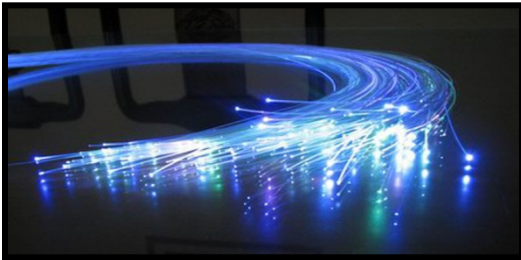


Si Photonics (SiP)

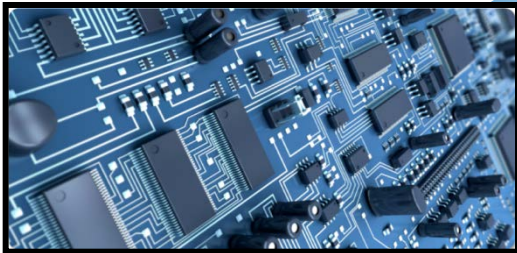
● Motivation

- More Moore: Continuation of **Scaling** and **Integration**.
- More than Moore: New Materials and **Technology (photonics)**.

Photonics

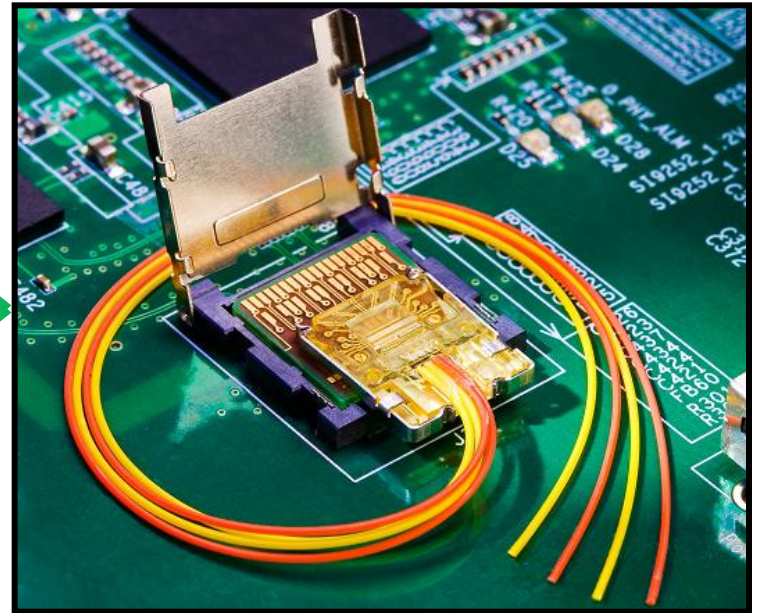


+



Electronics

Electronics & Photonics in Silicon!

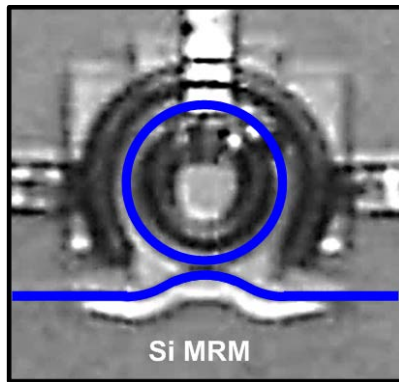
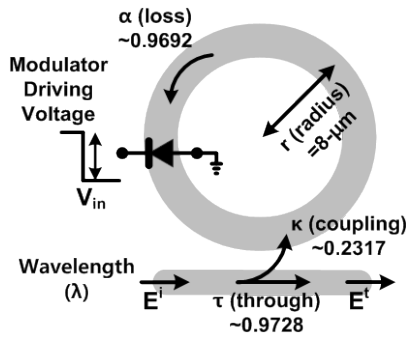


“Development of CMOS-compatible optical components is of paramount importance”

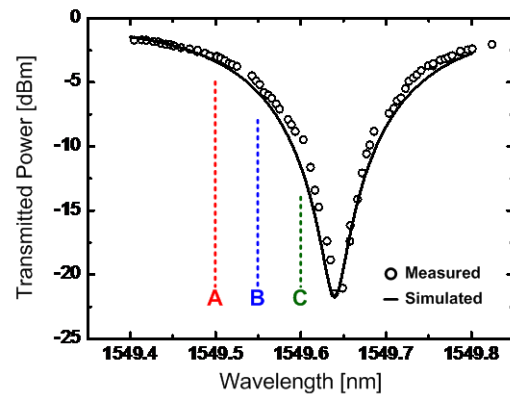
(ITRS Roadmap 2009 – Interconnect, p.56)

Behavioral Model of Si Ring Modulator

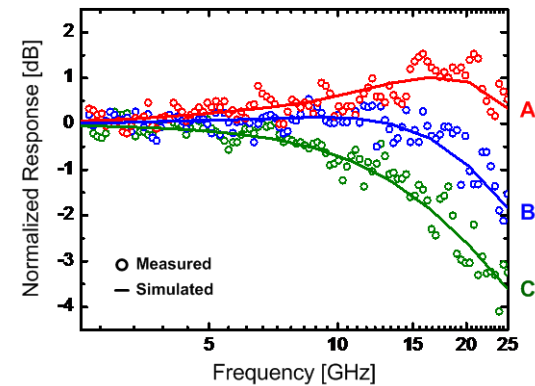
- Based on coupled-mode theory & verilog-AMS language
- DC, AC as well as transient simulation & experimental verification
- Target conference / journal: GFP 2014 (accepted) / OE (submitted)



