



# SOLID-STATE LIGHTING

## A Bright Idea

How cool is this? LEDs, short for Light Emitting Diodes that produce light, are probably in something you used today. LEDs produce the glow and light emitted from your cell phone, your TV screen and laptop computer. Because LEDs can glow very brightly without using a lot of expensive energy, there is more demand for new uses of LEDs.

### Put on your sunglasses because LEDs get brighter every day!

This is exciting news for the future of what's known as **solid state lighting**. Can you believe that the first LEDs ever made emitted weak red light that formed just a tiny drop of energy? Today's LEDs come in all colors of the rainbow and have much more energy. And now LEDs are many, many times brighter than when you were born!

### Hey, you are probably wondering how LEDs produce light compared to old-fashioned light bulbs.

Well, artificial lighting that began with the Thomas Edison filament light bulb over a century ago uses electrical resistance that heats up a tungsten filament until it gives off bright light. Fluorescent bulbs, invented later, use low pressure gas excited by a flow of electrons to form light.

LEDs produce light in a totally crazy way! Light emitting diodes are **semiconductor devices** that convert electricity into light. A diode is like a one-way street that allows electric current to flow in one direction. Light is produced when a flow of electrons from a battery or outlet meet up with positive Swiss-cheese type holes in the material. When the electrons and holes combine, the leftover energy has to go somewhere. Through inspiration and perspiration that would have made even Edison proud, many researchers have improved LEDs until each time this **state** is produced, most of the extra energy generates a **photon** of light.

### Fasten your seat belts, because new breakthroughs lie ahead for LED optics technology.

Guess what? You and the kid sitting next to you in science class could help make advances in this field in the future. You could be an expert who studies vision and perception to research what white light looks like to the human eye. Or maybe you'll be an applications engineer who can solve problems using LEDs, or a chemist who constructs new compounds with enhanced properties to make the world a better and brighter place!

Explore more, ask your teacher or visit [www.optics4kids.org](http://www.optics4kids.org) today.

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