

Assessment of a hybrid electro-optic module for high speed (100 Gb/s) applications

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Electronics intrinsic limitations have been emphasised by the steady rise of telecommunications needs. Photonics has proven to be a suitable solution to these limitations. Taking advantage of his CMOS platform, STMicroelectronics has developed a silicon photonics platform called PIC25G that allows single-channel transmission at 25 Gb/s. However, the data rate increase with Wavelength Division Multiplexing (WDM) encounter some constraints. Indeed, the high index contrast of silicon waveguide leads to large mismatch between the silicon waveguide and the optical fiber modes, which induces important coupling losses. Among several approaches envisaged in the literature, grating couplers (GC) seem to be the most suitable solution [1, 2].

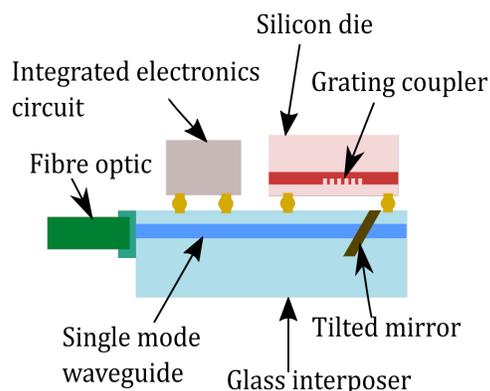


Figure 1 suggested solution to achieve high speed applications

The proposed solution to address this issue is shown in figure 1 and is based on a hybrid approach combining silicon and glass ions exchanged photonics. The solution consists of a glass interposer on which a silicon photonics chip is assembled. First, the study focused on the components of the silicon chip especially the optimisation of the GCs [3]. Then, the optical and electrical passive components of the glass interposer were studied and realised. The feasibility of an optical coupling between the silicon chip and the glass interposer had been demonstrated. Moreover, the test structures needed to validate the proposed solution were also studied. These test structures allowed to transmit radiofrequency signals up to 40 GHz between the silicon chip and the glass interposer.

Finally, a new approach to realise the optical waveguides of the interposer had also been suggested and implemented [4]. Ultimately, this approach will provide an electro-optical module for high-speed applications.

Keywords: silicon photonics - grating couplers - glass ion exchange - interposer

References

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