PATENT ASSIGNMENT

Electronic Version v1.1
Stylesheet Version v1.1

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
Frank SHUM	02/28/2008

RECEIVING PARTY DATA

Name:	Bridgelux Inc.
Street Address:	1225 Bordeaux Drive
City:	Sunnyvale
State/Country:	CALIFORNIA
Postal Code:	94089

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	12183020

OP $40.00 12183020

CORRESPONDENCE DATA

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ATTORNEY DOCKET NUMBER:	030348.00019
NAME OF SUBMITTER:	Linda S. Santiago

Total Attachments: 5
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source=030348-00019_RecordOfAssign#page2.tif
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Form PTO-1595 (Rev. 07/05)
OMB No. 0651-0027 (exp. 7/31/2008)

U.S. DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

RECORDATION FORM COVER SHEET
PATENTS ONLY

To the Director of the U.S. Patent and Trademark Office: Please record the attached documents or the new address(es) below.

1. Name of conveying party(ies)

Frank Shum

Additional name(s) of conveying party(ies) attached? ☐ Yes ☑ No

2. Name and address of receiving party(ies)

Name: Bridgelux Inc.

Internal Address:

Street Address: 1225 Bordeaux Drive

City: Sunnyvale

State: California

Country: USA Zip: 94089

Additional name(s) & address(es) attached? ☐ Yes ☑ No

3. Nature of conveyance/Execution Date(s):

Execution Date(s) February 28, 2008

☑ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Joint Research Agreement
☐ Government Interest Assignment
☐ Executive Order 9424, Confirmatory License
☐ Other

4. Application or patent number(s):

☑ This document is being filed together with a new application.

A. Patent Application No.(s)

B. Patent No.(s)

Additional numbers attached? ☐ Yes ☐ No

5. Name and address to whom correspondence concerning document should be mailed:

Name: Craig A. Gelfound

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State: California Zip: 90013

Phone Number: 213.443.7604

Fax Number: 213.629.7401

Email Address: LAIPDocket@arentfox.com

6. Total number of applications and patents involved: 1

7. Total fee (37 CFR 1.21(h) & 3.41) $ 40.00

☑ Authorized to be charged by credit card
☐ Authorized to be charged to deposit account
☐ Enclosed
☐ None required (government interest not affecting title)

8. Payment Information

a. Credit Card Last 4 Numbers 1007
Expiration Date 10/2012

b. Deposit Account Number

Authorized User Name Linda Santiago

9. Signature:

Craig Gelfound

Signature

July 30, 2008
Date

Craig A. Gelfound
Name of Person Signing

Total number of pages including cover sheet, attachments, and documents: 5

Documents to be recorded (including cover sheet) should be faxed to (571) 273-0140, or mailed to:
Mail Stop Assignment Recordation Services, Director of the USPTO, P.O.Box 1450, Alexandria, V.A. 22313-1450

Docket No. 030348.00010

U.S. ASSIGNMENT

IN CONSIDERATION of the sum of One Dollar ($1.00), and of other good and valuable consideration paid to the undersigned inventor(s) (hereinafter ASSIGNOR) by

BRIDGELUX INC.
1225 Bordeaux Drive
Sunnyvale, California 94089

(hereinafter ASSIGNEE), the receipt of which is hereby acknowledged, the undersigned ASSIGNOR hereby sells, assigns and transfers to ASSIGNEE the entire and exclusive right, title and interest, including the right to sue for past infringement, if any, and all rights pursuant to 35 U.S.C. §154, to the invention described in the invention disclosure, attached hereto as Appendix A, and entitled

LED STRUCTURE TO INCREASE BRIGHTNESS AND POWER

for which application for Letters Patent of the United States was executed on even date herewith unless otherwise indicated below:

filed on _____, Serial No. _____
(Arent Fox LLP is hereby authorized to insert the series code, serial number and/or filing date hereon, when known)

and all Letters Patent of the United States to be obtained therefor on said application or any continuation, division, renewal, substitute, reissue or reexamination thereof, and any other application claiming priority thereto, for the full term or terms for which the same may be granted.

The ASSIGNOR agrees to execute all papers necessary in connection with application and any continuing, divisional, reissue or reexamination applications thereof and also to execute separate assignments in connection with such applications as the ASSIGNEE may deem necessary or expedient.

The ASSIGNOR agrees to execute all papers necessary in connection with any interference, litigation, or other legal proceeding which may be declared concerning this application or any continuation, division, reissue or reexamination thereof or Letters Patent or reissue patent issued thereon and to cooperate with the ASSIGNEE in every way possible in obtaining and producing evidence and proceeding with such interference, litigation, or other legal proceeding.

IN WITNESS WHEREOF, the undersigned inventor(s) has (have) affixed his/her/their signature(s).

(SIGNATURE)	Frank Shum (TYPE NAME)	2/28/2008 (DATE)

INVENTION DISCLOSURE

Date: 3/1/2006

eLite Optoelectronics Inc.

*Instructions: The information contained in this document is **COMPANY CONFIDENTIAL** and may not be disclosed to others without prior authorization. Submit this disclosure to Heng Liu as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.*

Descriptive Title of Invention:

LED Structure to Increase Brightness and Power (Without Increasing Current or Power Density)

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):
No

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):
No

Was the invention disclosed to anyone outside of eLite, or will such disclosure occur? If so, the date(s) and name(s):
No

If any of the above situations will occur within 3 months, please let Heng Liu know.

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.)

