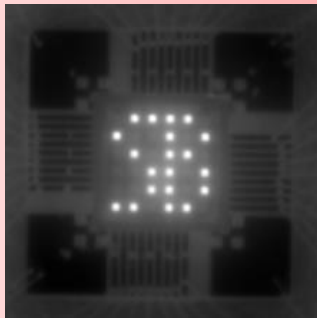
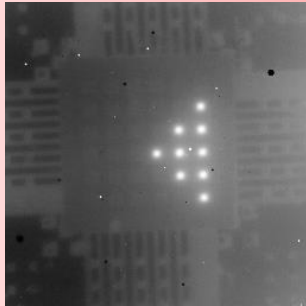


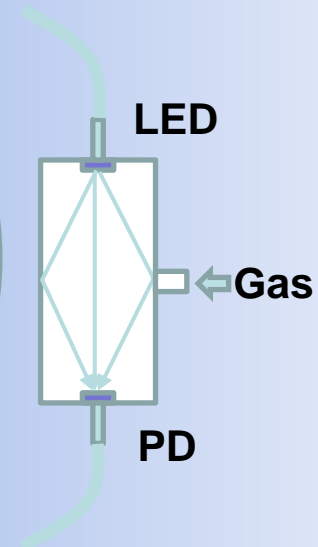
MWIR and LWIR LEDs and LED Arrays



IR Scene Projection

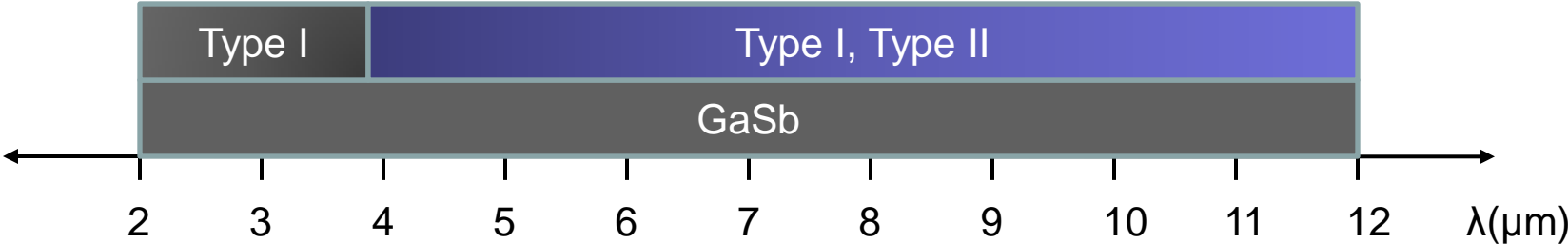
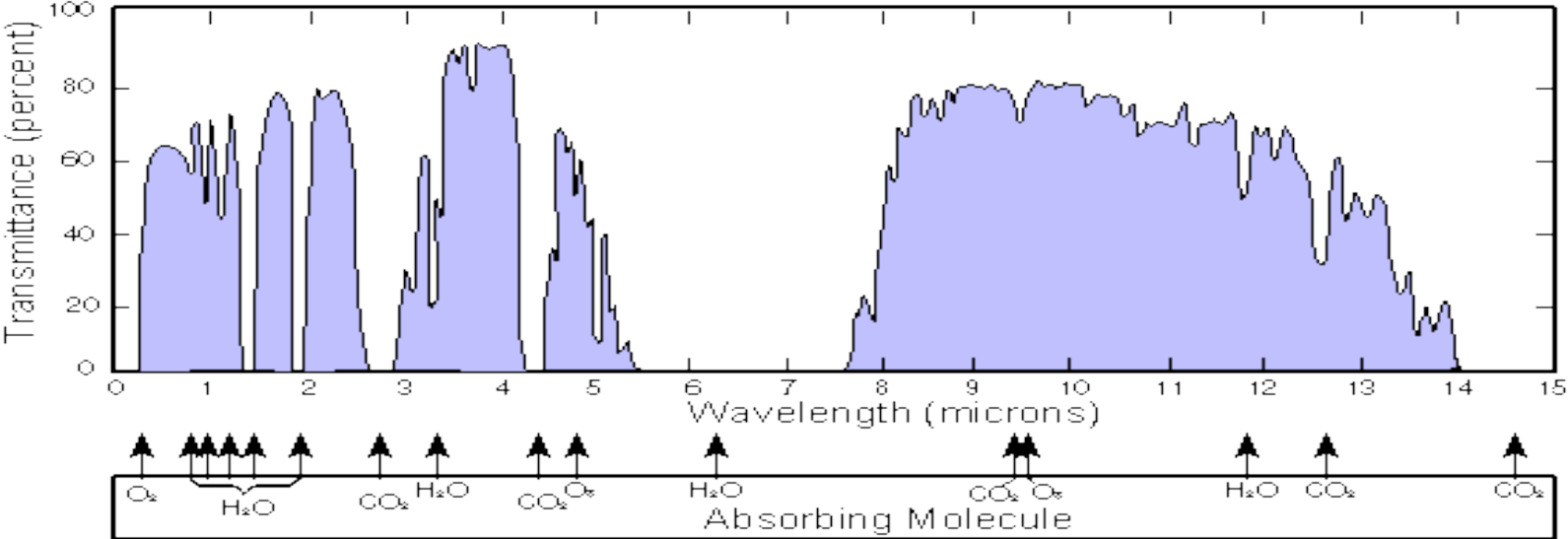
Advantages of Mid IR LEDs

