“Collaborate To Win”

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New Interface Materials

Thermal Management in PCBs

Very High Intensity LEDs

Thermal Management Issues

- Solid-air interface represents the greatest barrier in thermal management

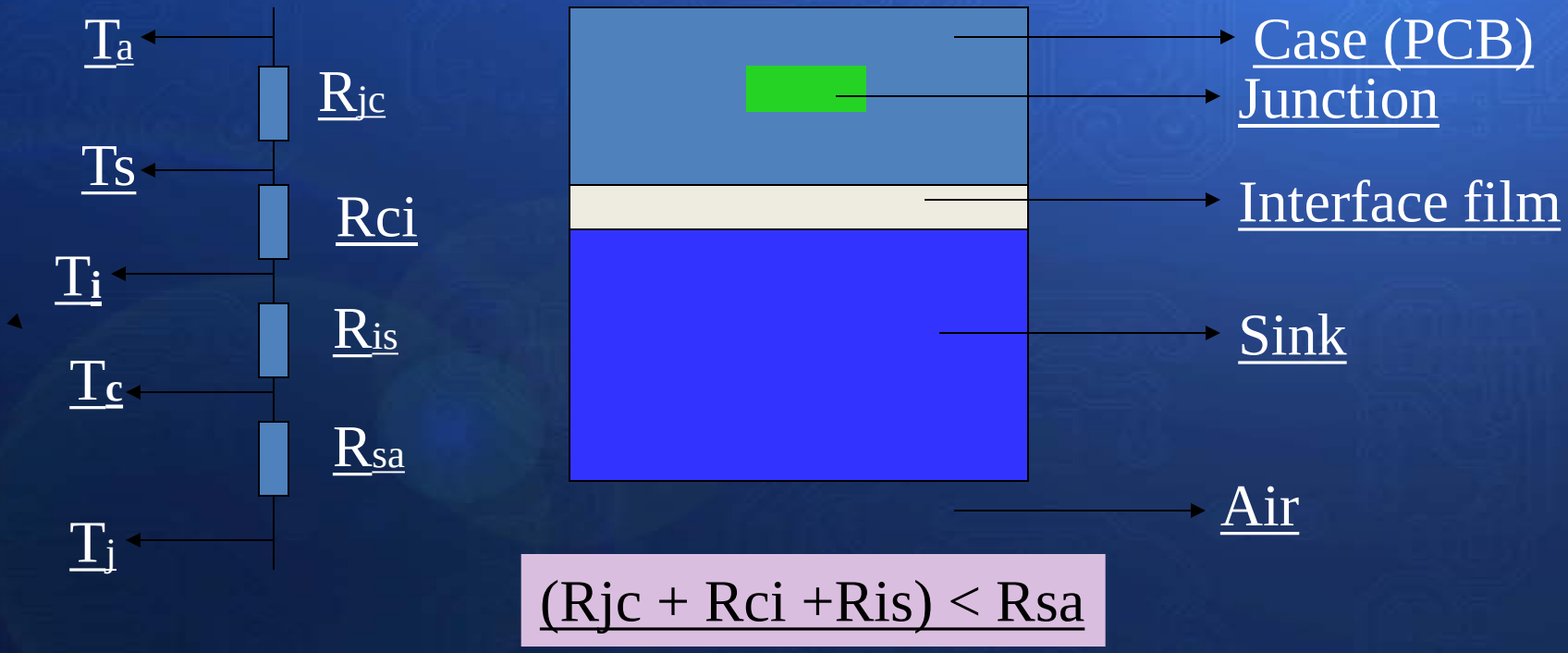
- Between two typical electronic components, as much as 99% of the surfaces are separated by a layer of interstitial air leading to poor heat transfer *

* Dr. Miksa de Sorgo, Electronics Cooling, 2000

Total Thermal Resistance is given by

$R_{ja} = R_{jc} + R_{ci} + R_{is} + R_{sa} = (T_j - T_a)/Q$

(Q = Heat generated in Watts / Time)



