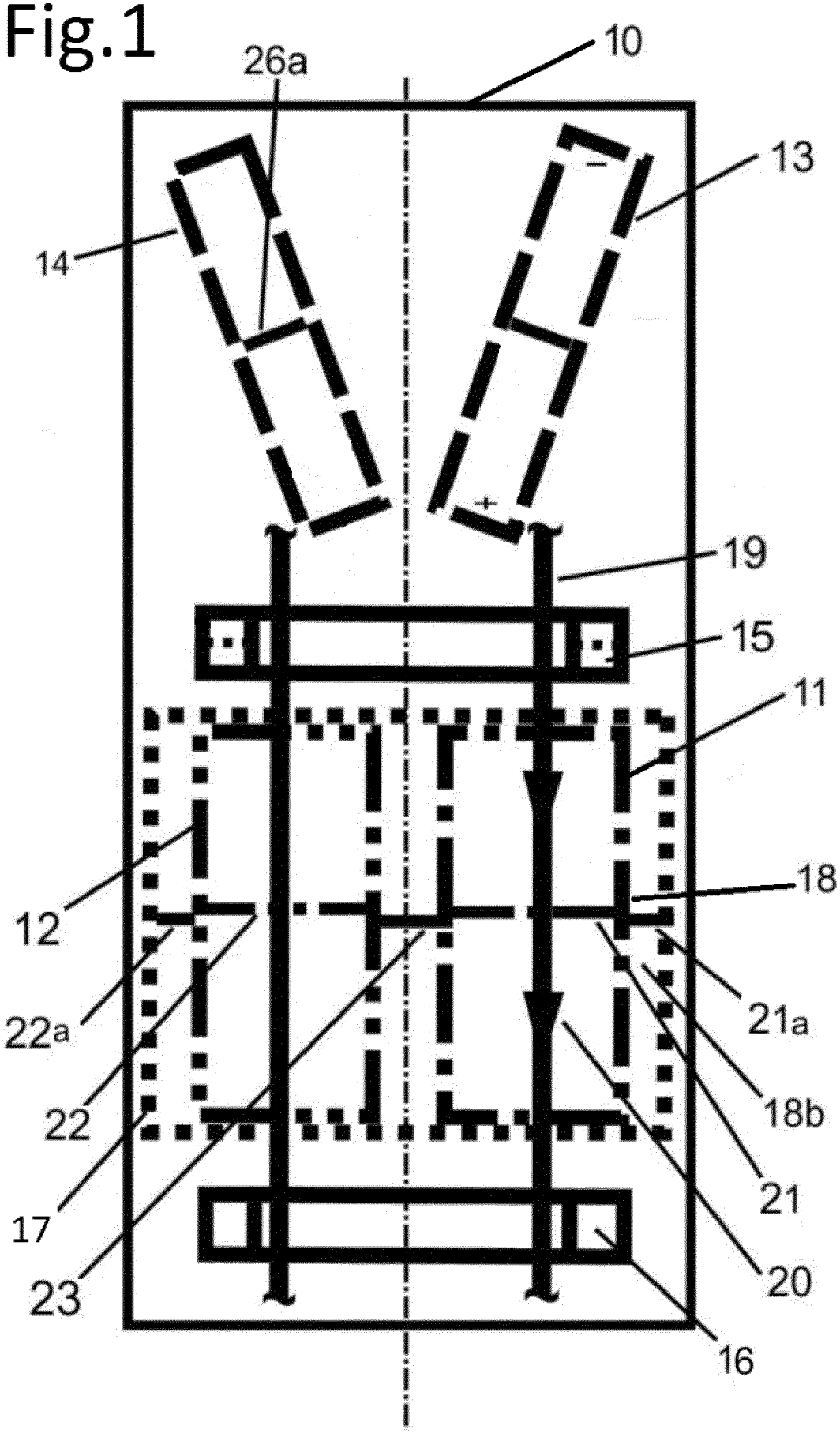


Fig. 2

