

Numerical modeling of ultracompact folded photonic crystal waveguide Mach-Zehnder interferometer thermo-optic switch

ABSTRACT

We numerically studied an ultracompact folded-path photonic crystal waveguide Mach-Zehnder interferometer (MZI) thermo-optic switch based on a small-bend radius double 180° waveguide bend MZI arm. The design can at least double the active waveguide length and sensitivity while maintaining a small heater size compared to the conventional MZI design. From 3D finite difference time domain simulation, a refractive index increase of 0.019 in the $25\ \mu\text{m}$ long heated arm that is induced by a temperature difference of 102 K produces a $\pi\pi$ phase shift in the output of the MZI.

Keyword: Numerical modeling; Ultracompact folded photonic; Crystal waveguide; Waveguide length; Mach-Zehnder interferometer