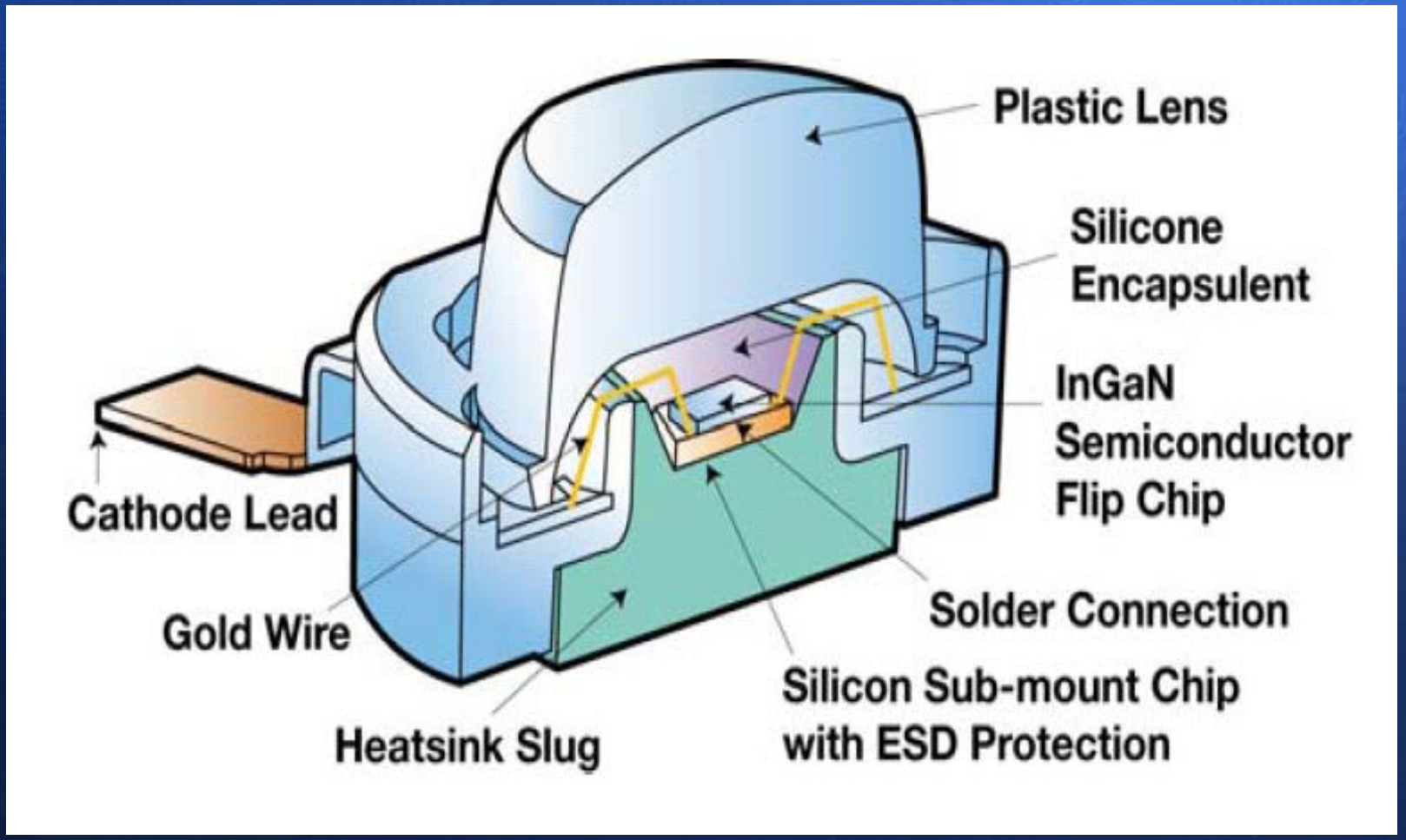
$(Rjc + Rci + Ris) < Rsa$

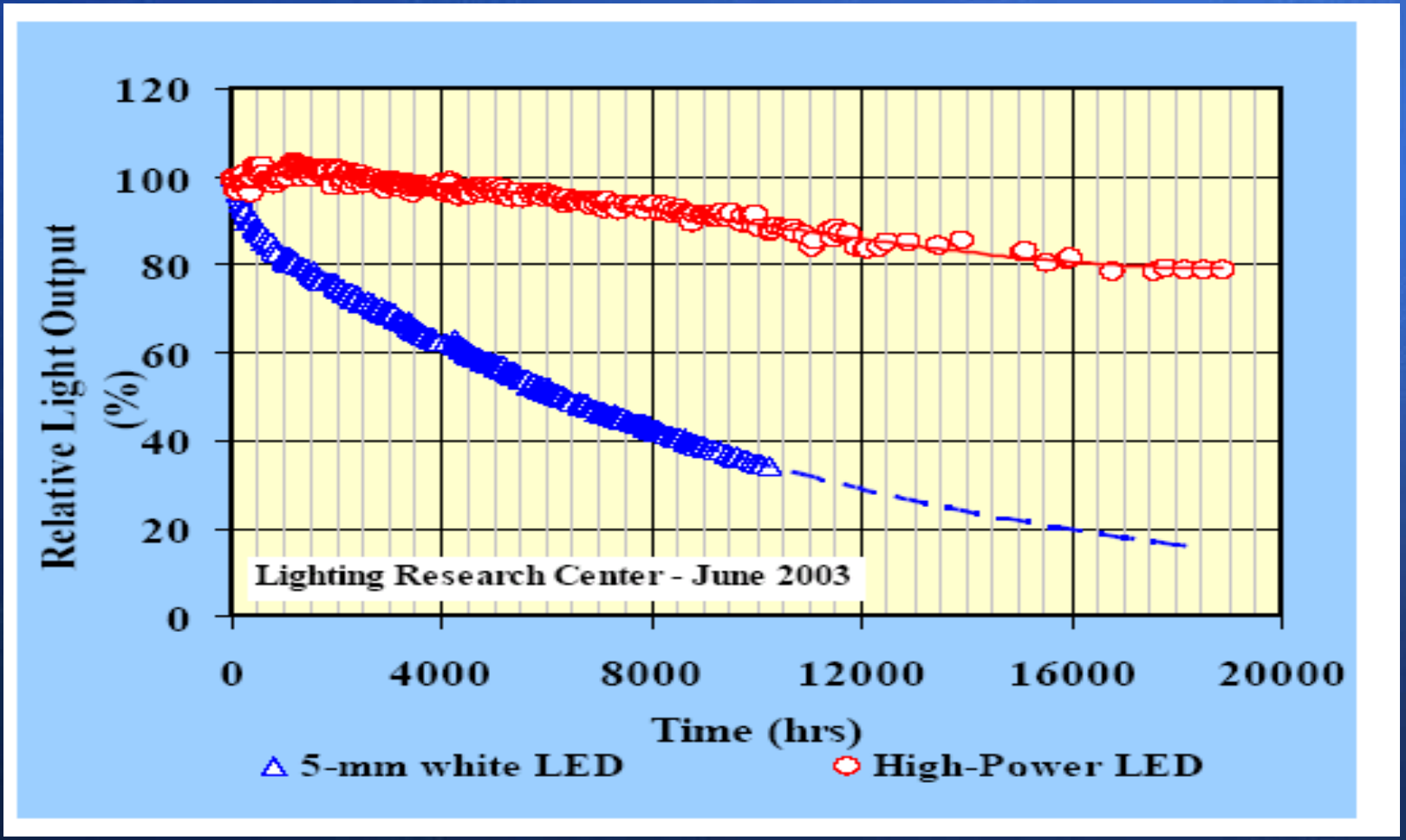
R_{ci} and R_{is} can be decreased significantly by surface finish and type of interface material

