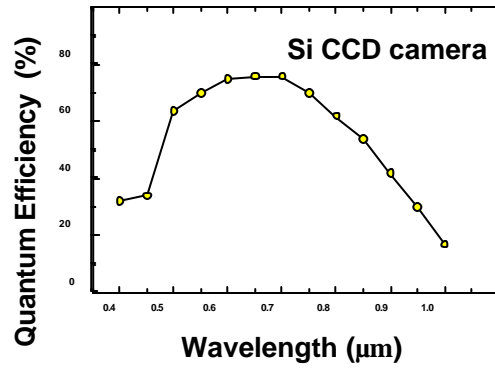
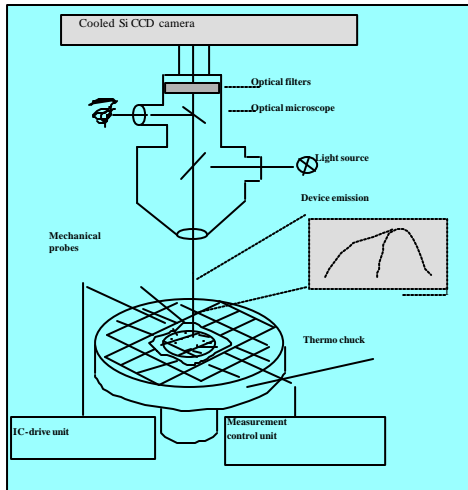
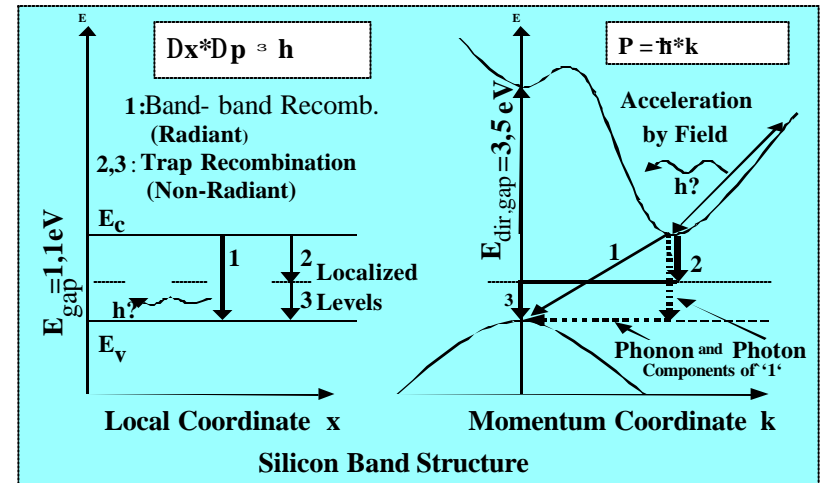


Photon Emission microscopy (PEM) (Electroluminescence)

Experimental Setup



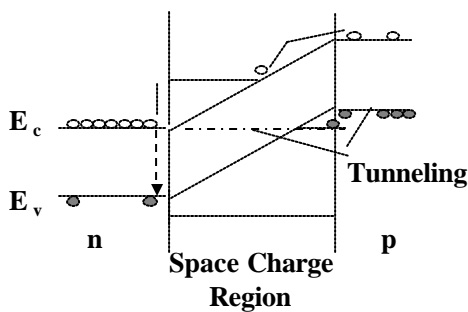
Silicon = Indirect Semiconductor = Faint light emission



Two basic mechanisms of photoemission(PE) in semiconductor

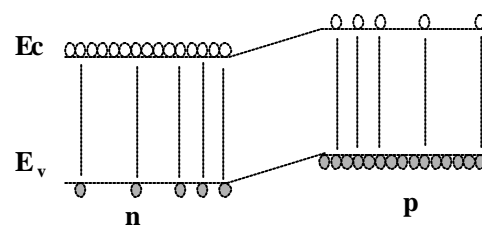
1. Reverse biased pn-junction

Scattering of Field Accelerated Carriers (F-PE) (+ Recombination)