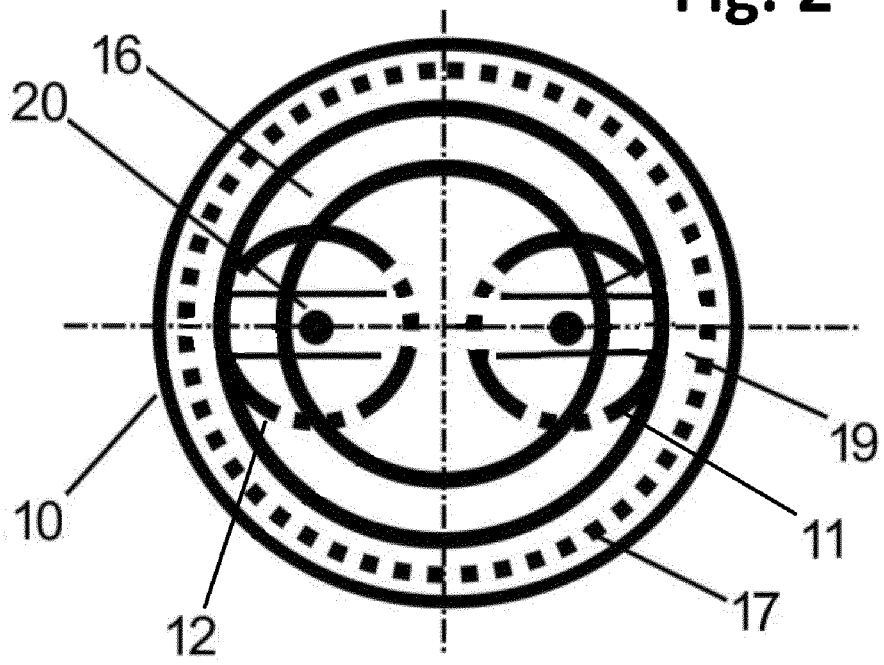
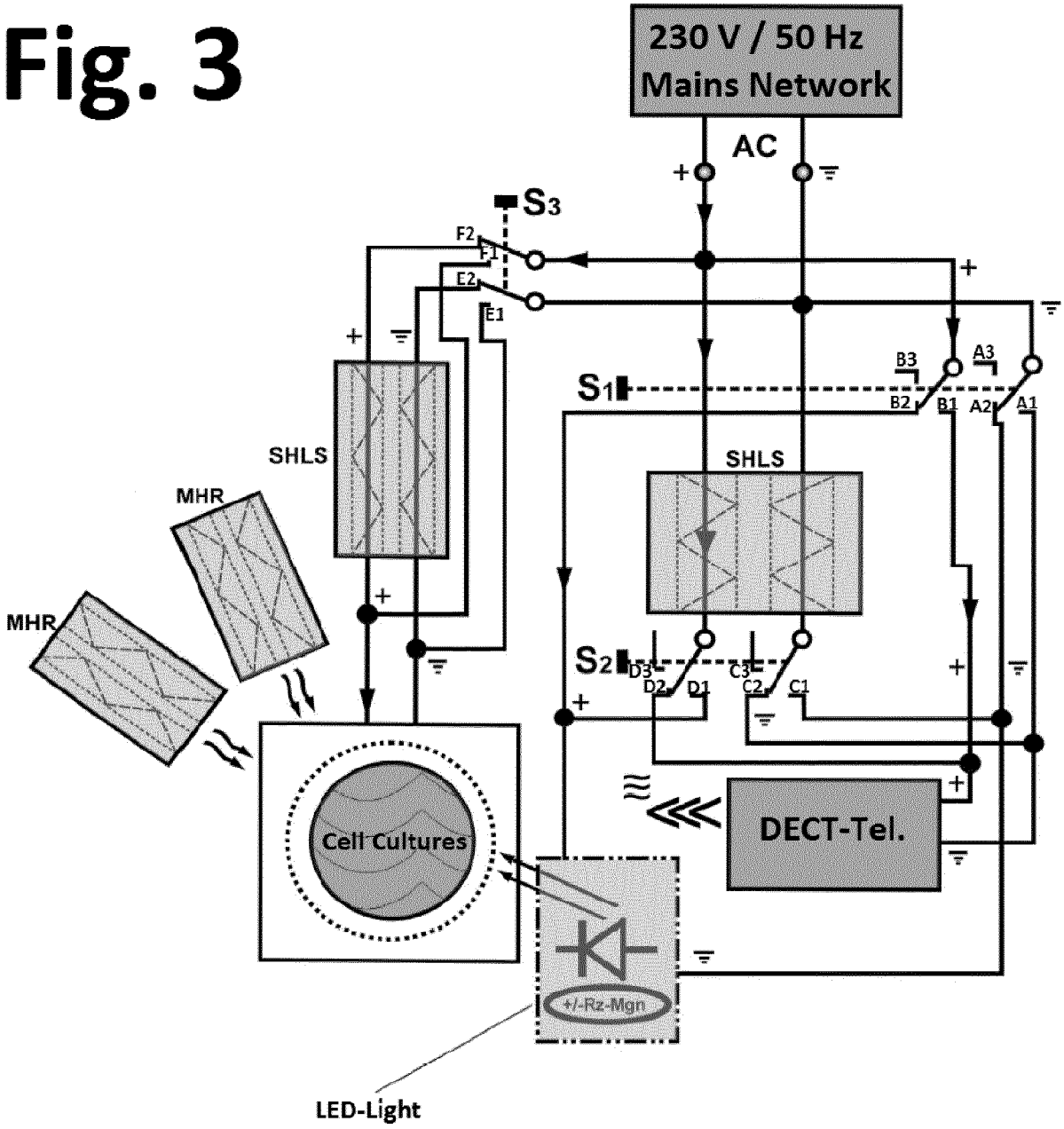


