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Communications at 2µm & the Role of Integrated Photonics

Abstract

Optical Communications at the 2µm wavelength dates back to the 1980s [1], where ZBLAN and fluoride optical fibres provided the potential for very low loss transmission [2], albeit exploitation of their full potential was dampened by the creation of Erbium-doped fibre amplifiers and the success of transmission systems at the C-band. Three decades later, 2µm waveband became of interest once again for communications to explore novel optical silica-based fibres, such as hollow core photonic bandgap fibres, the advancements of low loss silicon photonics, and the development of extended emission of InP/InPGaAs [3]. Moreover, micro-tranfer printing (MTP) is becoming one of the popular techniques in many labs, enabling heterogeneous integration of aforementioned active devices into complex silicon-based optical passive circuits [4].

In this talk, we will show how 2µm waveband is an interesting wavelength region to explore strained InP lattices for lasers and Si as passives structures (or as a nonlinear element), given its low two-photon absorption and high Kerr nonlinearity. We will revisit how opening a new transmission window at this waveband became possible, highlighting the development key enabling devices, and how heterogeneous integration can potentially also unlock their impact in other applications such as environmental and biomedical sensing.

References

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Figures

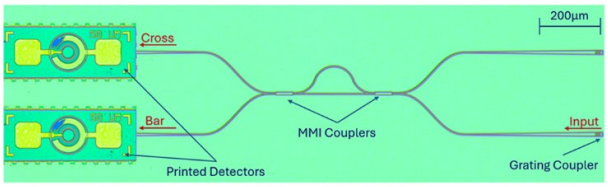

Fig 1: example of MTP wavelength selective filter based on silicon assimmetric Mach-Zehnder interferometer and 2µm detectors [6].

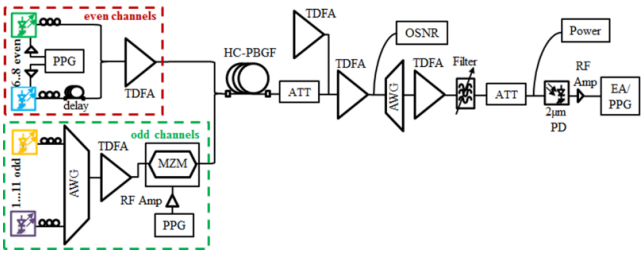

Fig 2: Typical experimental setup of a 2µm transmission testbed, including actives (i.e. lasers, modulators, detectors), filters, amplifiers, etc [5].