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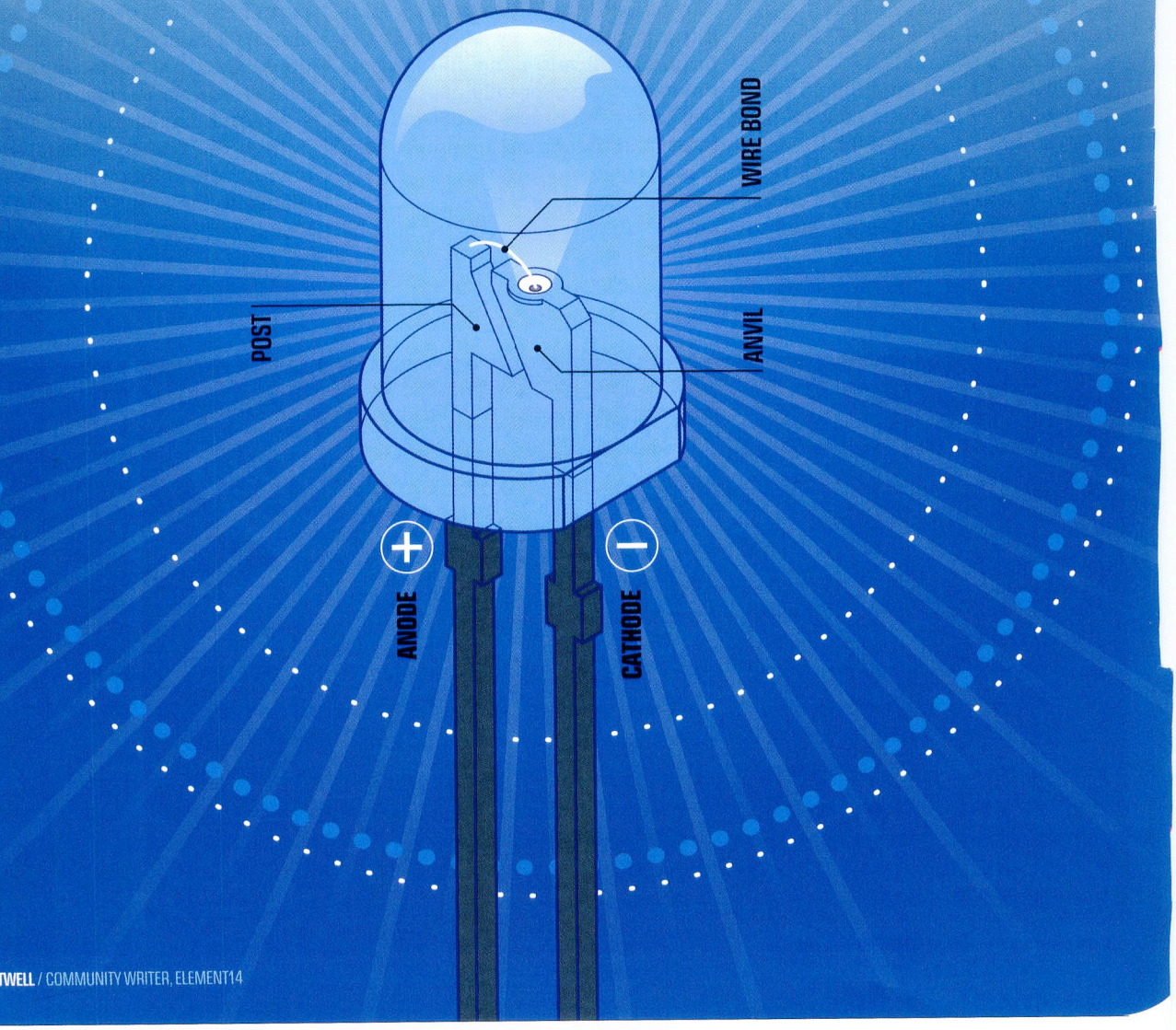
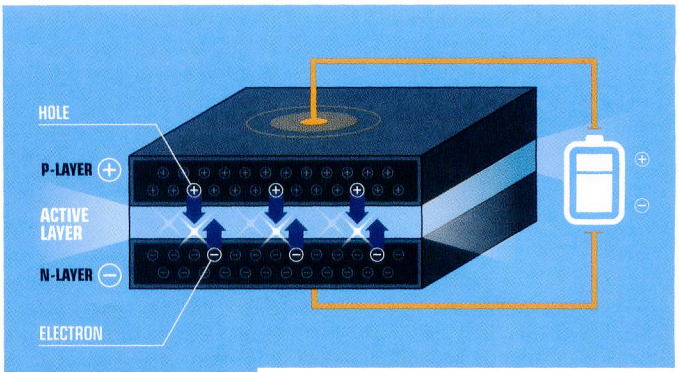
THE BIRTH OF

ENERGY EFFICIENT WHITE LIGHT



BY CABE ATWELL / COMMUNITY WRITER, ELEMENT14

SURE, THEY'RE BLUE, BUT WE CAN'T HAVE WHITE LIGHT WITHOUT THEM.



