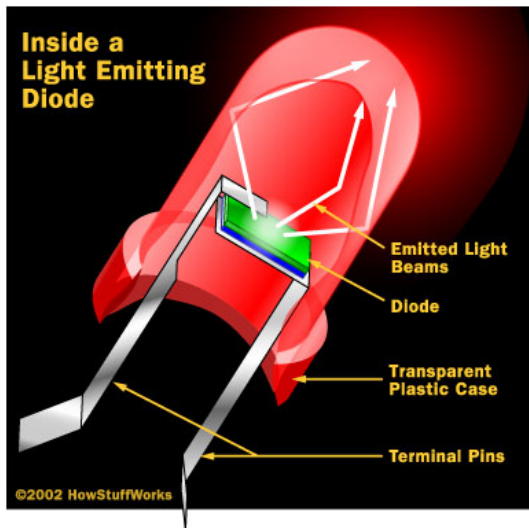


# Light Emitting Diodes

ECE3080

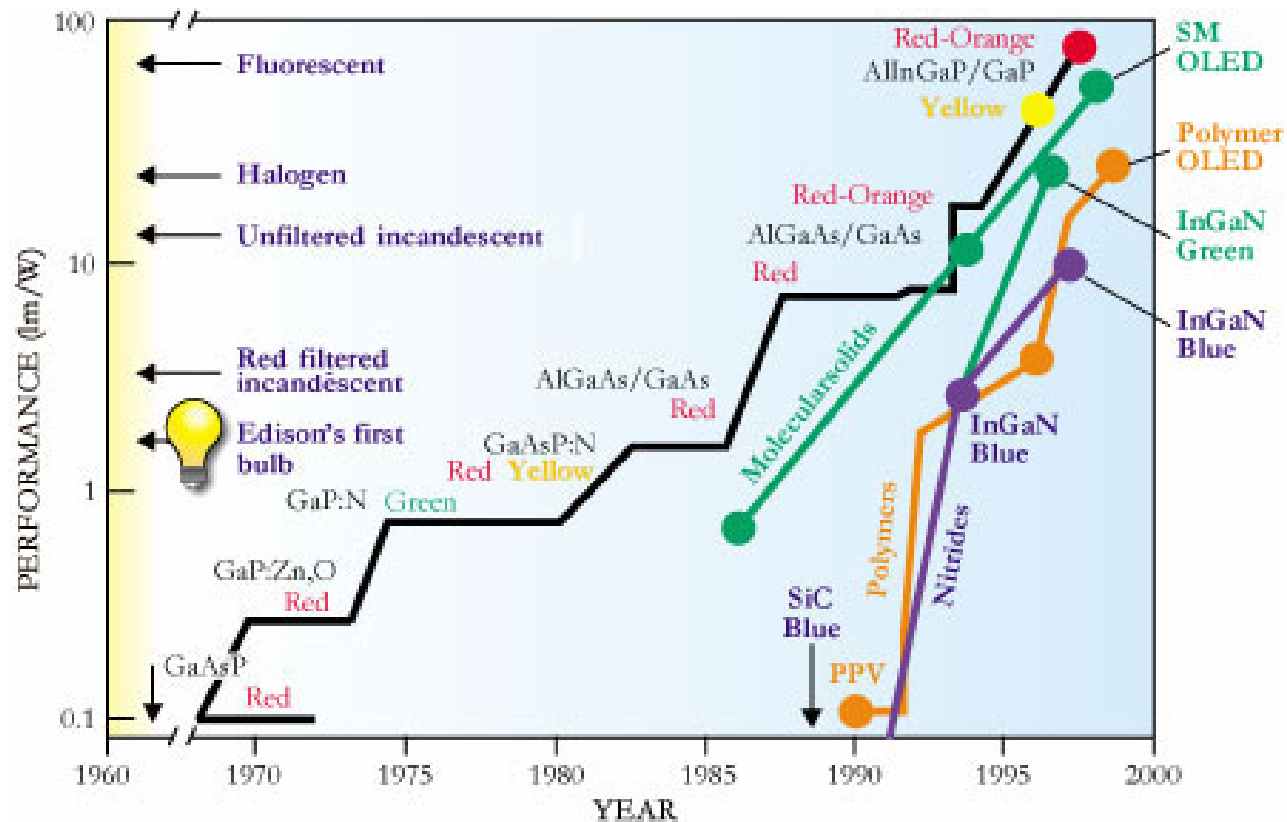
HENRY MINH VO

# What is a diode?



# History of LED

- Created in the mid 1920s by Russian Oleg Losev



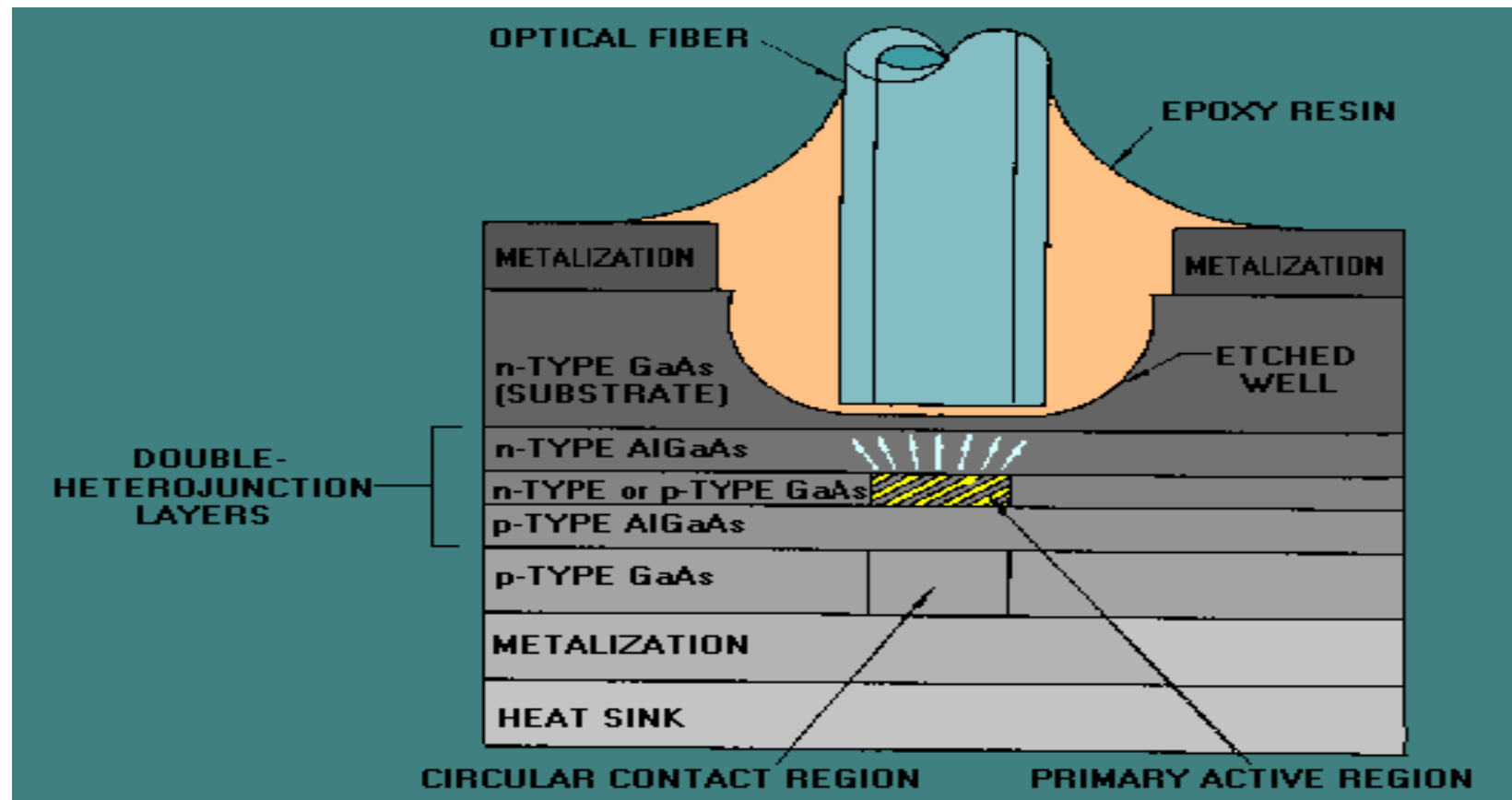
# Applications

- LED Panel: Conventional (discrete LED) is outdoor screens & Surface Mounted Device (SMD) consists of pixel using red, blue, and green diodes that mounted on a chipset.
- Fiber Optic Data: uses for high-speed transmission links
- Flexible Bending Display
- Remote Control