No

Was the invention built or tested? If so, the date:

No

Was this invention made under a government contract? If so, the agency and contract number:

No

Description of Invention: *Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).*

Background:

The brightness or luminance of an LED is an important quantity that specifies how well it will illuminate a particular location. Applications where Luminance is important include rear projection TV, Presentation projectors, automotive headlights, spot lights etc.

Assuming the source is in air, the Luminance of a source is defined as:

$L = \Phi / (A\,\Omega)$ where

Φ is the Optical Power
A is the area of the source
Ω is the solid angle of the emission

Typically the area (A) will proportionally scale with the Output Flux. Thus changing will not change Luminance. The the solid angle (Ω) is typically fixed. Traditionally, one can only turn up the current to the LED to increase the Luminance. However increasing current density will decrease reliability. Even if reliability is not a concern, above a certain current density; the output optical power will "Roll over" producing a decrease in brightness. Increasing current density also increase power density or the heat

Inventor:	Signature	Date	Witness	Signature	Date
Frank Shum		3/1/2006	HENG LIU	Heng Liu	3/13/06

generated per unity area which can be undesirable.

Invention

It is the object of this invention to provide a LED structure that will:

1. Increase the Power Output
2. Increase Luminance
3. No Increase in current density
4. No Increase in heat density.

In traditional LEDs, the emission aperture is the same size or larger than the width of the LED. I propose to make the emission aperture smaller than the width of the LED. A generic structure of the proposed structure is shown in figure 1 where a low reflector "wraps" around the LED producing an Emission aperture smaller than the LED width.

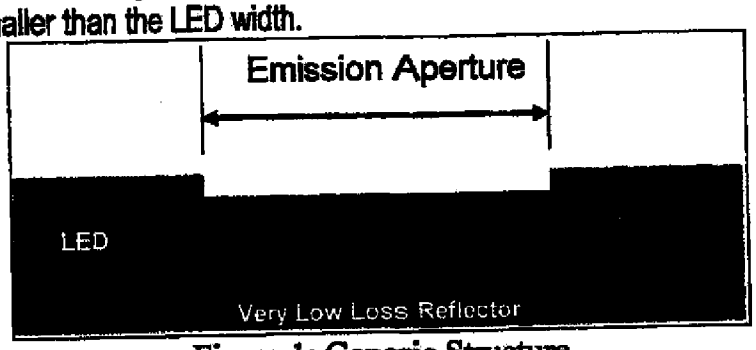

Figure 1: Generic Structure

The effectiveness of such of a structure is highly dependent on the losses of the reflectors beyond the emission aperture. However, a nature zero loss reflector can be achieved simply by TIR. This is shown in figure 2 where the emission aperture is "roughened" to promote scattering whereas the area beyond the aperture is smooth resulting in TIR at the top surface.

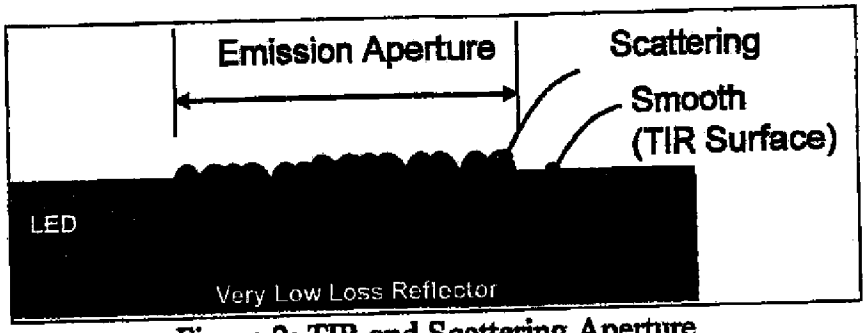

Figure 2: TIR and Scattering Aperture

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Simulations of a structure as shown in figure 2 shows an 28% increase in brightness and power for a doubling of the overall die area from 1x1 mm to 1.41x141 mm.

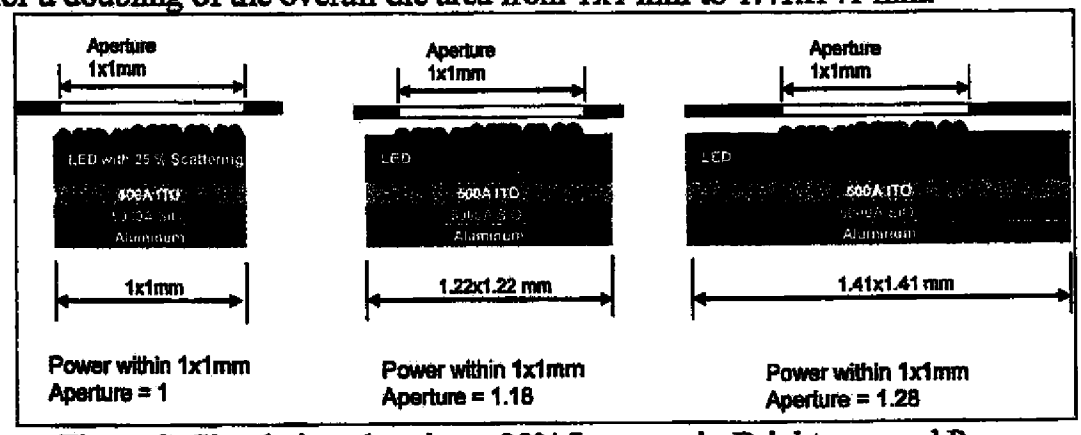

Figure 3: Simulation showing a 28% Increase in Brightness and Power

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