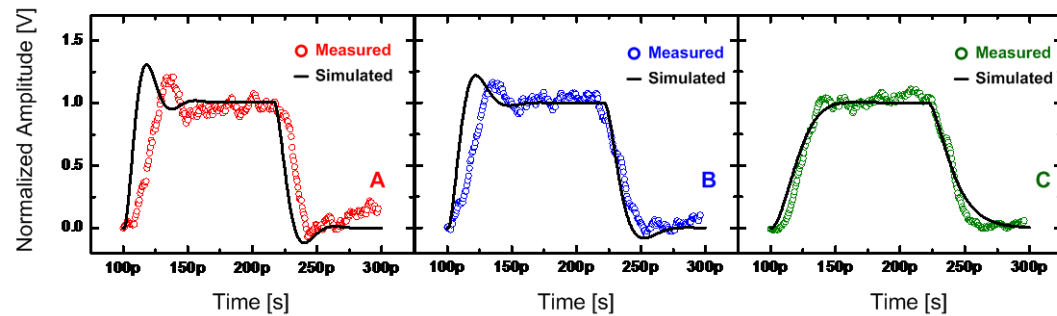
Si ring modulator



(a)



(b)

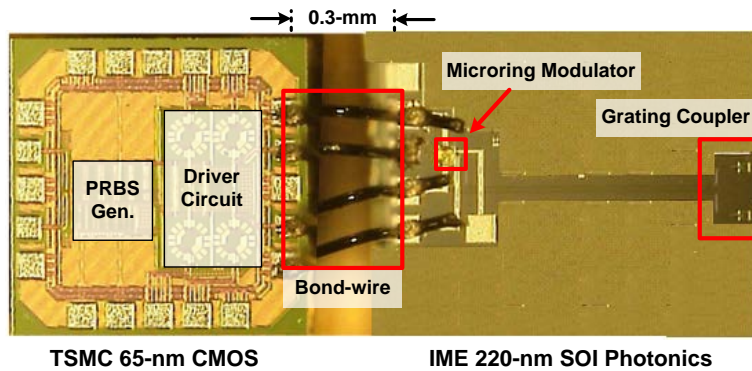


(c)

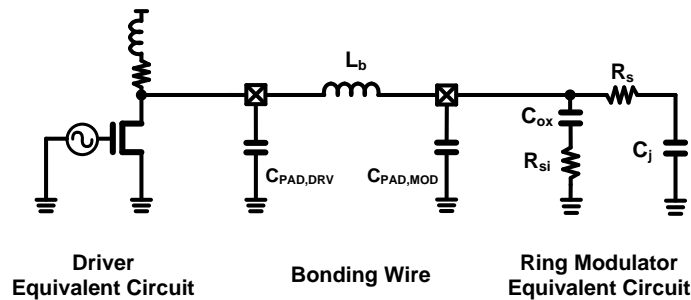
Comparison – our model vs. measurement results

25-Gb/s Hybrid-Integrated Optical Tx

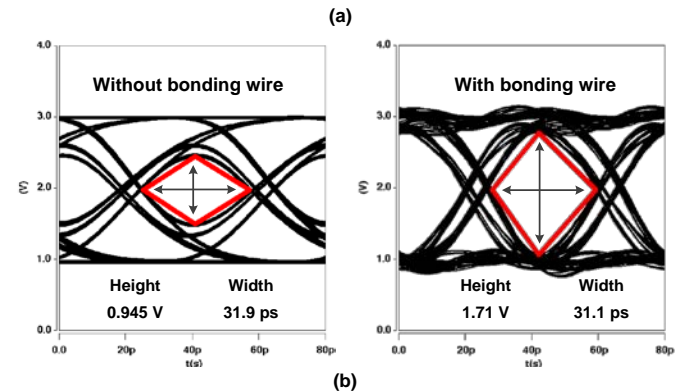
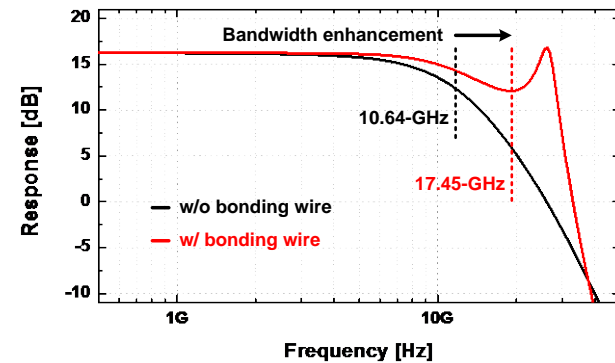
- Si ring modulator & hybrid-integrated CMOS driver
- Demonstrated 25-Gb/s operation with bonding wire
- Target conference / journal: 2014 SOC 학술대회 (accepted) / JOSK (published)



Microphotograph of 25-Gb/s Optical Transmitter



Transmitter equivalent circuit model



Enhancements in (a) bandwidth (b) Eye-opening