- ***High radiance***
- ***Reliable operation***
- ***Fast modulation rate***
- ***Room temperature and cryogenic operation***
- ***Low cost***

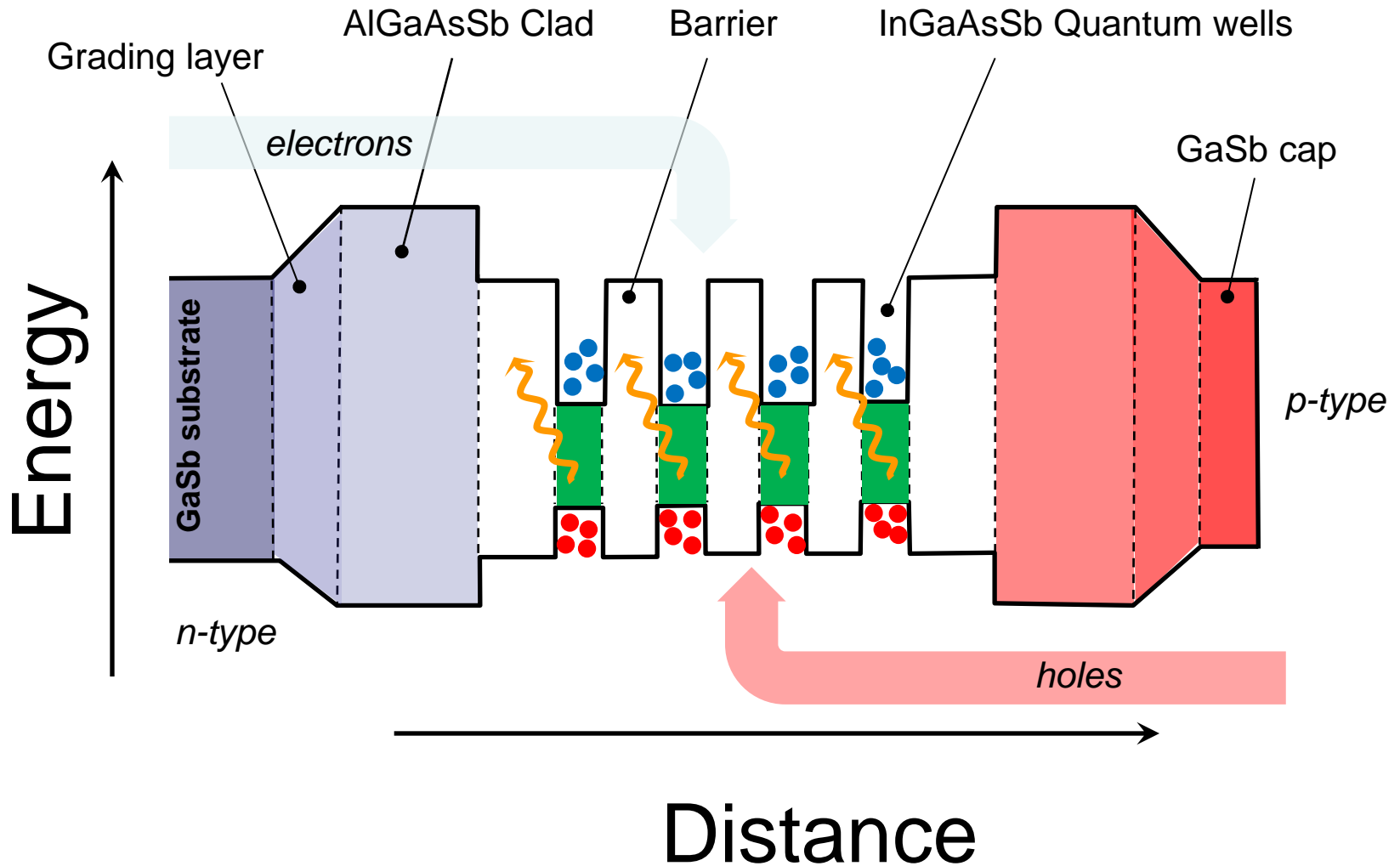


Gas Detection

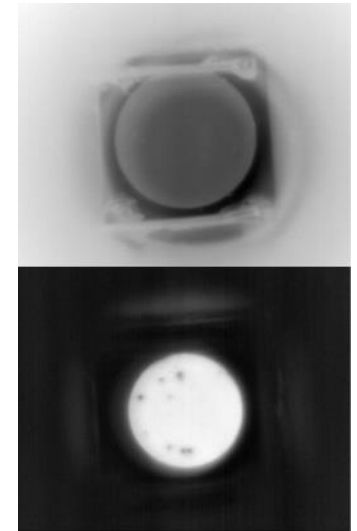
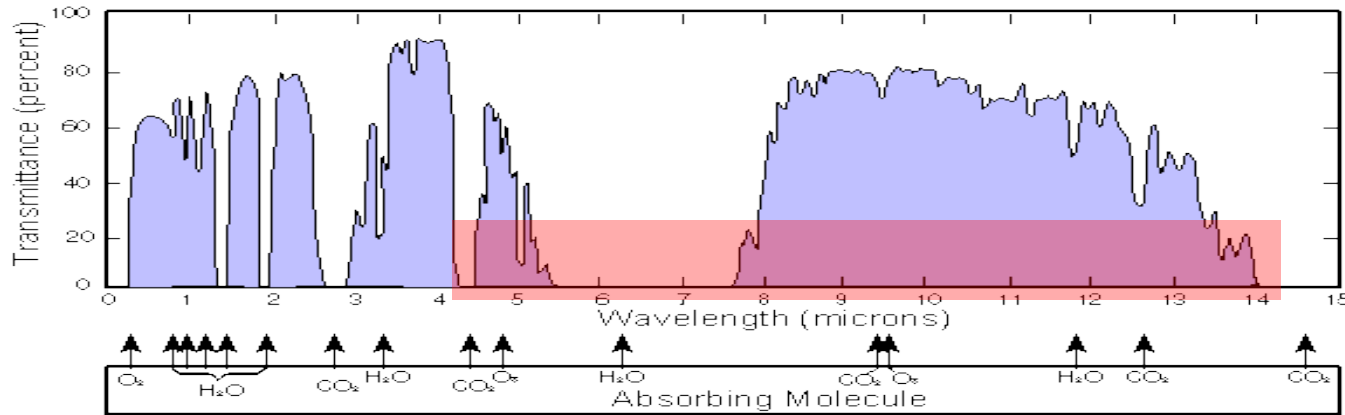
Wide operation spectral range of GaSb-based LEDs



