

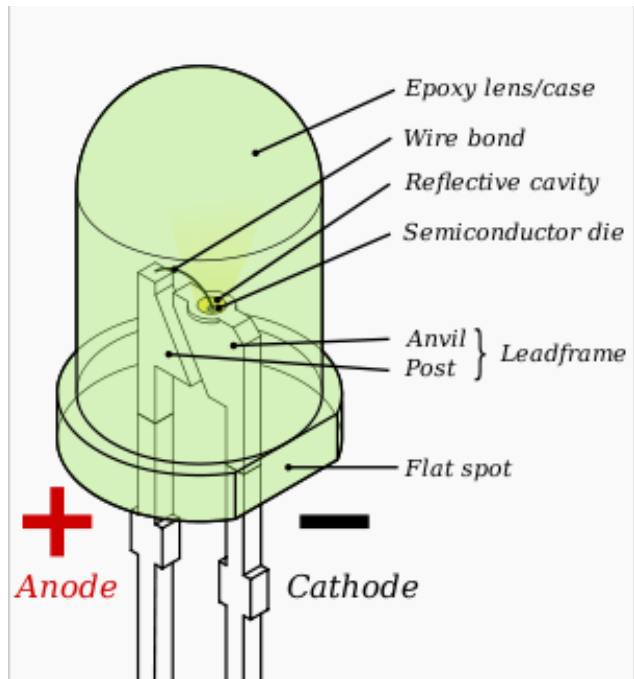
LED – An energy efficient light source

**23rd Oct 2009 ,
National Seminar on Energy efficient lighting designs
IHC , Delhi**

Content

- LED Basics
- Advantages
- World Market for HB LED
- Type of LED's
- Applications
- Success stories / Indian Industry

