the first application of optical interconnects on-chip is believed to be in clock distribution because of reduction in skew and jitter and in some cases even power advantages. The optical system consists of the transmitter (laser), the medium (waveguide) and the receiver. Integration of optical clocks could be done by placing transmitter off chip, using free space as the transmission medium and the receiver including a detector on the chip. Ge appears to be a very attractive choice for this purpose. Ge has a higher low-field carrier mobility which should allow the fabrication of high performance deep sub-micron Ge MOSFETs. In addition, the smaller optical bandgap of Ge broadens the absorption wavelength spectrum allowing opto-electronic integration to enhance CMOS functionality. Unlike Si, however, the lack of a stable native oxide hinders the passivation of Ge surfaces. Recently we have demonstrated MOS devices on Ge with ZrO2 gate dielectric [8]. With more development, this novel technology should allow the heterogeneous integration of high performance deep sub-micron Ge MOSFETs and optical detectors on Si.

Acknowledgments: The authors would like to acknowledge the DARPA HGI program and the MARCO Interconnect Focus Center for supporting this work.

References