Typical Comparison of Power Consumption

Light	LED	Incandescent	CFL
Life, Hours	50,000	1,200	8,000
Watt used	6-8	60	13-15

Anatomy of High Power LED





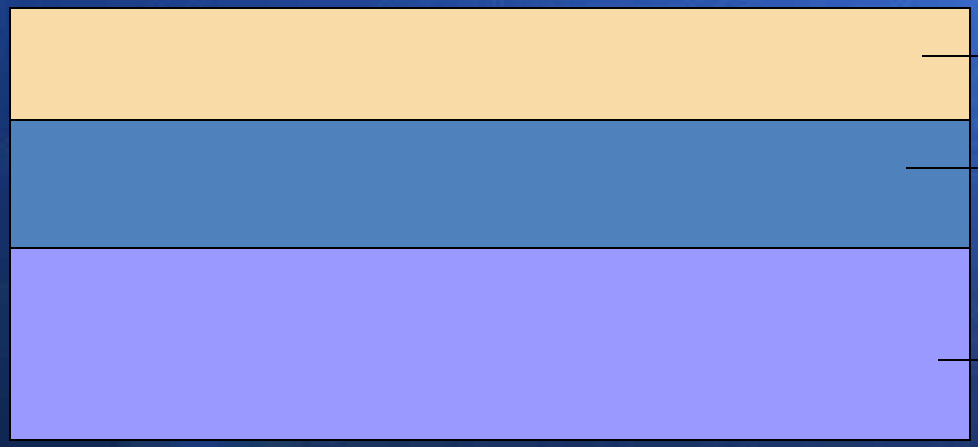
Comparison of high and low Power LEDs

(Ref: RPI Lighting Research Center, NY)

Our New LED Interface Materials

- Si and Al based bonding material.
- The Si-Si bond energy of 444kJ/mol is much higher than for C-C (356 kJ/mol) and C-O (339 kJ/mol).
- This gives rise to higher temperature stability to our adhesives (than epoxy based ones), needed for high intensity LEDs.

Anatomy of ASC9801 bonded LED PCBs



Copper = ¼ Oz to 5 Oz
ASC9801 Film: 3 mil or more
Heat Sink: Aluminum

Properties of ASC9801 Conductive Silicone

Sp. Gr.	***Durometer Shore A***	***Tensile Strength***	***Elongation***
1.6	90	1220 PSI	400 %
Resistivity	***Thermal Conductivity,***	***Tear Strength***	***Flame test***
10^{12} Ω·cm	9.0 *W/mK*	190 PPI	Pass

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Features/Benefits

Increased thermal conductivity provides these benefits:

- Reduces thermal wear/degradation of LED's.
- Extends LED life cycles.
- Maximizes LED performance values.
- Allows increased LED density with vastly improved luminescence/brightness.
- Increased luminescence possible in small form factor.
- Higher performance and small form factor equals lower fixture/device costs.
- Extended life cycles reduce overall investment considerably

Material Specs & Finish

- Thermal Conductivity: 9.0 W/mK
- Cu Finish: HASL, Immersion Ag, Immersion Sn, ENIG, OSP, Electrolytic Ni/Au
- Al Finish: Bare, Ni, Au, Ag, Chromate

Applications

Flood Lights for;

- Outdoor playing fields
- Performance theaters
- Gymnasiums
- Large public areas
- Warehouses
- Movie theaters
- Other outdoor activity areas.

Thank You !!!

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