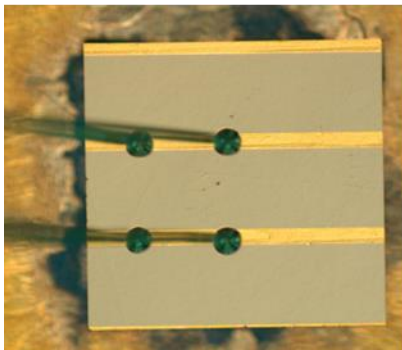
Single WL Type I QW LED structure



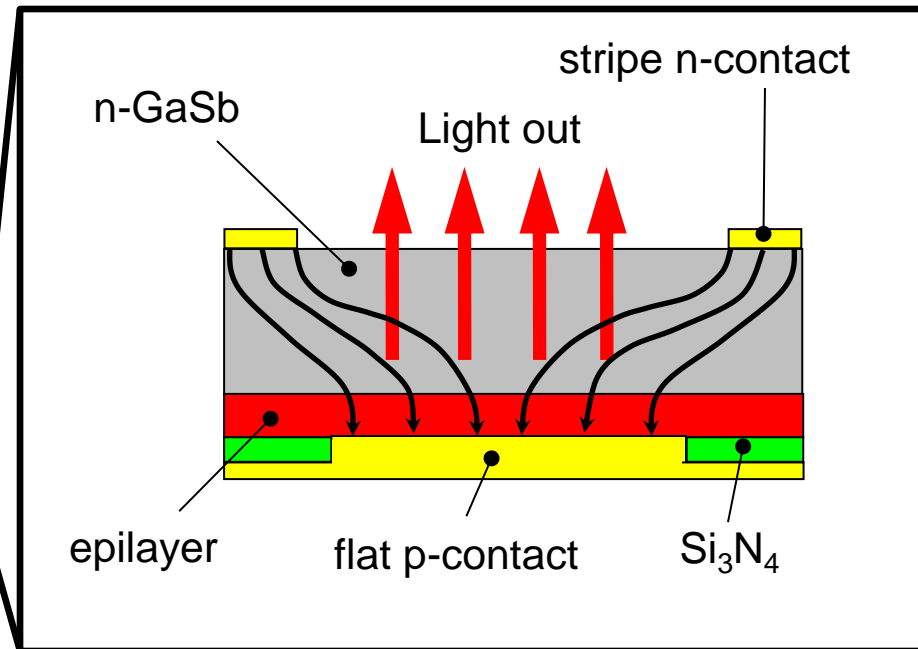
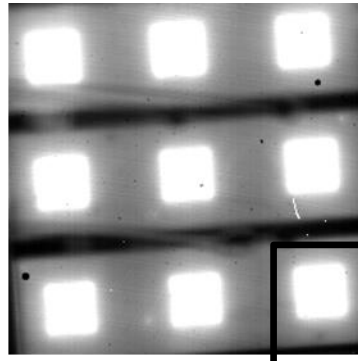
GaSb-based LEDs cover spectral range from 2 μ m to 12 μ m