LED Construction

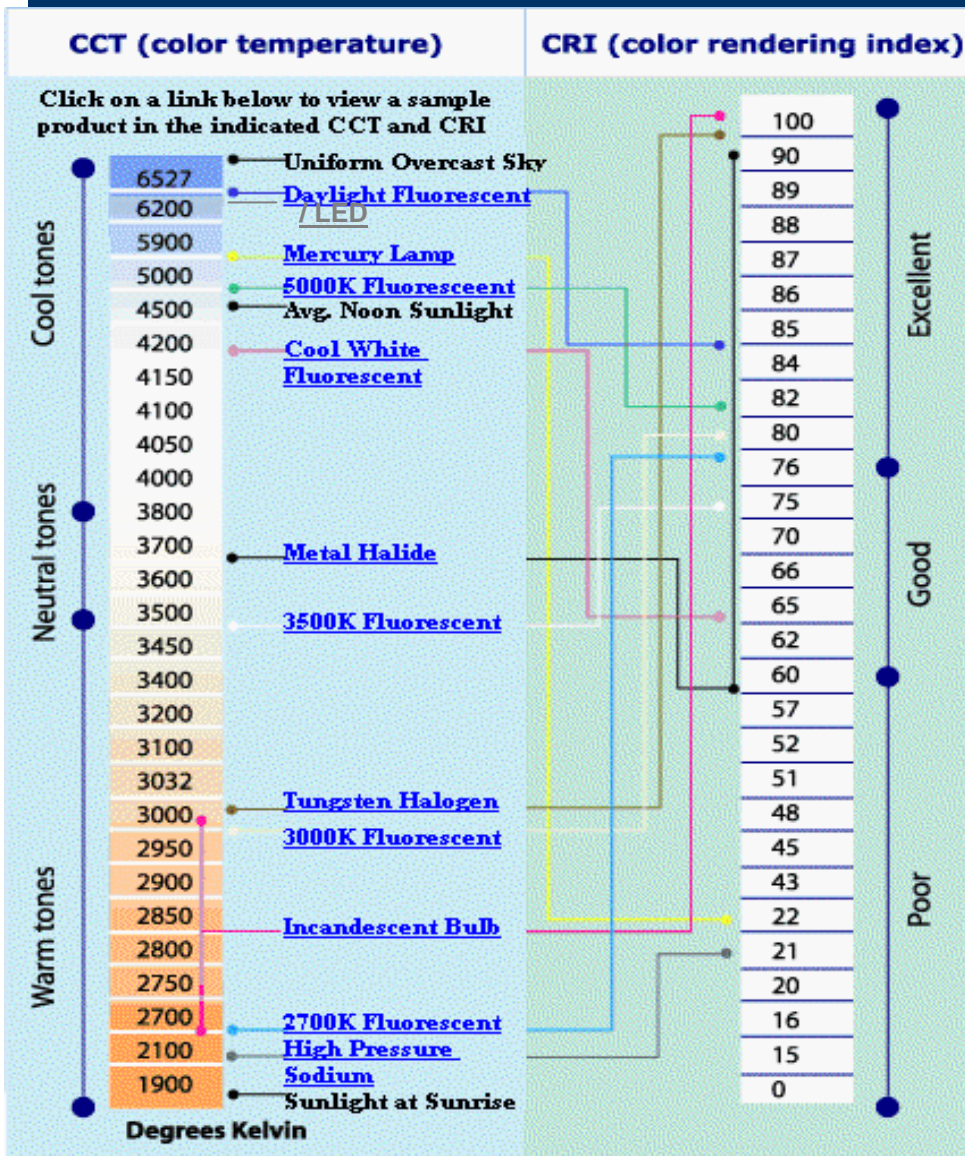


- LED consists of a chip of semiconducting material it is doped with impurities to create a p-n junction
- LEDs are usually built on an n-type substrate, with an electrode attached to the p-type layer deposited on its surface.
- Current flows easily from the p-side(anode) to the n-side (cathode) but not in the reverse direction and releases energy in the form of a photon.

Why LED's

- ✓ Long and predictable service intervals ⇒ Low maintenance cost
- ✓ Reliability and long lifetime ⇒ increased road safety
- ✓ Dimming ⇒ adjusting to specific ambient light levels
- ✓ Small package size ⇒ flexible, flat and compact lamp design
- ✓ Instant turn on / off ⇒ No Hot ignition
- ✓ Unbreakable' LED package
- ✓ LED contains no Mercury & Lead ⇒ Easy lamp recycling , Eco friendly

Why LED's



- High Color Rendering Index (CRI) - better visual effect and clarity

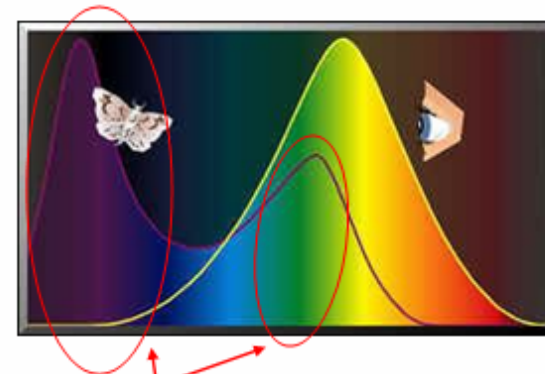
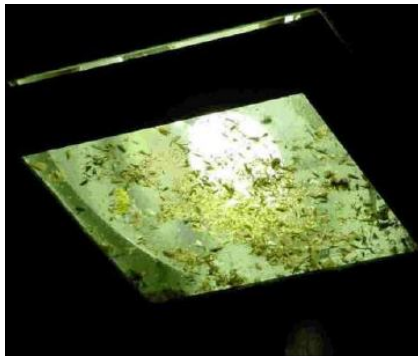