Fig. 3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Mains Network
AC
S3
F2
F1
E2
E1
S1
B3
A3
B2
B1
A2
A1
SHLS
SHLS
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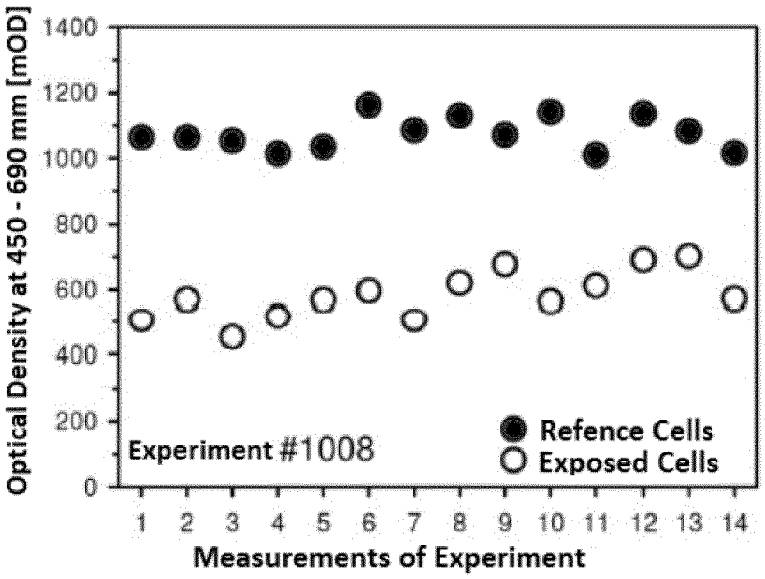
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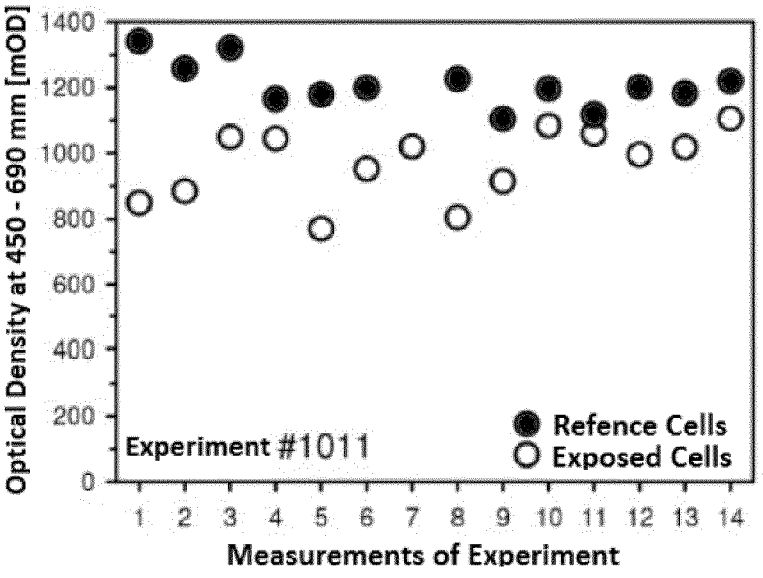
1400
1200
1000
800
600
400
200
0
Experiment #1008
Refence Cells
Exposed Cells
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Measurements of Experiment


