

SOI Rib Waveguide Physical Dimension Dependent Micro Ring Resonator Characterization

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Abstract— Design and simulation of rib waveguide physical dimension dependent Micro Ring Resonator (MRR) is demonstrated in this paper. In here, the analysis of the effects of Silicon on Insulator (SOI) rib waveguide dimension is studied which included the width and height of the core/ring, height of rib and height of buried oxide. This analysis is crucial as it provides an initial reference point with regards to varying waveguide dimensions where future research designers can study and make fundamental decisions in designing effective and reliable photonic devices such as optical filter. During fabrication work, the actual device performance might vary from the initial design performance, therefore performing simulations is important to determine the effects of varying dimensions to determine the actual fabricated device outputs. Results shows the performance characteristics of MRR varies significantly when there is a waveguide dimension variation. Based on the simulation results, it is seen that as we increased the width of the core, Free Spectral Range (FSR) increased and Full Width Half Max (FWHM) decreased as we increased the height of the core and the rib. While Quality-factor (Q-factor) increased as core and rib height increased. It is also deduced that percentage variation between all different dimension is less than 30% except for height of buried oxide in which there is no percentage change. However, Q-factor remains at 1573 as we increased buried oxide height. Thus, the dimensions of the SOI waveguide are chosen to be at a core width of 450nm, a core height of 210nm and a rib height of 70nm.

Keyword— Free Spectral Range, Full Width Half Max, Micro-Ring Resonator, Quality factor and Rib waveguide



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