LED

Color Rendering	Class
90-100	1A
80-90	1B
70-80	2A
60-70	2B
40-60	3
20-40	2

Why LED's

- Less attraction to Nocturnal Insects



Spectral sensitivity of nocturnal insects

Spectral sensitivity of human

- Direction Lighting

- No light pollution as it illuminate the desired area only



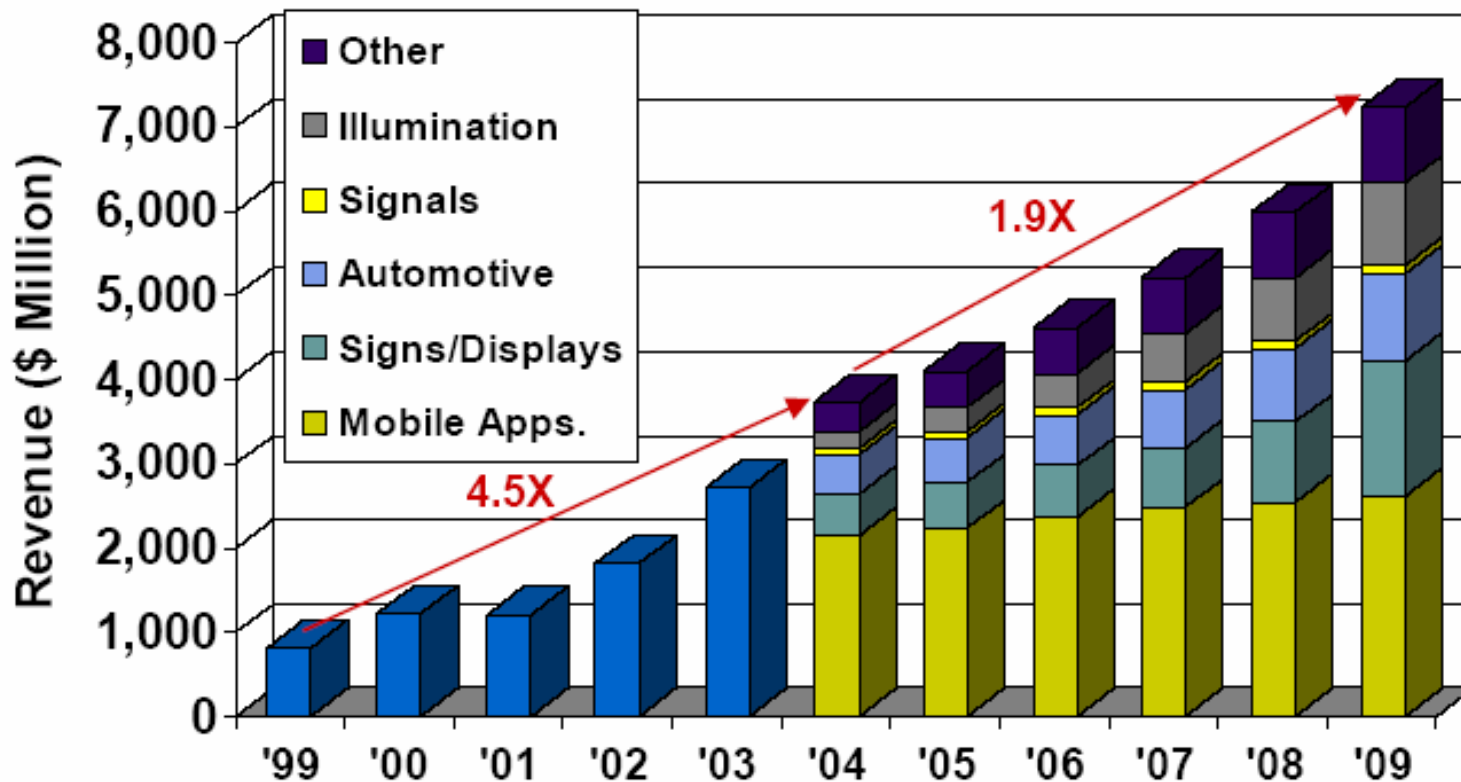
Comparison between various light sources

Lamp Type	Watt (W)	Luminous Flux (klm)	Efficiency (lm/W)	CRI	Lifetime (x 1000 hrs)
High Pressure Sodium	35 - 400	1.3 - 55	39 - 140	20 - 40	24
Metal Halide	35 - 400	3.4 - 32	70 - 90	60 - 90	6
High Pressure Mercury	50 - 400	1.8 - 22	35 - 90	40 - 60	8 - 12
Low Pressure Sodium	18 - 90	1.8 - 15	100 - 160	<20	16 - 30
Compact Fluorescent	5 - 55	0.25 - 4.8	50 - 88	70	6
LED	16 -140	2 - 18	100 - 130	75	50 (50% light decrease)

HB LED GROWTH –WORLD MARKET

14% longterm growth trend for high brightness LED market

The growth drivers are display backlight, projection, automotive exterior, and illumination