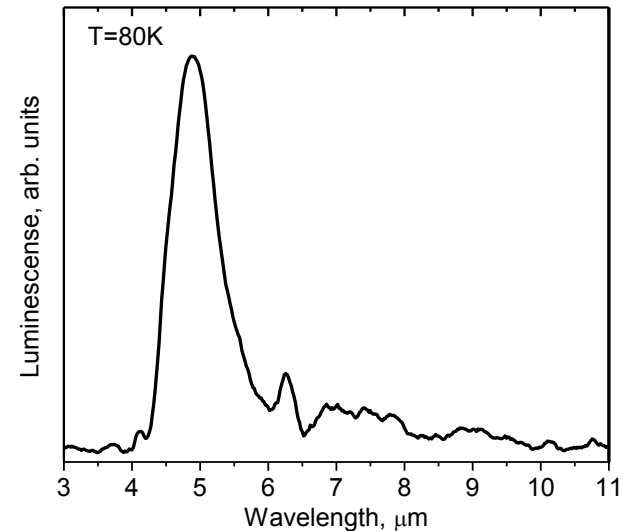
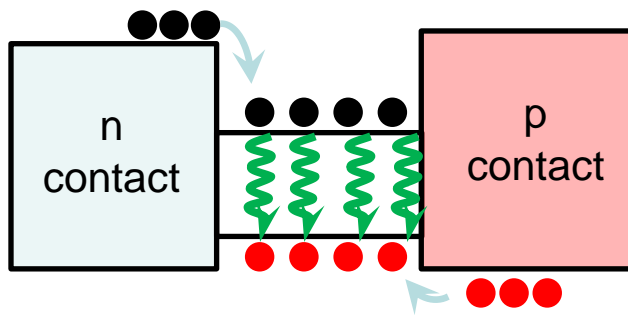
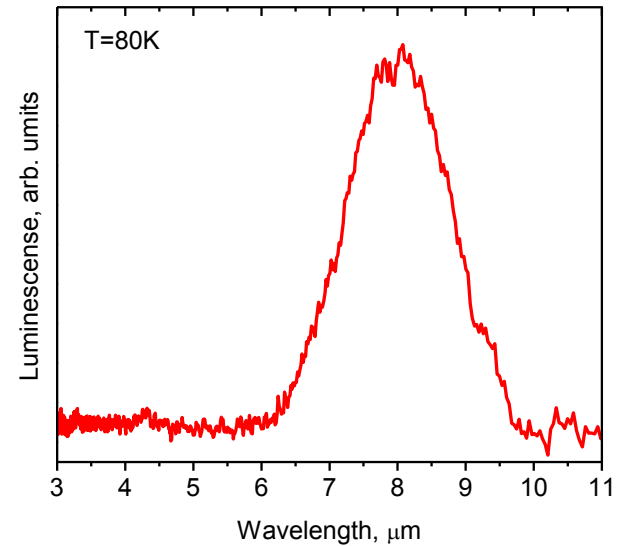
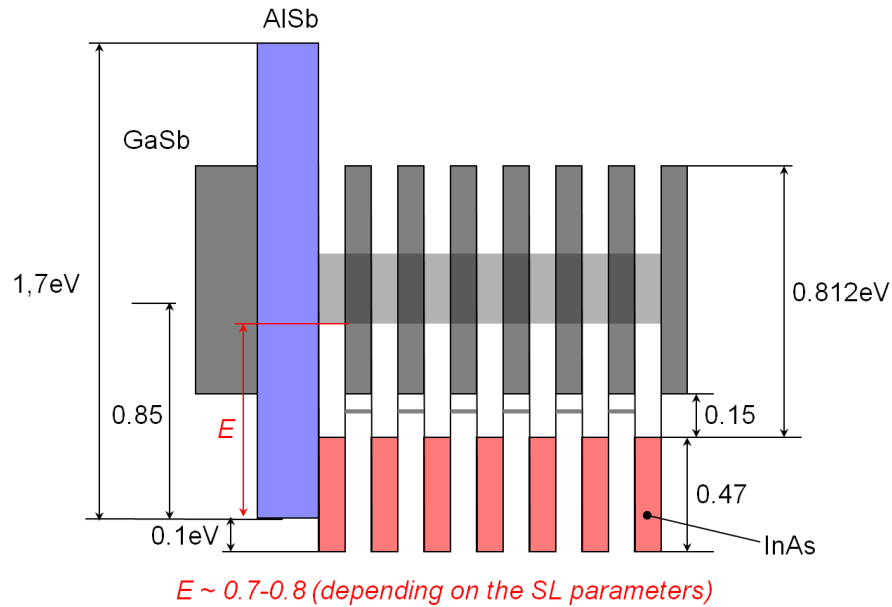
nonaddressable test
3x3 LED array



