

Design and test of silicon photonic Mach-Zehnder interferometers for data transmission applications

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Silicon photonics is a rapidly emerging field in research and technology. Given its high diffraction index and low dispersion, silicon is an high quality optical material. On the other hand, VLSI CMOS compatible processes allow to design reliable photonic structures which can be easily integrated with standard integrated electronic circuits at affordable prices.

Optical modulation is obtained in silicon photonic circuits with electro-optical effect (plasma dispersion) in two different kind of structures: the Mach-Zehnder interferometer and the ring resonator.

In a Mach-Zehnder interferometer optical signal modulation is obtained controlling with the electro-optical effect the interference condition between the two interferometer branches.

We designed a silicon photonics chip in standard VLSI CMOS compatible process implementing two different Mach-Zehnder interferometer configurations. Design and tests of these two interferometers are reported.

Keywords: Silicon photonics, Mach-Zehnder interferometer, optical data transmission.

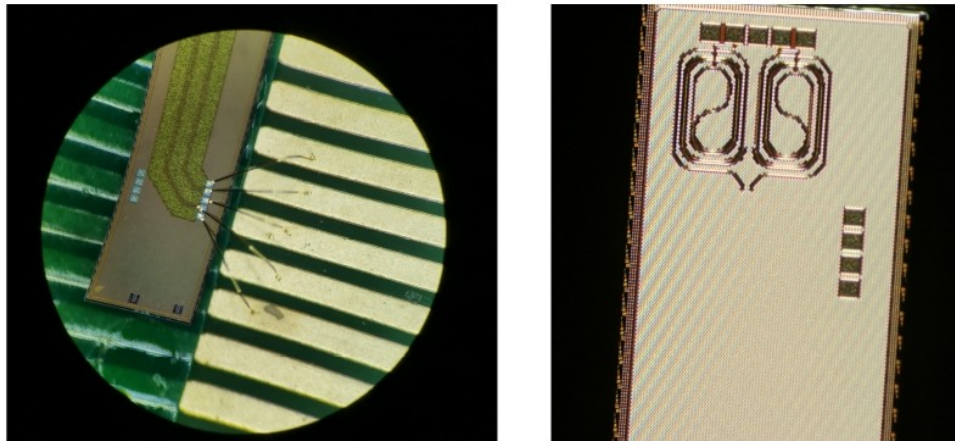


Fig. 1 A straight Mach-Zehnder interferometer soldered on a test board (left) and a folded Mach-Zehnder interferometer bare chip (right).