

PATENT COOPERATION TREATY

REC'D 21 SEP 2005
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From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) 19 SEP 2005

Applicant's or agent's file reference LEL009PCT		FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/US04/11620	International filing date (day/month/year) 15 April 2004 (15.04.2004)	Priority date (day/month/year) 02 May 2003 (02.05.2003)	
International Patent Classification (IPC) or both national classification and IPC IPC(7): H01S 3/09 and US Cl.: 372/19, 69			
Applicant LIGHTWARE ELECTRONICS CORPORATON			

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Date of completion of this opinion 31 August 2005 (31.08.2005)	Authorized officer <i>D. Wildermuth</i> Min Harvey Telephone No. 571-272-2800
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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- the international application in the language in which it was filed
- a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- a sequence listing
- table(s) related to the sequence listing

b. format of material

- on paper
- in electronic form

c. time of filing/furnishing

- contained in the international application as filed.
- filed together with the international application in electronic form.
- furnished subsequently to this Authority for the purposes of search.

3. In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>Please See Continuation Sheet</u>	YES
	Claims <u>Please See Continuation Sheet</u>	NO
Inventive step (IS)	Claims <u>Please See Continuation Sheet</u>	YES
	Claims <u>Please See Continuation Sheet</u>	NO
Industrial applicability (IA)	Claims <u>Please See Continuation Sheet</u>	YES
	Claims <u>Please See Continuation Sheet</u>	NO

2. Citations and explanations:

Please See Continuation Sheet

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V.1. Reasoned Statements:

The opinion as to Novelty was positive (Yes) with respect to claims 4, 6, 16-18, 20-21, 28, 30, 44, 46, 57-58, 61-63
The opinion as to Novelty was negative (No) with respect to claims 1-3, 5, 7-15, 19, 22-27, 29, 31-43, 45, 47-56, 59-60, 64-65
The opinion as to Inventive Step was positive (Yes) with respect to claims NONE
The opinion as to Inventive Step was negative (NO) with respect to claims 1-65
The opinion as to Industrial Applicability was positive (YES) with respect to claims 1-65
The opinion as to Industrial Applicability was negative (NO) with respect to claims NONE

V. 2. Citations and Explanations:

Claims 1-3, 5, 7-15, 19, 20-27, 29, 31-43, 41, 45, 47-59, 60 and 64-65 lack novelty under PCT Article 33(2) as being anticipated by Scheps (5285467).

Regarding claims 1, 19-21, 41, 56-58, and 65, Scheps disclose a diode pumped laser Fig. IA, comprising a cavity 20 defined by two or more reflecting surfaces 25, 31, and a gain medium 30 disposed within the cavity 20, wherein a peak intensity of internal infrared radiation within the gain medium 30 is greater than about 0.01 Gwatts/cm², wherein the gain medium 30 contains co-dopant ions Cr³⁺ that make the gain medium 30 resistant to ionizing radiation, whereby the gain medium 30 is resistant to damage from the infrared radiation, it is inherent that the structure of Scheps laser is able to operate as limited by the wherein clauses since they are all characteristics of the gain medium 30 being co-doped with Cr³⁺.

Regarding claim 2, Scheps disclose the claimed invention as cited above in claim 1, "wherein the concentration in the gain medium of the co-dopant ions is sufficient to reduce a rate of degradation of the gain medium from infrared radiation by a factor two or more compared to the same or a substantially similar gain medium without the co-dopant ions", is a characteristic property of the co-dopant.

Regarding claim 3, Scheps disclose wherein the gain medium 30 is a solid-state material, col. 7, lines 61-64. Regarding claim 5, Scheps disclose wherein the solid-state material is a crystalline material, col. 7, lines 61-64.

Regarding claim 7, Scheps disclose wherein the gain medium 30 is a garnet, col. 16, line 21.

Regarding claim 8, Scheps disclose wherein the gain medium 30 is selected from: the group of YAG, (GGG), (GSGG), col. 8, lines 34-54.

Regarding claim 9, Scheps disclose wherein the gain medium 30 is YAG, col. 8, line 47.

Regarding claim 10, Scheps disclose wherein the gain medium is Tm:Ho:YAG, Yb:YAG, Nd:YAG or Er:YAG, col. 8, lines 42-47.

Regarding claim 11, Scheps disclose wherein the gain medium is Nd:YV04 or Nd:YALO, col. 9, line 31. Regarding claim 12, Scheps disclose wherein the gain medium is Nd:YAG, col. 8, lines 42-47.

Regarding claim 13, Scheps disclose wherein the co-dopant ions are Cr³⁺ ions, col. 9, lines 12-13.

Regarding claim 14, Scheps disclose wherein the co-dopant ions are present in the gain medium at a doping level of between about 0.01% and about 5%, col. 16, lines 27-34.

Regarding claim 15, Scheps disclose wherein the co-dopant ions are present in the gain medium at a doping level of between about 0.50/c and about 1%, col. 16, lines 27-34.

Regarding claim 22, Scheps disclose wherein the laser is configured to have low noise, since it is not understood how low is low noise or what is considered to be in the range of low noise.

Regarding claim 23, it is inherent that the device of Scheps can operate at more than about 5 times a threshold pump intensity.

Regarding claim 24, Scheps disclose the claimed invention as cited above in claim 1, "wherein the peak intensity of internal infrared radiation within the gain medium is greater than about 0.1 Gwatts/cm², is a characteristic property of the co-dopant.

Regarding claims 25-27, 29, and 31-40, Scheps disclose a method for making a laser gain medium resistant to damage induced

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

by internal infrared radiation, since the method only describes the device as claimed above. Therefore the rejection used to rejection the device above, also applies to the method herein.

Regarding claims 41-43, 45, 47-55, 59, 60 and 64, Scheps disclose a method for operating the device as claimed above, since the device inherently overates in the given manner. Therefore the rejection used to rejection the device above_ also applies to the method

Claims 4, 28 and 44 lack an inventive step under PCT Article 33(3) as being obvious over Scheps (5285467) in view of Hardy (3355674).

Scheps, as applied to claims 1, 25 and 41 above, discloses all the stated limitations, except for the gain medium being a fiber, whereby the laser is a fiber laser. Hardy teaches/shows that fiber lasers are well known in the laser art and it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a fiber as a gain medium in order to better couple to laser output into a fiber linked communication system.

Claims 6, 30 and 46 lack an inventive step under PCT Article 33(3) as being obvious over Scheps (5285467). Scheps, as applied to claims 1, 25 and 41 above, discloses all the stated limitations, except for the gain medium is a fluoride crystal or an oxide crystal, instead, Scheps teaches the gain medium, although not specifically named, may be produced and chosen by one skilled in the art to provided feedback at a desired wavelength, cot. 8, lines 47-54. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a gain medium of a fluoride crystal or an oxide crystal in order to obtain a specific emission wavelength.

Claims 16-18 and 61-63 lack an inventive step under PCT Article 33(3) as being obvious over Scheps (5285467) in view of Bjorkholm (3609389). Scheps, as applied to claims 1, 25 and 41 above, discloses all the stated limitations, except for a Q-switch disposed within the cavity. Bjorkholm teaches/shows that Q-switches are well known in the laser art for switching between storing lasing energy within the lasing material and releasing an output beam from the lasing material and it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a Q-switch of any kind in order to control the pulse rate of the laser output beam.