MID IR image

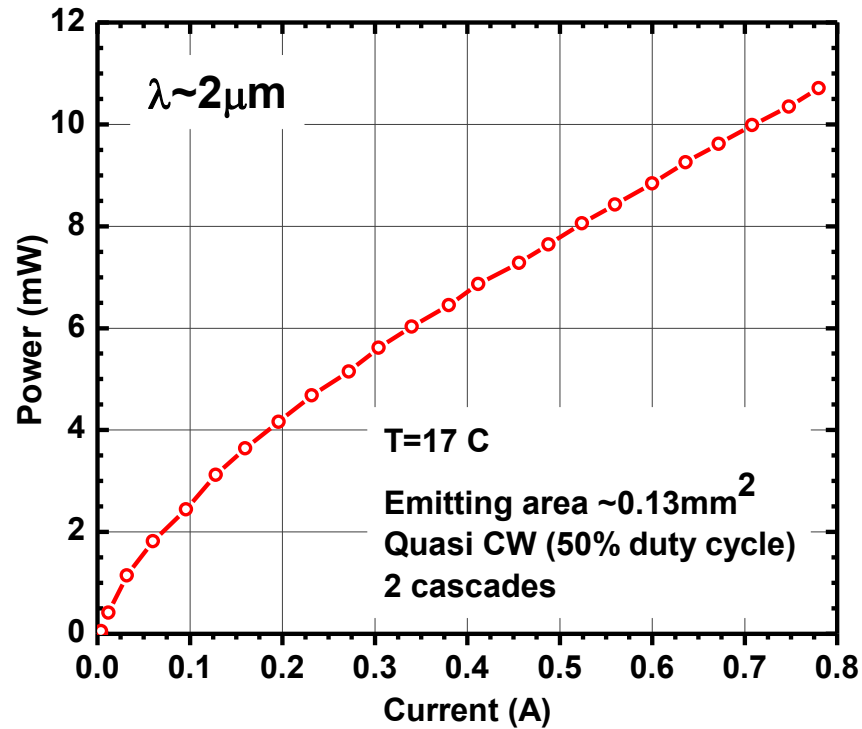


LWIR LEDs: type II quantum wells and superlattices as the materials for the active area