IT'S ALL IN THE GaN: GALLIUM NITRIDE REVOLUTIONISED BLUE LED LIGHTING PAVING THE WAY FOR WHITE.

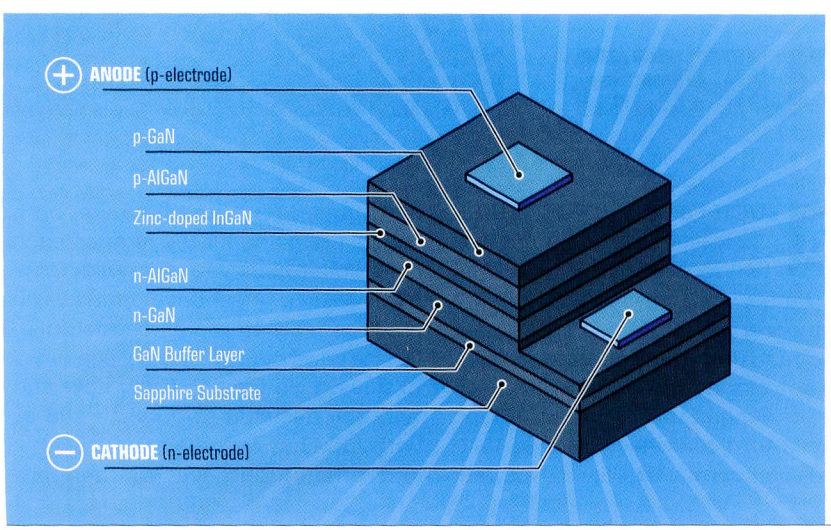
Scientists win Nobel Prize in physics with their creation of blue LEDs

EONS AGO (ROUGHLY 1907), scientists began messing with the idea of LEDs in the form of electroluminescence using a crystal of silicon carbide and a cat's-whisker detector. Apparently, Edison's light bulb was no longer cutting the mustard and people wanted tiny little lights in their radios, which is probably why RCA was playing around with gallium arsenide-based semiconductors back in 1955.

Regardless, LEDs have come a long way in the last hundred years and has become the dominant light source on the planet overtaking incandescent and fluorescent lighting. While the LEDs manufactured today are highly efficient, energy saving and environmentally friendly, they do have their drawbacks, in this case the ability to generate a broad spectrum of colours. More specifically, white light due to the fact scientists couldn't produce blue light in LED form.

Confused yet? Okay, let's break it down in simple terms- in order to create bright, efficient white light, green or red LEDs need to be combined with a blue LED. They could also be shown through a phosphor that emits red and green light. Sure there have been blue LEDs in existence since the 70s but the material they are made from made them pretty much useless in the broad spectrum (pun intended) of practical applications.

By the late 80s, the people's demand for bright, shiny things continued to grow and there still were not any devices (much less radios) with tiny LEDs that glowed bright white or blue. Noticing those demands, three material scientists decided the world could wait no longer for bright, efficient blue LEDs and began developing their own using gallium nitride.



In the early 90s, Professors Isamu Akasaki (Nagoya University), Hiroshi Amano (Nagoya University) and Shuji Nakamura (University of California) began working on a way to grow gallium crystals big enough to be used to emit blue light. They found that they could do so using a specially designed scaffold made in part with sapphire. That's the key, different materials emit a different colored light when applied to LEDs and gallium was the ticket in emitting blue.

Gallium isn't without its troubles as it tends to become poisoned when exposed to hydrogen. The people would have to wait a few years more before they would get bright, shiny blue or white lights. To get around that issue, the scientists 'doped' up the gallium using aluminium or zinc but ultimately went with indium, which protects the gallium from the hydrogen used in manufacturing the semiconductor the LED resides on.

The hard work that all three endeavoured over the years to get an efficient blue LED earned the trio a Nobel Prize this year in physics. Not only does their work provide bright and shiny LEDs in our mobile devices but also reduces the power draw on the grid when used for lighting our homes. Not only that, they are also better for the environment over compact florescent lighting (CFLs) due to the fact that the latter is filled with mercury. The trio received their prizes in December, where their breakthroughs could be seen lighting up the homes all over the city. ■