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FEBRUARY 2007

Rocky Mountain Monthly

IESNA ROCKY MOUNTAIN SECTION

WWW.IESRMS.ORG

LED TECHNOLOGY

The emergence of efficient, high brightness LEDs has generated a tremendous amount of excitement in recent years. Ruggedness, reliability, color changing capability, optical control, and long life are among the unique qualities that this potentially revolutionary technology offers.

However, there are a number of issues that currently limit the degree to which it can be practically applied. Join us as we take an in-depth look at LED performance and discuss the inherent challenges relative to broad-scale application.

Join us for this exciting update on LED technology, while being able to get hands on demonstrations of the latest products using LED technology, all available from various manufacturers before the meeting!

We will have a wide variety of LED fixtures and products from several manufacturers available for demonstration before the meeting .

COME EARLY TO CHECK THEM OUT!

LED TECHNOLOGY MEETING DETAILS

Date: Tuesday, February 20, 2007

Time: 5:30pm

Cost: $15 Members
$25 Non-Members
$5 Students

DIRECTIONS? CLICK HERE

Location: Original Brooklyn's
2644 West Colfax, Denver

RSVP: rsvp@iesrms.org

Deadline for RSVP is Monday, February 19

Register for this meeting right now!

RSVP Online NOW!

Click here to be automatically directed to the registration website.

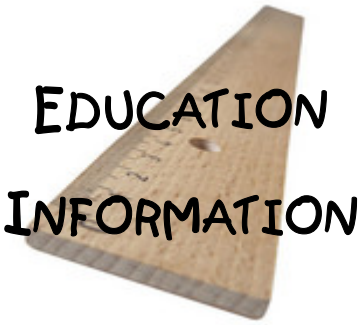
Wisdom,

Wonders,

and

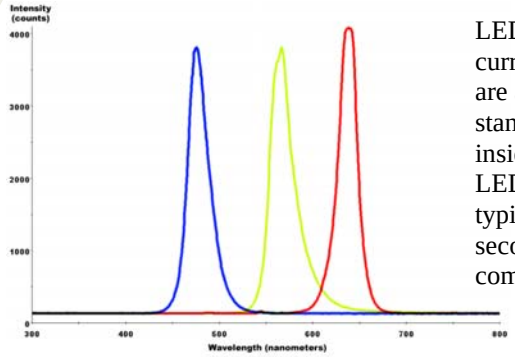
Wit

LED-101



A **light-emitting diode** (**LED**) is a semiconductor device that emits incoherent narrow-spectrum light when electrically biased in the forward direction. This effect is a form of electroluminescence. The color of the emitted light depends on the composition and condition of the semiconducting material used, and can be infrared, visible or near-ultraviolet. Rubin Braunstein of the Radio Corporation of America first reported on infrared emission from gallium arsenide (GaAs) and other semiconductor alloys in 1955. Experimenters at Texas Instruments, Bob Biard and Gary Pittman, found in 1961 that gallium arsenide gave off infrared (invisible) light when electric current was applied. Biard and Pittman were able to establish the priority of their work and received the patent for the infrared light-emitting diode. Nick Holonyak Jr. of the General Electric Co. developed the first practical visible-spectrum LED in 1962.

The wavelength of the light emitted, and therefore its color, depends on the band gap energy of the materials forming the *p-n junction*. In silicon or germanium diodes, the electrons and holes recombine by a *non-radiative transition* which produces no optical emission, because these are indirect bandgap materials. The materials used for an LED have a direct band gap with energies corresponding to near-infrared, visible or near-ultraviolet light.



Combined spectra of a common blue LED, a yellow-green LED and a high brightness red LED.

LEDs are usually constantly illuminated when a current passes through them, but flashing LEDs are also available. Flashing LEDs resemble standard LEDs but they contain a small chip inside which causes the LED to flash with a typical period of one second. This type of LED comes most commonly as red, yellow, or green. Most flashing LEDs emit light of a single wavelength, but multicolored flashing LEDs are available too.

The semiconducting chip is encased in a solid plastic lens, which is much tougher than the glass envelope of a traditional light bulb or tube. The plastic may be colored, but this is only for cosmetic reasons or to improve the contrast ratio; the color of the packaging does not substantially affect the color of the light emitted.

Conventional LEDs are made from a variety of inorganic semiconductor materials, producing the following colors:

- aluminum gallium arsenide (AlGaAs) - red and infrared
- aluminum gallium phosphide (AlGaP) – green
- gallium arsenide phosphide (GaAsP) - red, orange-red, orange, and yellow
- gallium phosphide (GaP) - red, yellow and green
- indium gallium nitride (InGaN) - near ultraviolet, bluish-green and blue
- aluminum gallium indium phosphide (AlGaInP) - high-brightness orange, yellow, and green
- silicon carbide (SiC) as substrate — blue
- sapphire (Al_2O_3) as substrate — blue
- zinc selenide (ZnSe) - blue
- diamond (C) - ultraviolet

There is currently no new information to report in the education section of the Rocky

You can always visit www.iesrms.org/education for the latest in what is happening in lighting education in the Rocky Mountain region.

Strategies in Light 2007

February 12 – 14, 2007

San Jose, California

Strategies in Light 2007, Strategies Unlimited's business-oriented conference and exhibition on high-brightness LEDs in San Jose, California.

This year's conference theme is LEDs – Pushing the Boundaries of Lighting. The original and longest-running annual forum for presenting the HB LED Market Overview five-year forecast and current commercial developments in high-brightness LEDs.

Four pre-conference workshops, two-day conference and exhibits as well as providing networking opportunities for component and equipment suppliers, manufacturers, and end-users of HB LED devices.

Contact: lubah@pennwell.com or visit www.strategiesinlight.com

BIG BROTHER IS WATCHING YOU!!!