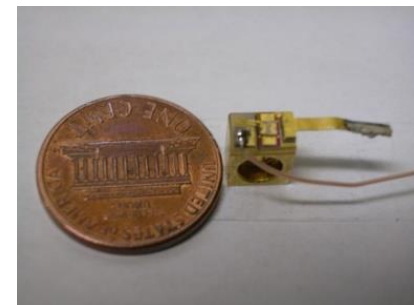
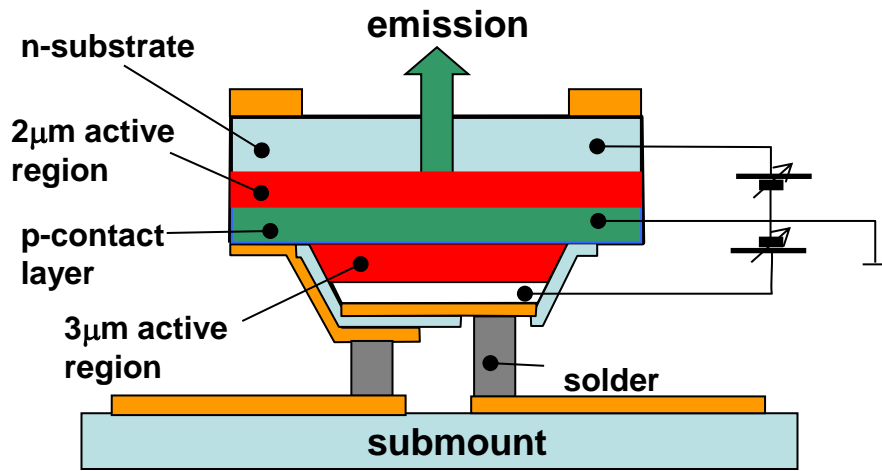
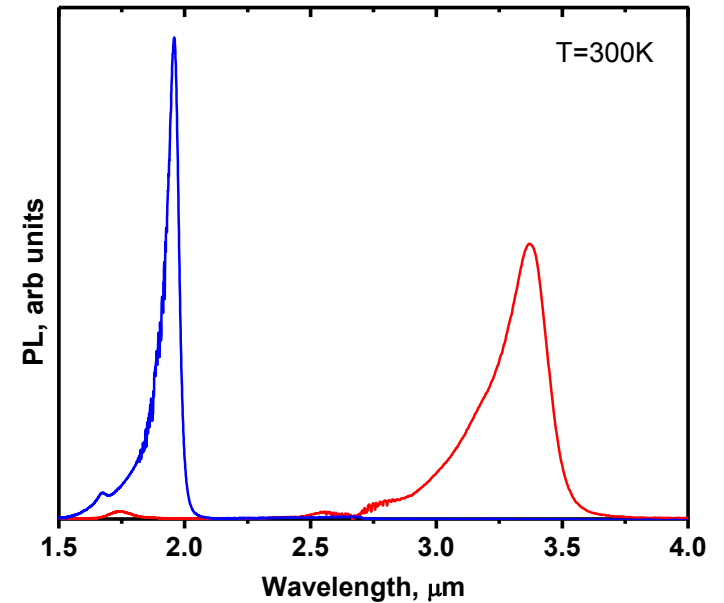
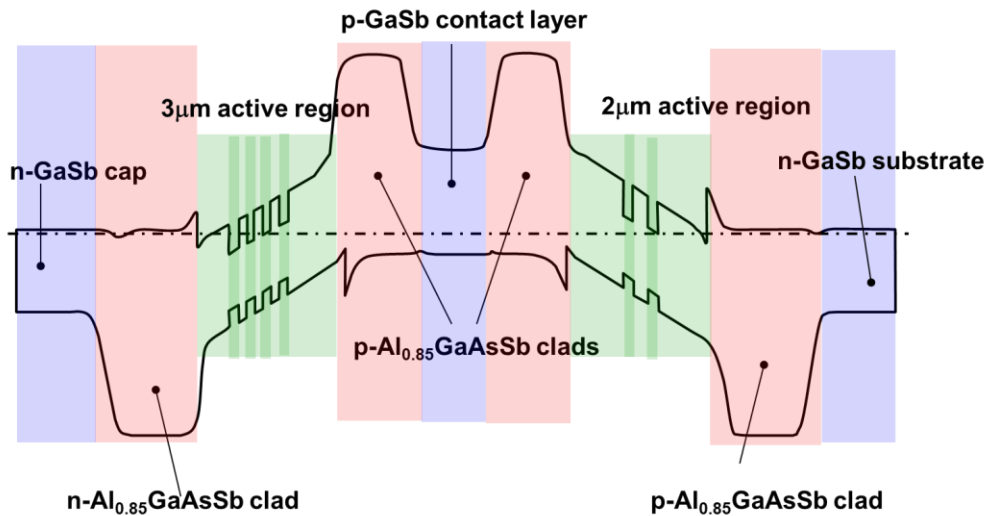
Journal of Applied Physics, 117, 165701 (2015)

