

Geometrical optimization of lithium niobate on insulator rib waveguide for quantum communication application

Abstract

Recently, thin film Lithium niobate has been recognized as an alternative material to silicon based technology due to its capability to support a broader range for quantum communication system. With the aim to operate within single photon application, we demonstrate the mode distribution, propagation constant and effective refractive indices of the Lithium Niobate on Insulator rib waveguide which operates at both fundamental wavelength, 1550 nm and second harmonic wavelength, 775 nm, respectively by using Finite Element Method. The etched depth and width of the core was varied from 340 to 400 nm and 700 to 1400 nm, respectively with the thickness of slab is fixed at 100 nm. From the result, it shows the effective refractive index increases gradually with the increment of etched depth and width of core, respectively. At second harmonic wavelength, the effective refractive indices and propagation constant shows a significant increment compare to observation at 1550 nm with an ability to produce both fundamental mode and first order mode across the structure.