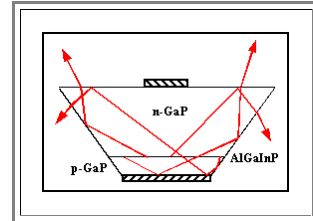
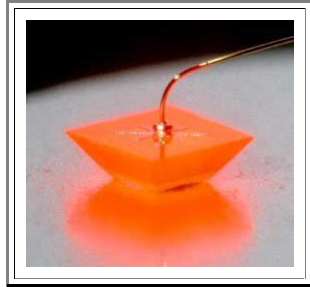


Recent Developments in LEDs

Advanced

Here is some more information about the inverted Pyramid LED.

- It was described quite recently (*M.R. Krames et. al., "High-Power truncated-inverted-pyramid (Al_xGa_{1-x})_{0.5}In_{0.5}P/GaP light-emitting diodes exhibiting >50% external quantum efficiency," Applied Physics Letters, 75[16], pp. 2365, (1999)*) and has a large [optical efficiency](#) leading to a "external quantum efficiency" which is simply the what we called [total external efficiency](#) of **55%** (as compared to about **30 %** of the former champion).
- The cross section below shows why: There are few reflection losses. Otherwise the device is not quite as simple as looks like. It is based on an epitaxially-grown aluminum gallium indium phosphide/gallium phosphide (**AlGaInP/GaP**) multiwell active region sandwiched between an **n**-type gallium phosphide (**GaP**) layer and a **p**-type **GaP** layer.



- More information can be found in a [recent article](#) from the internet or in the *Scientific American* from February 2001.