Cascaded IR LEDs: demonstration of record output power



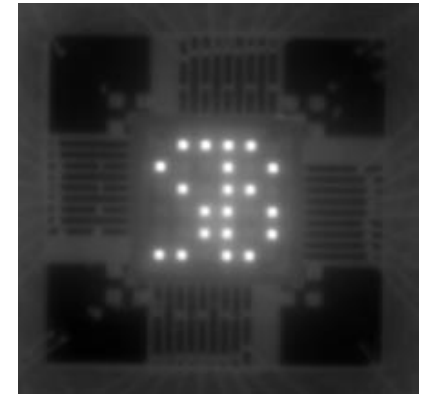
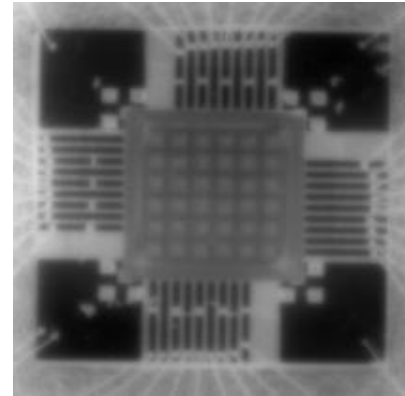
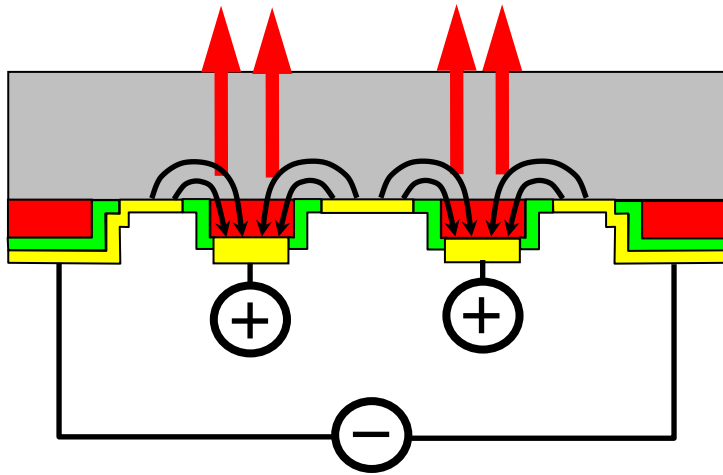
IEEE Photonic Technology Letters, 25, 2278 (2013).