Optical Density at 450 - 690 mm [mOD]
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1200
1000
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600
400
200
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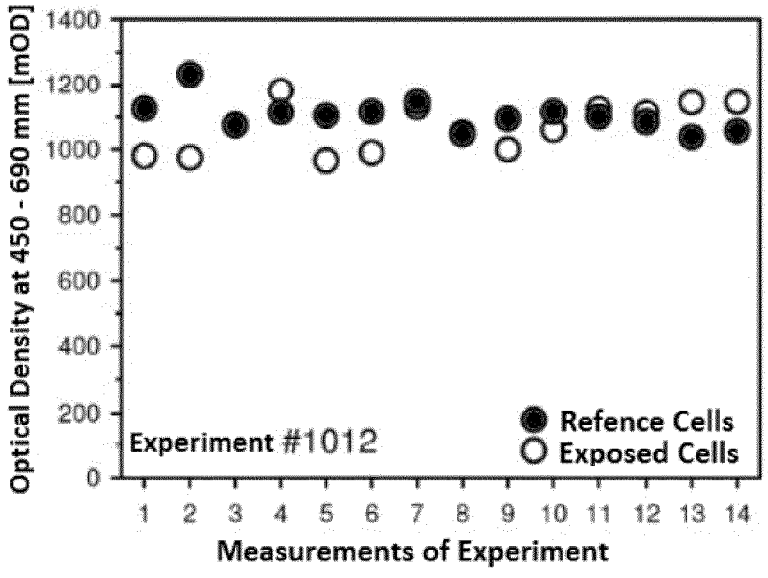
Experiment #1011
Refence Cells
Exposed Cells
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Measurements of Experiment


Optical Density at 450 - 690 mm [mOD]
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1200
1000
800
600
400
200
0
Experiment #1012
Refence Cells
Exposed Cells
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Measurements of Experiment