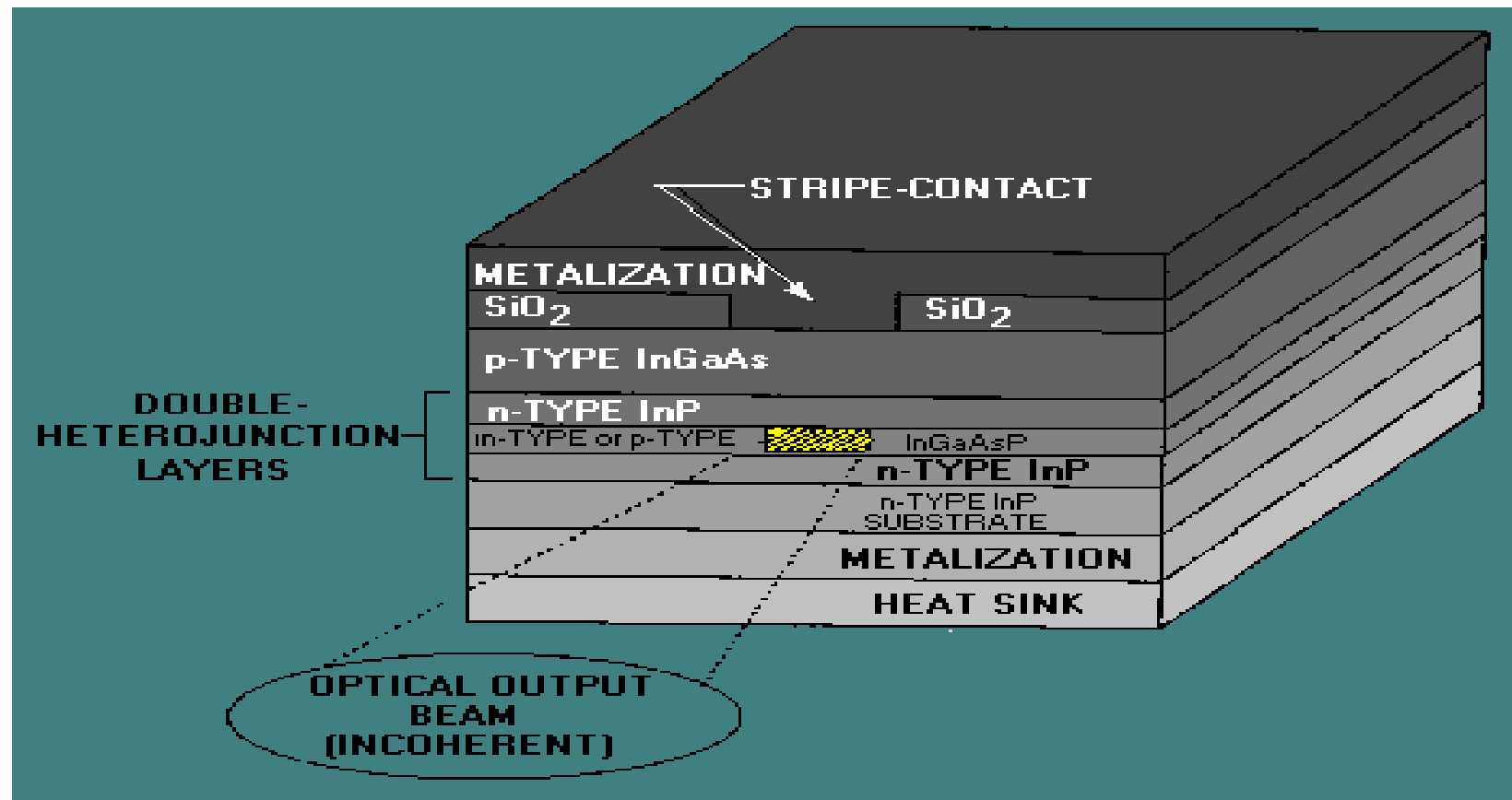
# Diode Produces Light



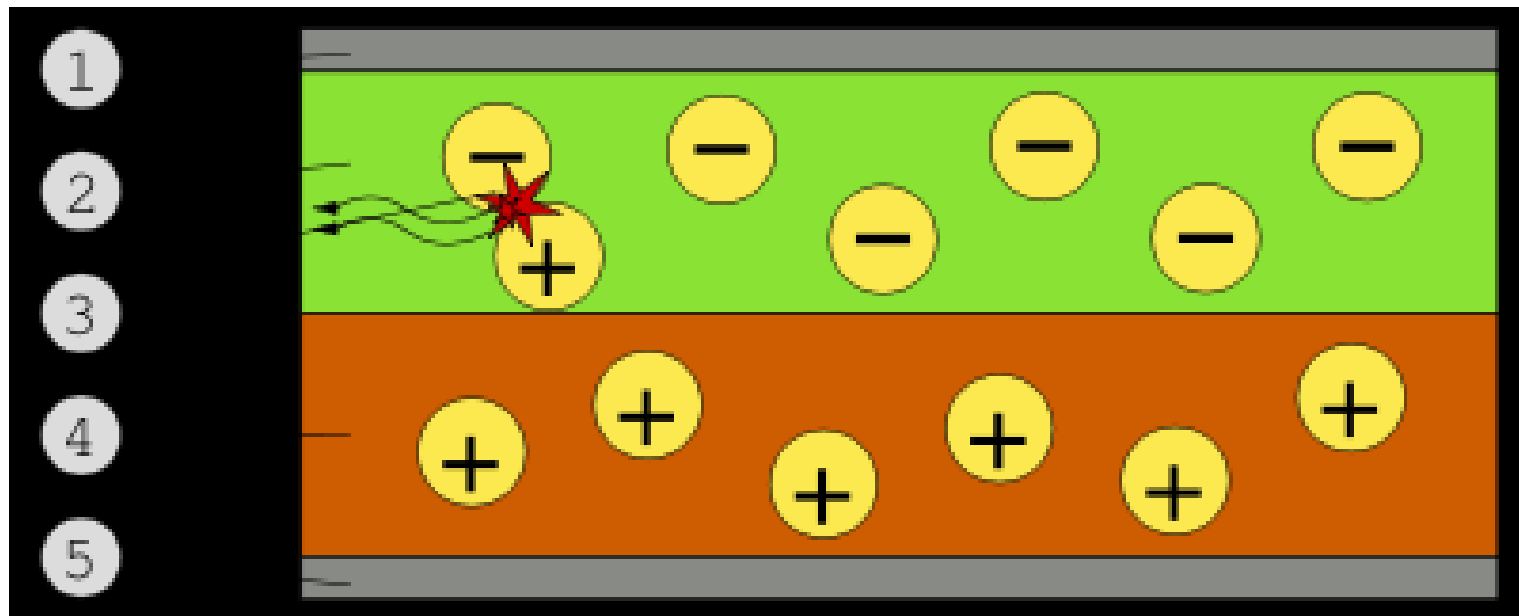
# Surface Emitting LED



# Edge Emitting LED



# Organic LED





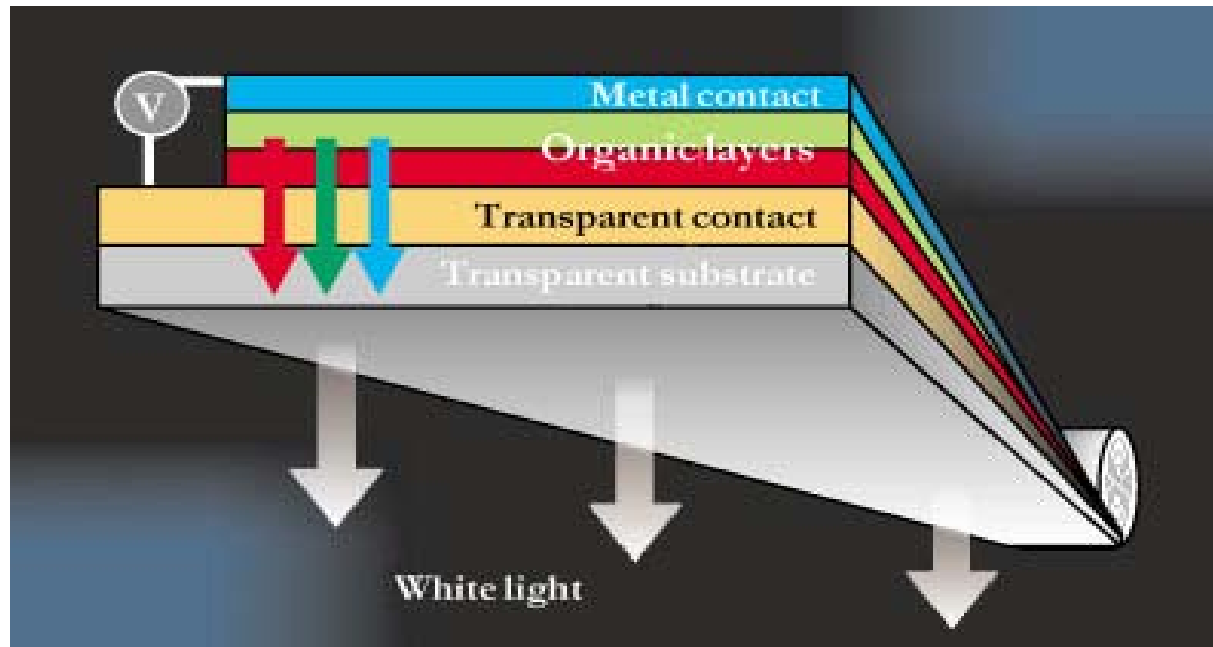
# Organic LEDs

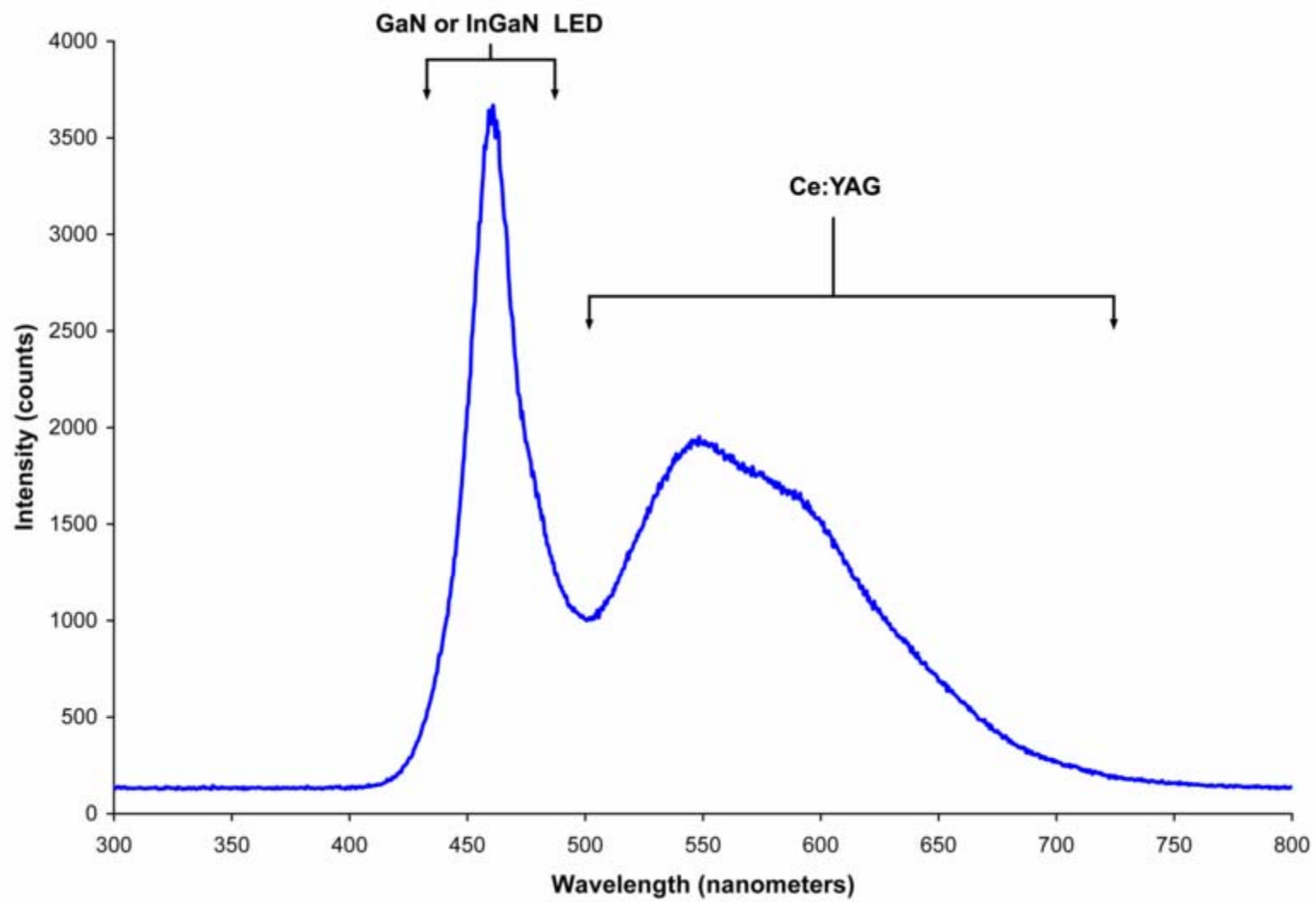
- TOLED - Transparent organic light-emitting device
- SOLED – Stacked OLED
- IOLED – Inverted OLED
- PLED – **Polymer light-emitting diodes**
- PHOLED - **Phosphorescent OLED**
- **POLED** - **Patternable organic light-emitting device**

# OLED

- Lighter compared to regular LEDs
- Flexible
- Possible Future Applications:
  - Flexible Displays (inexpensive)
  - Light sources for decorations
  - Luminous clothing

# WHITE LIGHT





# Inorganic Materials

Materials	Color	
AlGaAs	Red & Infrared	
AlGaP	Green	
AlGaInP	Orange, Red, Green	
GaAsP	Red, Orange, Yellow	
InGaN	Ultraviolet, Blue	
GaN	Ultraviolet	

# LED Performance

- Highest Efficiencies: AlInGaP heterostructure
- Highest Quantum Efficiency(External): 55% at 650 nm
- Power Conversion Efficiency for 650 nm is 45%