Two color LED with independently controlled color intensities was implemented

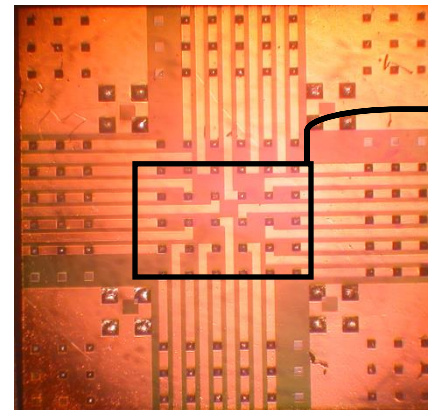
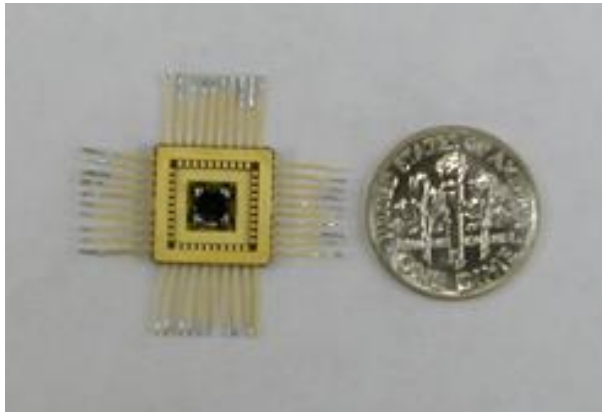


Applied Physics Letters, 96, 191102 (2010).

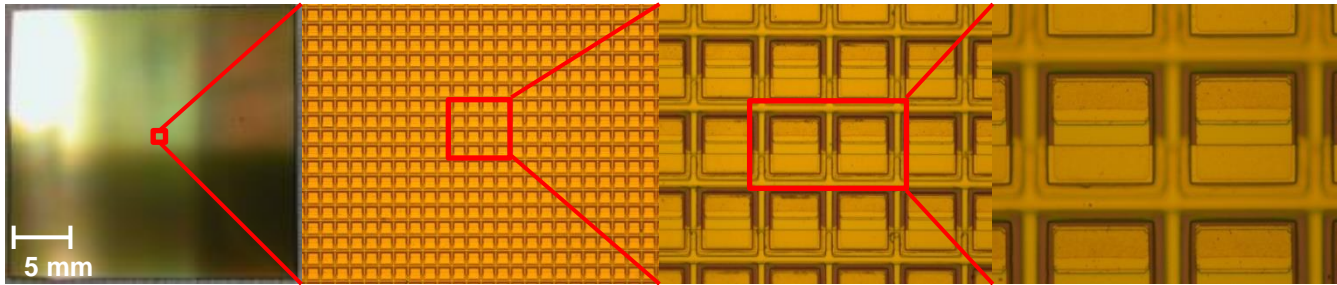
Addressable LED array: demonstration of the prototype



Both p- and n- contacts are at the epi-layer side



512x512 addressable LED array was designed and fabricated



512x512 addressable LED array