Have any of you noticed we haven't been giving out our meeting raffle tickets? Well, we've been keeping attendance this year. Yep! Just like in school! *(You though those dreams of being shoved in your locker were a coincidence?)*

We are going to give a **COOL PRIZE** to the person that shows up to the most meetings this year!

See, you knew you were coming for something other that learning!

WEB LINX

Click the link to go right to the site!

www.IEEE.org
The Institute of Electrical and Eleectronics Engineers, a non-profit organization, is the world's leading professional association for the advancement of technology. IEEE Is a leading authority on areas ranging from aerospace systems, computers, and telecommunications to biomedical engineering, electric power, and consumer electronics among others.

www.ANSI.org
The American National Standards Institute (ANSI) coordinates the development and use of voluntary consensus standards in the United States and represents the needs and views of U.S. stakeholders in standardization forums around the globe.

www.ENERGYSTAR.org
ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.

www.ETL.com
The ETL SEMKO division of Intertek is a leader in testing, certifying, and inspecting products for global market access. The ETL Listed Mark is issued to products that have met the requirements of product safety standards in the US and Canada.

Who's Who in the IESRMS Community?

We all have something in common....we're NUTS over lighting. Guess what? There's much more to each of us, and wouldn't it be great to know who's really who in our lighting community? The RMS of IESNA will randomly select one of you folk at each section meeting, beginning with the February LED expo, and this may be your 10 seconds of fame. In an exclusive short interview, along with a photo shot, tell us about yourself... what you do for work and fun, what inspires you, what you'd like to be recognized for. The interview each month will appear in the section newsletter.

It's all about getting to know each other, and appreciating our diverse and talented community. Come to the section meeting and be the next IESNA Rocky Mountain section idol!

WELCOME NEW SECTION MEMBERS

Jennifer Scheib,
Architectural Energy Corp.
Boulder, Colorado

Oleg Duday
Hadji & Associates, Inc.
Denver, Colorado

Denver Lights up the Crosswalks!

Would you have guessed that one of the country's largest LED traffic light inventories is downtown?

The City of Denver has one of the largest light-emitting diode traffic light inventories in the country.

In the late 1990s, the city's Traffic Operations Division began an ongoing retrofit program to convert its traffic signals from incandescent lamps to LED bulbs. Since then, more than 48,000 red, yellow and green traffic and pedestrian signals have been converted to LED, which saves the city more than $800,000 per year in energy, labor and material costs.

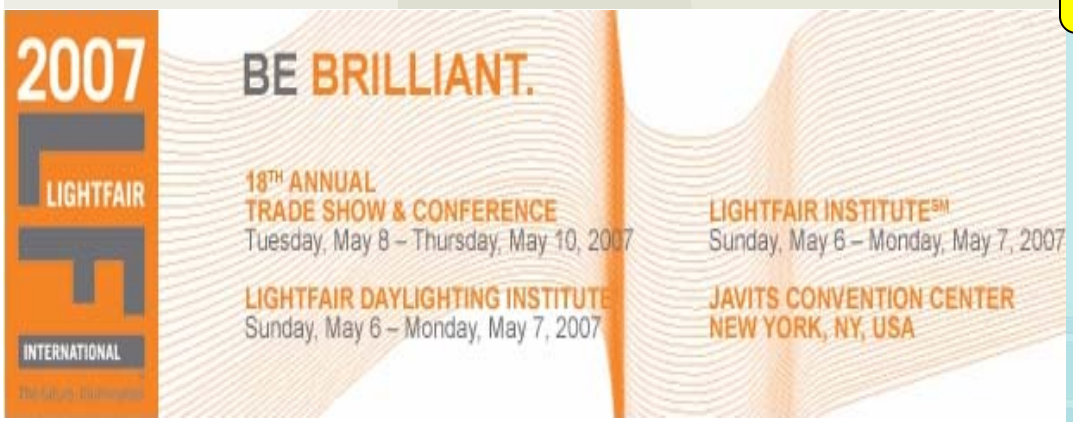
Denver has approximately 1,250 traffic intersections containing over 55,000 signal indicators, and they must be powered 24 hours a day.

A single four-way conventional traffic light with incandescent lamps consumes roughly 85 kilowatts of electricity per day and costs about $1,600 per year to operate. For a city the size of Denver, traffic lights would consume 931 million kilowatts of electricity per year at an annual cost of $2 million.

LED traffic signals, on the other hand, use 90 percent less energy and last up to five times longer. In addition to the tremendous energy savings, their low-maintenance performance means that technicians are dispatched for fewer repairs, which helps lower liability costs and simplify parts inventories. The city's LED conversion has reduced annual emissions of carbon dioxide by 2,937 tons. This is equivalent to removing 374 cars from the road.

At the launch of the program, city experts worked directly with manufacturers to develop and refine traffic light LED technology, improving aspects such as signal visibility, bulb life, energy efficiency, and reduced maintenance. The traffic light retrofit program received a national award from the U.S. EPA's Green Lights program for energy conservation.

CLICK THIS BOX TO check out the links section at WWW.IESRMS.ORG for more information on Denver and all of Colorado's codes and ordinances



SECTION SPOTLIGHT!

Visit the website for the ***Capital Section***, covering Washington D.C. and the surrounding area!

The Capital Section Is part of the East Central Region.

Click here to visit the website for the IESNA Capital Section!

REPRESENTATIVES... MANUFACTURERS...
Did you remember to reserve your tabletop space for the LED Technology section meeting?

SHOW YOUR STUFF HERE!

Send an e-mail to info@iesrms.org, and an IES Board Member will be in touch with you quickly to get your space reserved!

Section Officers

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Vice President	Jim Blakley
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