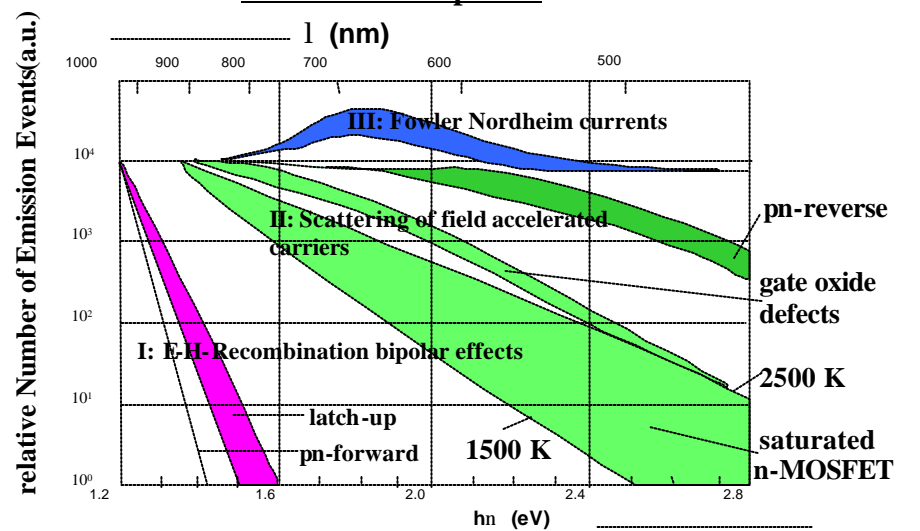


2. Forward biased pn-junction

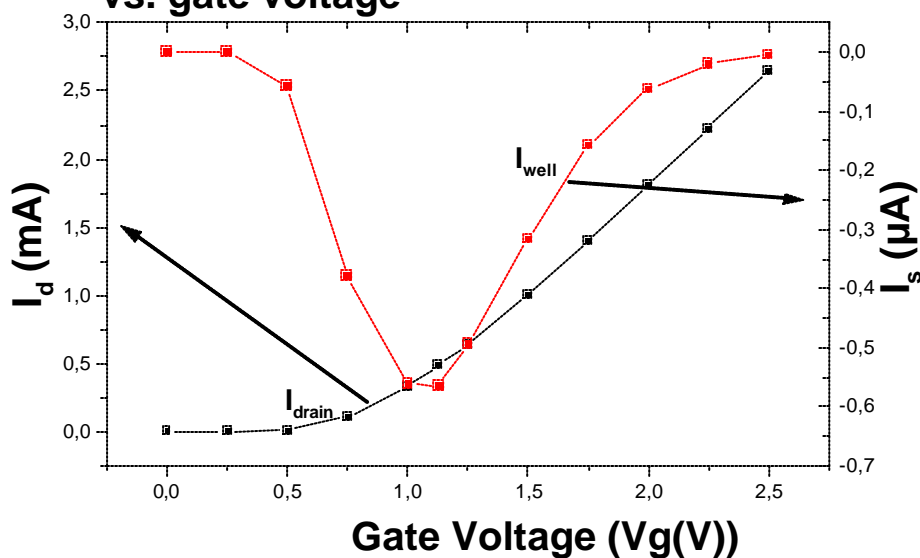
Electron-hole (R-PE) Recombination



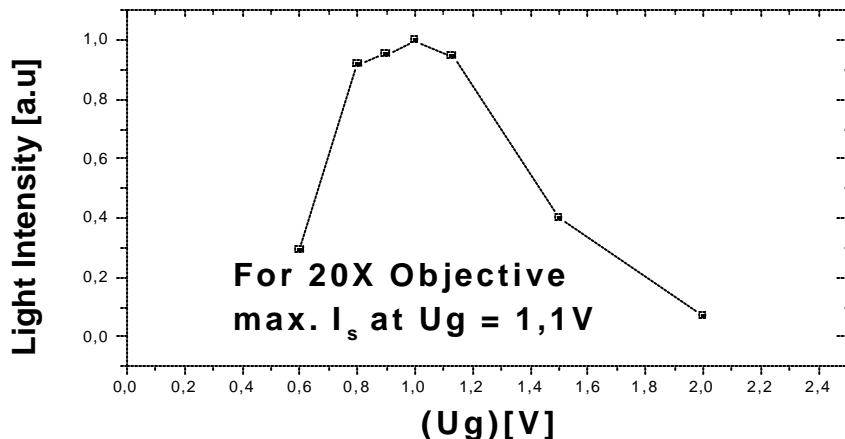
Fundamental Spectra



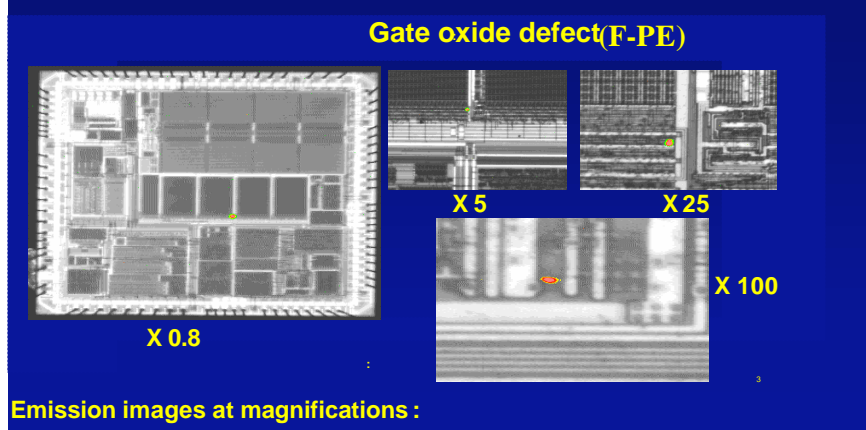
MOSFET: Drain and Substrate current vs. gate voltage



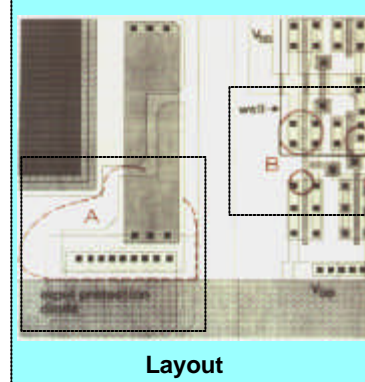
Photon Emission of MOS Device



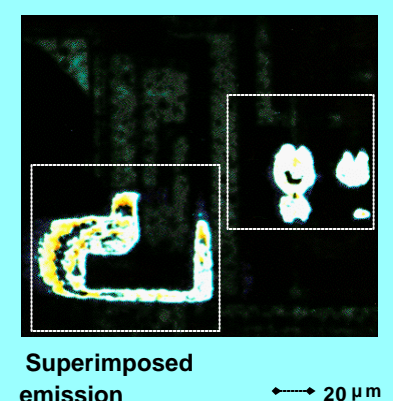
Direct defect identification



CMOS Latch-up (R-PE)



A: input protection diode
 B: latch-up area



Layout

Superimposed emission

20 μm