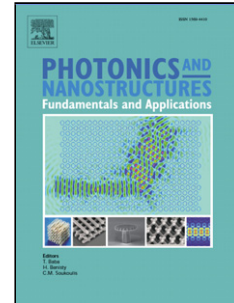


Accepted Manuscript

Title: All-optical photonic crystal logic gates using nonlinear directional coupler

Authors: Hojjat Sharifi, Seyedeh Mehri Hamidi, Keivan Navi



PII: S1569-4410(17)30104-9

DOI: <https://doi.org/10.1016/j.photonics.2017.10.002>

Reference: PNFA 612

To appear in: *Photonics and Nanostructures – Fundamentals and Applications*

Received date: 6-4-2017

Revised date: 2-10-2017

Accepted date: 24-10-2017

Please cite this article as: Hojjat Sharifi, Seyedeh Mehri Hamidi, Keivan Navi, All-optical photonic crystal logic gates using nonlinear directional coupler, *Photonics and Nanostructures - Fundamentals and Applications* <https://doi.org/10.1016/j.photonics.2017.10.002>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

All-optical photonic crystal logic gates using nonlinear directional coupler

Hojjat Sharifi¹, Seyedeh Mehri Hamidi^{2,*} and KeivanNavi^{1,*}

¹Faculty of Computer Science and Engineering, Shahid Beheshti University, GC, Tehran, Iran

² Laser and Plasma Research Institute, Shahid Beheshti University, GC, Tehran, Iran

*m_hamidi@sbu.ac.ir and k_navi@sbu.ac.ir

Highlights

1. Nonlinear directional coupler and junctions is proposed to design all-optical logic gates.
2. New topologies for all-optical XNOR, NOR and AND logic gates is proposed.
3. Silicon nano-crystal has been used as nonlinear efficient material.

Abstract

In this paper, a nonlinear photonic crystal structure consisting of a nonlinear directional coupler and junctions for the design of all-optical logic gates is proposed. A bi-functional photonic crystal structure is initially designed which provides different two XOR or OR logic operations. Thereafter, by applying some modifications in the basic structure, new topologies for all-optical XNOR, NOR and AND logic gates are proposed. Nonlinear rods of the proposed structure are made of silicon nanocrystal to create required phase shift. The finite difference time domain and plane wave expansion methods are used to evaluate the proposed structures. Our simulation results show that the proposed gates can operate with a bit rate of more than 1 Tbits/s and also, inputs and output of the proposed logic gates are homogeneous with the required power of 3W for switching operation.

Keywords: All-optical logic gate, Photonic crystal, Kerr effect, Directional coupler.

Download English Version:

<https://daneshyari.com/en/article/7932830>

Download Persian Version:

<https://daneshyari.com/article/7932830>

[Daneshyari.com](https://daneshyari.com)