Crossing

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Description

Crossings are used to support the routing of more complex photonic circuits. Improvement to the waveguide's transmission can be achieved by reducing diffraction that occurs in the component's centre crossing region. To widen the waveguide's core, elliptical mode expanders are used for this component.

Model Name

ebeam_crossing4

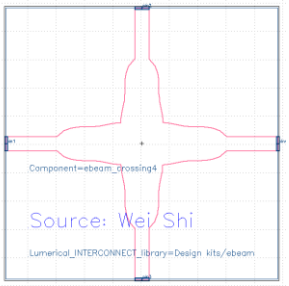

Fig. 1: Compact Model of Crossing

Compact Model Information

- Support for TE and TM polarization
- Operating at 1550 nm wavelength
- Performance:
  - Transmission loss: < 0.2 dB
  - Crosstalk and reflection: < 40 dB in a broad bandwidth of 20 nm
- Implemented by Wei Shi in 2011 based on "Highly efficient crossing structure for silicon-on-insulator waveguides"
- Similarly fabricated by OpSIS and published with test results in "A CMOS-Compatible, Low-Loss, and Low-Crosstalk Silicon Waveguide Crossing"

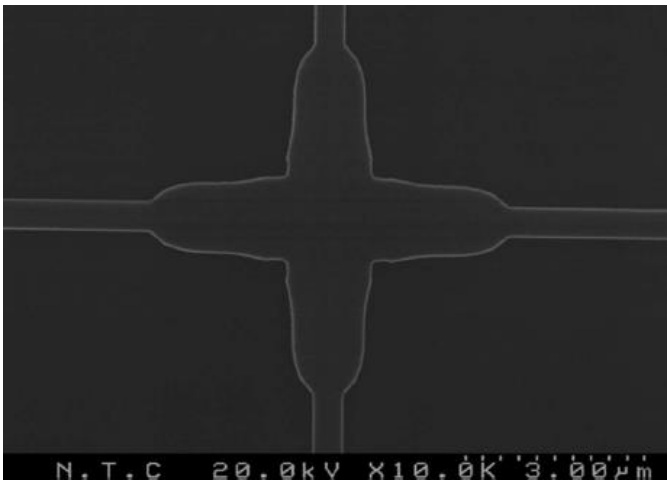

Fig. 2: Optical Micrograph Picture of Crossing

Parameters

N/A

Simulation and Experimental Results

- Not tested with EBeam

From P. Sanchis et al.:

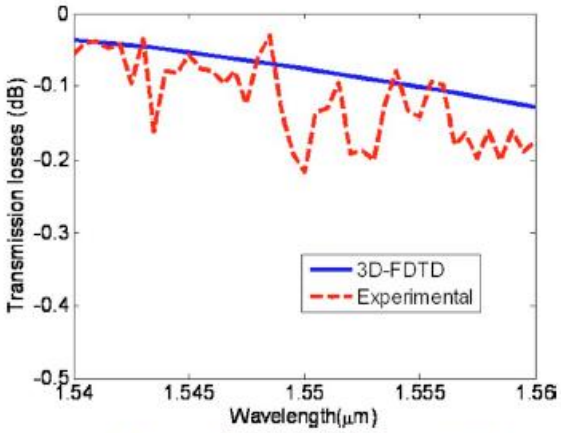

Fig. 4. (Color online) Experimental and 3D-FDTD simulation results of the transmission losses as a function of the transmission wavelength.

Fig. 4: Experimental Results for Crossing

Additional Details

- Potential Usage
    - 2x2 splitter/combiner, with adjustable coupling coefficient
    - Ring resonator
    - Mach-Zehnder Interferometer

Reference

1. P. Sanchis, et al., Highly efficient crossing structure for silicon-on-insulator waveguides, Opt. Lett., vol. 34, no. 18, pp. 2760-2762, 2009.
2. Yi Zhang, Shuyu Yang, Andy Eu-Jin Lim, Guo-Qiang Lo, Christophe Galland, Tom Baehr-Jones, and Michael Hochberg, "A compact and low loss Y-junction for submicron silicon waveguide," Opt. Express 21, 1310-1316 (2013)