Source : Strategies Unlimited

Type of LED's

TOPLED®



2 lm 90mW
@20mA single
chip white

**Power
TOPLED®**



3 lm 140mW
@30mA single
chip white

**Advanced
Power
TOPLED®**



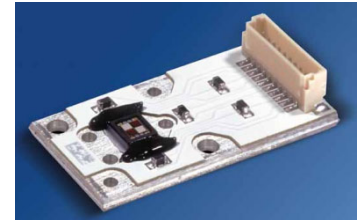
10 lm 250mW
@200mA single
chip white

Golden Dragon®



30 lm 1,4W
@350mA single
chip white

OSTAR®



100-1000lm
10 - 50W
multi chip



Chipped
0,8mm



MicroSIDELED®
1,0mm



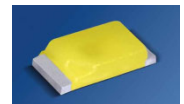
SmartLED®
0,6mm



MicroSIDELED®
0,6mm



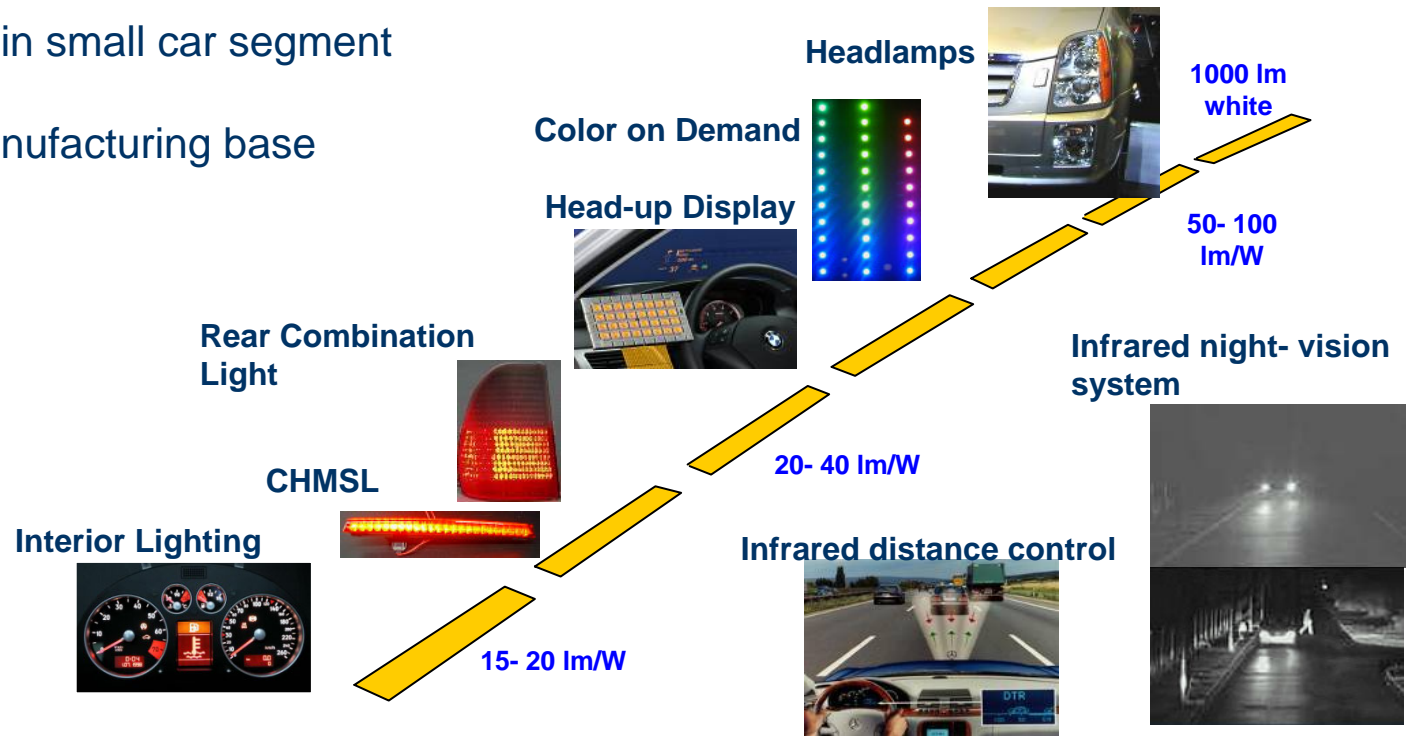
Firefly®
0,5mm



SmartLED®
0,3mm

Automotive Applications

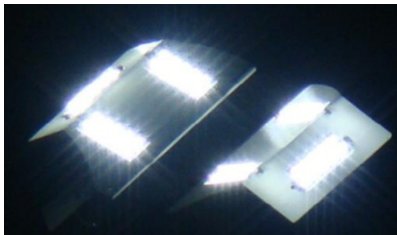
- India is the 2nd largest 2 wheeler manufacturer
- Crossed 1 mill production mark for 4 wheeler
- Second largest in small car segment
- Huge Tier-2 Manufacturing base



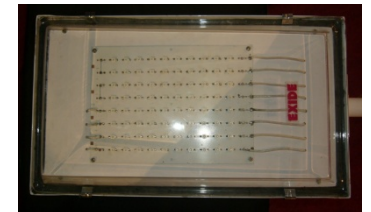
LED Street Lighting Manufacturers



SANARTI INTERNATIONAL



Joshi Electronics



ECMANN

Industrial Applications



Signaling



Backlighting



Display Boards

Consumer / Communication Applications



Mobile Phone
Keypad / LCD backlighting



LCD Backlighting



Fridge illumination



Projectors

Success stories in Railways

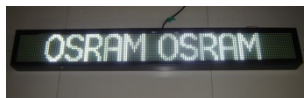
1. Railway Coach light



2. Railway Emergency Light



3. Display boards



4. Headlight



5. Signaling





Thank you for your Attention !