Fig. 4a

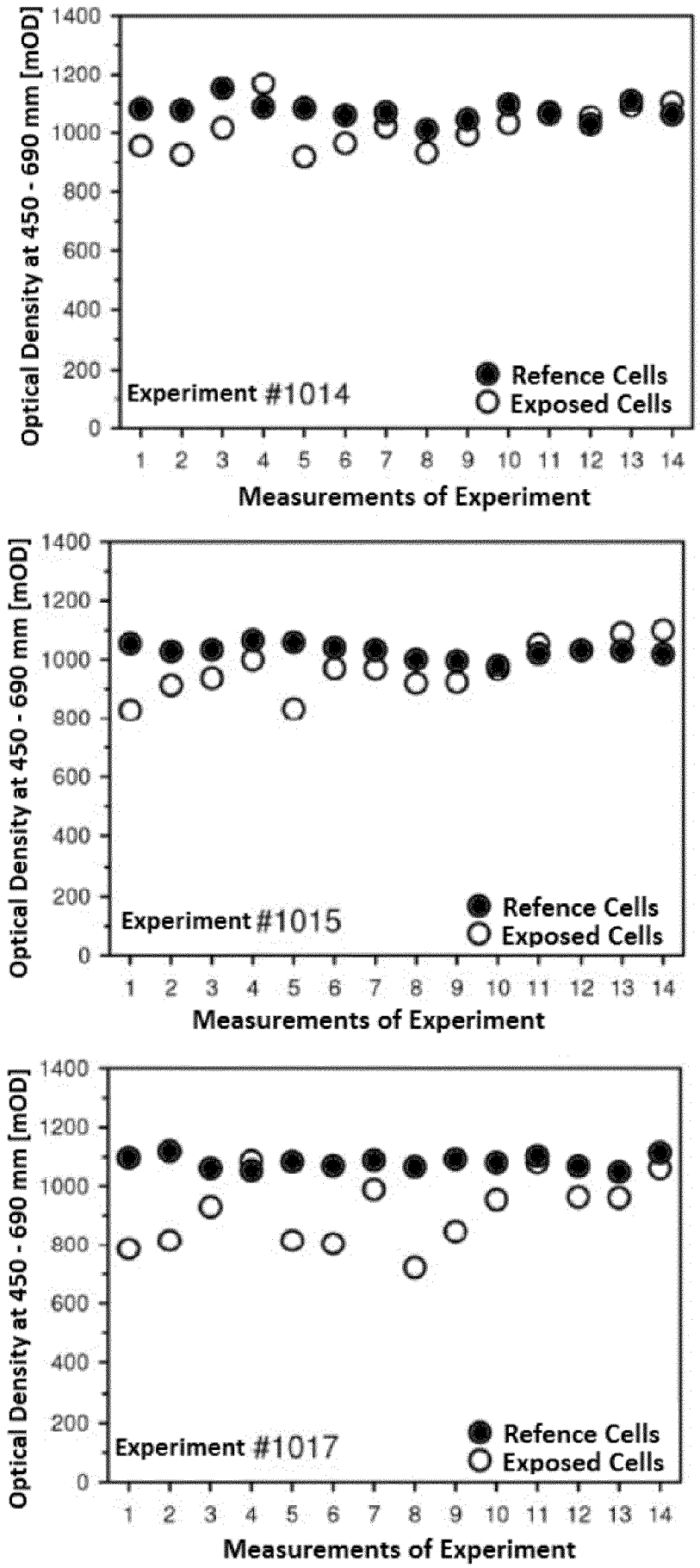
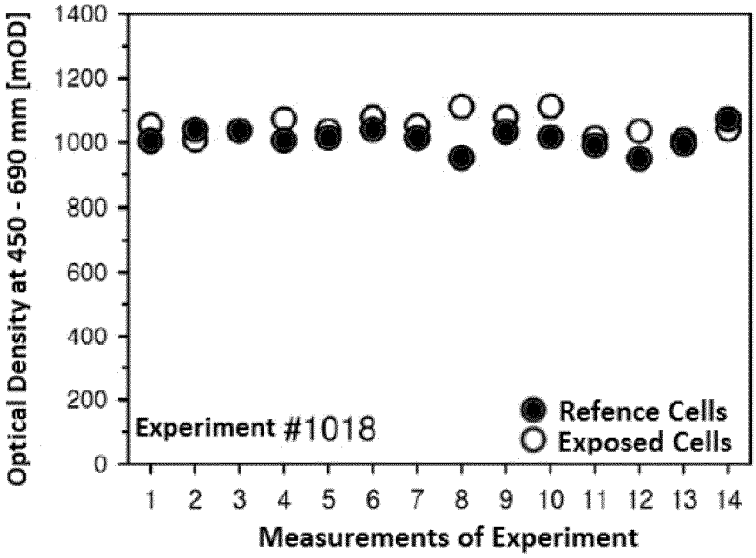
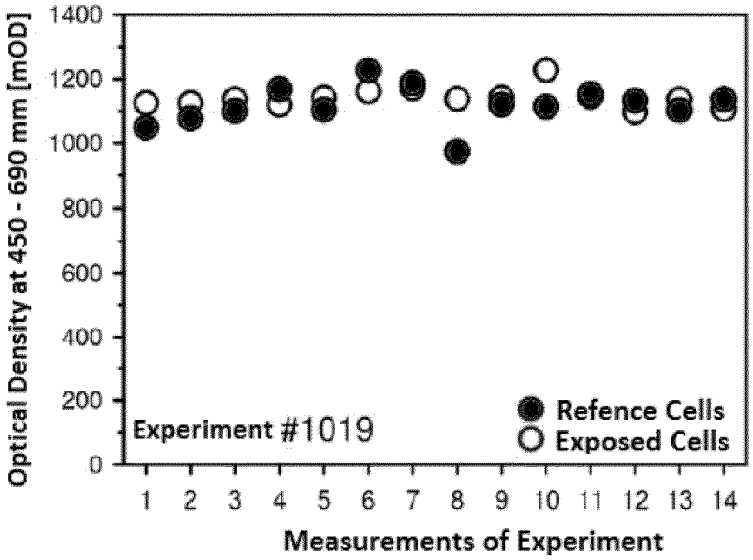

