Localization of Device Properties and Device Modification with Access from the Backside of the Die

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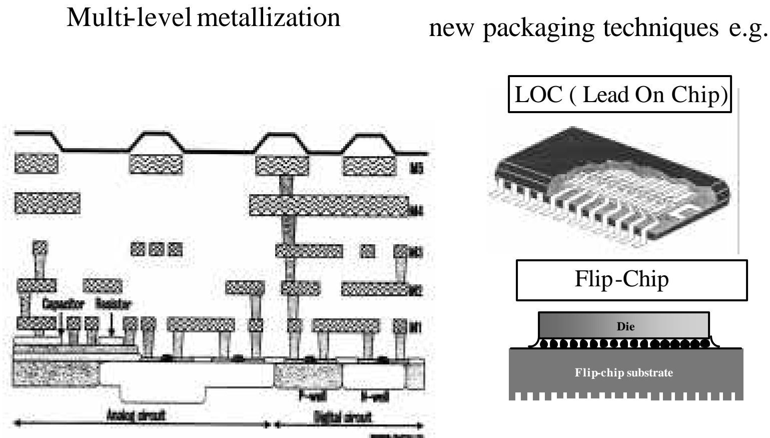
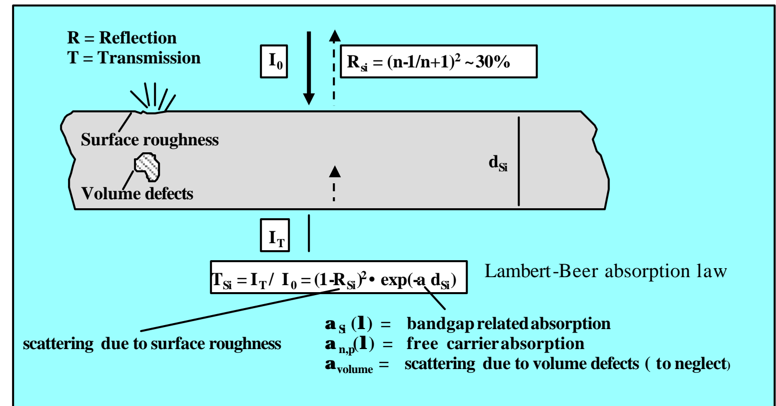
Why FA from the Backside of the Die?

Multi-level metallization

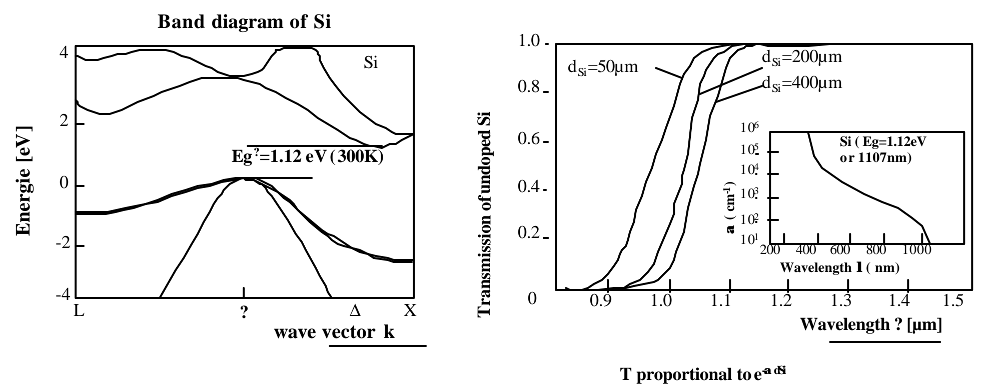
new packaging techniques e.g.



Transmission Trough Bulk Si



Band-gap related absorption (interband absorption)



Localization Techniques from Backside of the Die

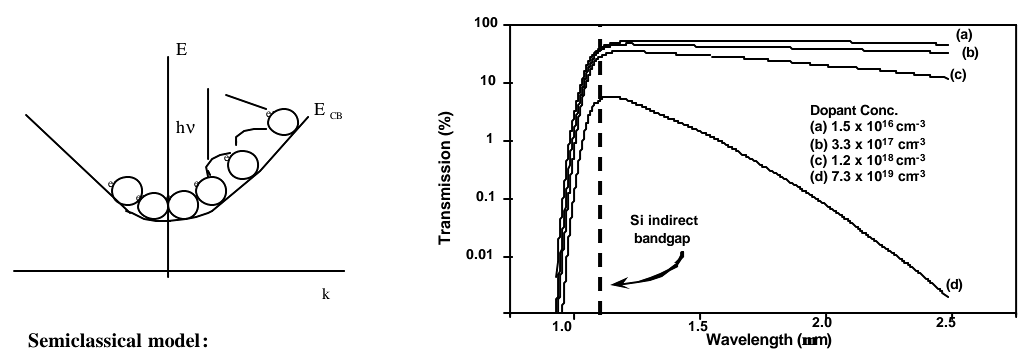
Optical Techniques:

- **Photon Emission**
- **Laser Induced Interaction with Device**

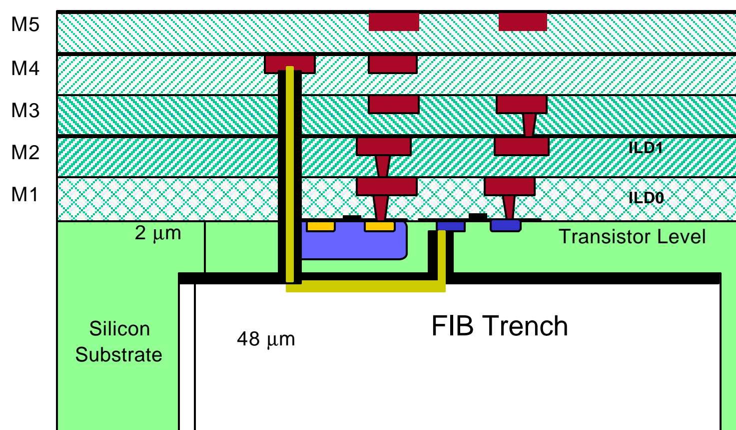
Device Edit /- Modification from Backside of the Die:

- **Removal of Bulk Silicon to < 10µm**
- **Milling through Active Area**

Free carrier absorption



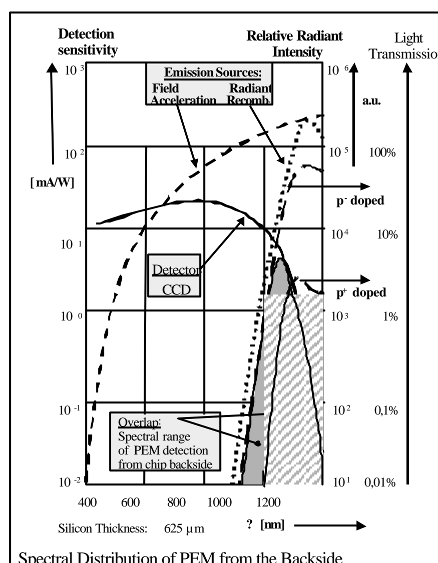
Through-Silicon FIB Editing of ICs



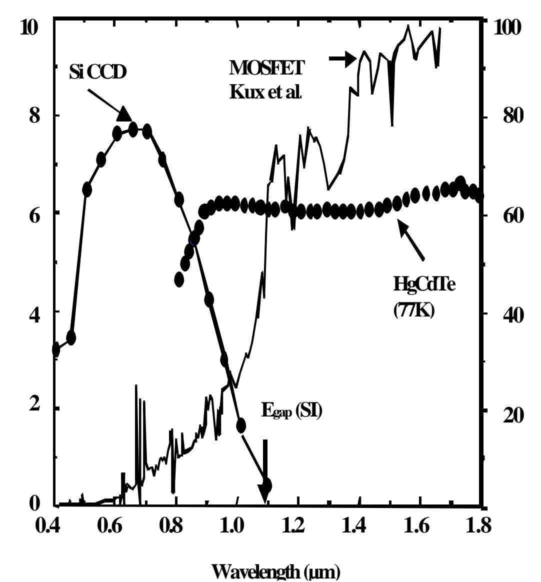
Photoemission Microscopy from back side of the die

Backside detection and detector characteristics

Spectral range of common Si-CCD compared to Emission spectrum from chip backside: only small overlap



Spectral range of Hg-Cd-Te detector compared to Si-CCD and Emission spectrum from saturated FET



Backside Preparation Techniques

Global Si thinning • CNC milling • mechanical grinding/ polishing • Dry etching (RIE)	• required for emission based /optical probe based backside techniques • auxiliary methods for local Si thinning •large areas >=1 cm^2 •min. remaining Si thickness: ca. 100µm
Local Si thinning • LMC technique • FIB (high speed process)	• required for e-beam/ mechanical probing and device modification from the backside •areas up to 500 x 500 µm^2 •min. remaining Si thickness: ca. 10µm •lateral resolution limited (ca. 1 µm)
Precision probe hole milling • FIB	high lateral resolution (ca. 0.1 µm)