A Study on Mach-Zehnder Interferometer

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Abstract—

I. INTRODUCTION

II. THEORY

A. Background

III. DESIGN

A. Waveguide Design

From fabrication bias requirements and the availability of componenets in the SiEPIC PDK, the waveguide has a design of 350 nm × 220 nm strip waveguide. This was simulated in Lumerical MODE Solutions using the Palik dataset of materials.
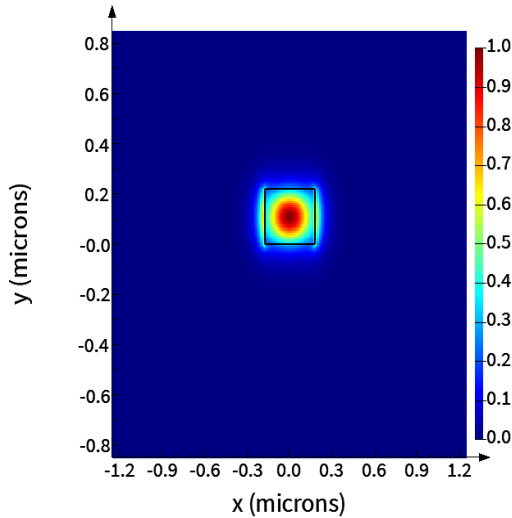

Fig. 1.   The 1st mode profile with 98% TE polarization for the 350nm *times* 220nm waveguide at λ = 1310nm, calculated using Lumerical MODE Solutions.
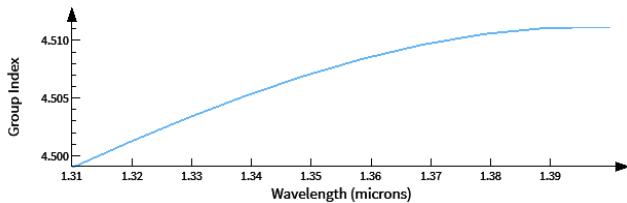

Fig. 2.   The group plotted against the wavelength, simulated using Lumerical MODE Solutions.

The mask layout in Figure 3 is spread out and designed to occupy most of the floor plan of the chip. This is designed to allow for phase accumulation, although this will mean longer propagation time and increased sensitivity to temperature variations.
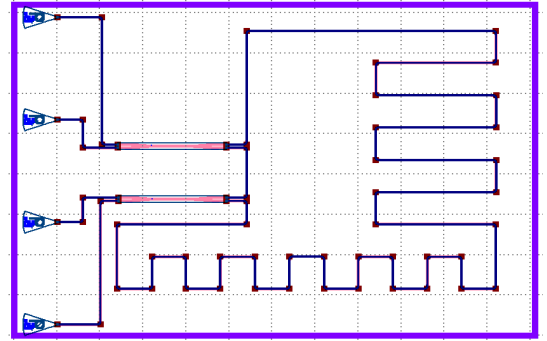

Fig. 3.   Mask layout for the spread-out version of the MZI

In Figure 4, the mask layout is spiral and designed to be compact. This allows for more design iterations on the chip and also lowers propagation loss. The leftmost layout is more spiral while the second from the left features straight segments in a spiral paperclip pattern.
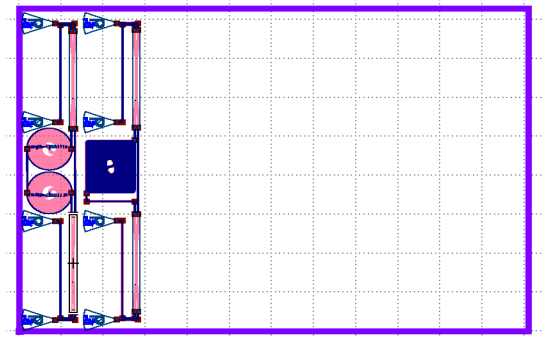

Fig. 4.   Mask layout for spiral versions of the MZI, with the left MZI being circular spiral while the second one from the left being a spiral paper clip.

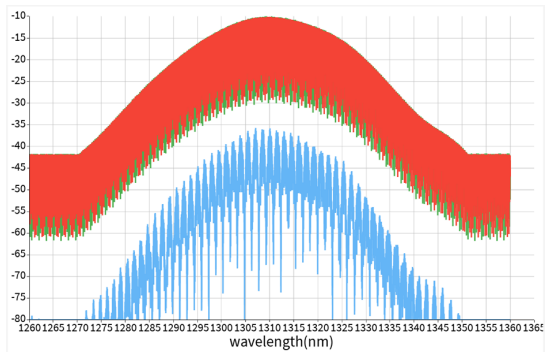The simulation of the spread out MZI in Figure 3 is shown in Figure 5.

IV. CONCLUSIONS

REFERENCES

Fig. 5.   Mask layout for the spread-out version of the MZI

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