Optical Density at 450 - 690 mm [mOD]
1400
1200
1000
800
600
400
200
0
Experiment #1014
Refence Cells
Exposed Cells
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Measurements of Experiment
Optical Density at 450 - 690 mm [mOD]
Experiment #1015
Refence Cells
Exposed Cells
Measurements of Experiment
Optical Density at 450 - 690 mm [mOD]
Experiment #1017
Refence Cells
Exposed Cells
Measurements of Experiment

Fig. 4b


Optical Density at 450 - 690 mm [mOD]
1400
1200
1000
800
600
400
200
0
Experiment #1018
Refence Cells
Exposed Cells
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Measurements of Experiment


Optical Density at 450 - 690 mm [mOD]
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1200
1000
800
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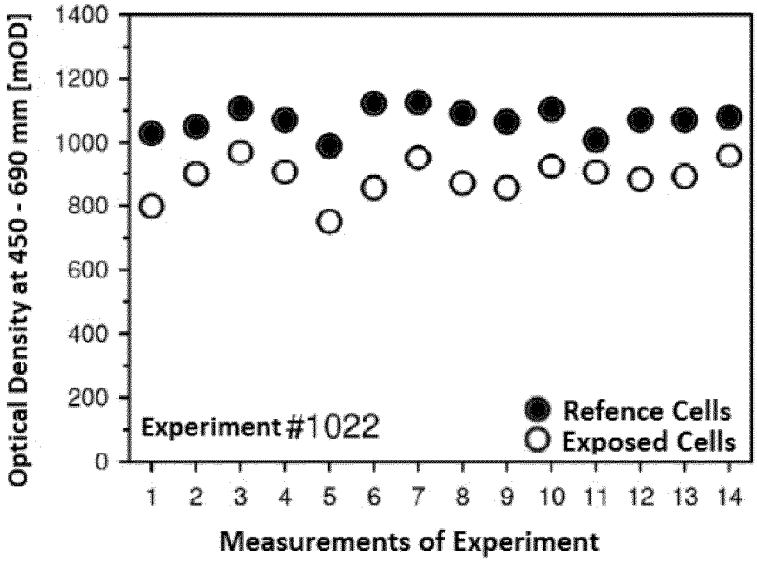
400
200
0
Experiment #1019
Refence Cells
Exposed Cells
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Measurements of Experiment


Optical Density at 450 - 690 mm [mOD]
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1000
800
600
400
200
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Experiment #1022
Refence Cells
Exposed Cells
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Measurements of Experiment

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/053743

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61N1/16
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	EP 2 434 858 A1 (LIM JES TYNG-YEE [AU]) 28 March 2012 (2012-03-28) abstract; figure 1 paragraph [0024] & DE 203 12 045 U1 (RENNER DIETER [DE]) 12 February 2004 (2004-02-12) abstract; claim 1 paragraph [0011] ----- -/--	1-14 1-14

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 April 2017	10/05/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pereda Cubián, David

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

International application No
PCT/EP2017/053743

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