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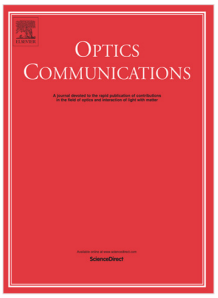

Wideband and low dispersion slow light by altering the geometry of a photonic crystal waveguide

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Wideband and low dispersion slow light by altering the geometry of a photonic crystal waveguide

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Abstract: In this paper, a novel type of slow light photonic crystal waveguide obtained by enlarging the entire holes of the PhC and shifting the first and second rows of the air holes adjacent to the waveguide center in the longitudinal direction, the designed structure provided a nearly constant group index over a large bandwidth. A flexible control of ng (18.24 <ng<41.7) with large bandwidth (11.7 nm < $\Delta\lambda$ < 24 nm) has been achieved. As well, a large normalized delay-bandwidth NDBP products ranging from 0.282 to 0.465 have obtained.

Keywords: photonic crystal, waveguide, slow light, NDBP

1 INTRODUCTION

Today, the world is witnessing a technological revolution especially data, information and communications technology. Photonic crystals, which prohibit the propagation of light for frequencies within a band gap, have enabled exciting new ways to control light and construct integrated optical devices. Hence, the use of photonic crystals in modern optical telecommunication systems has become necessary in order to achieve miniature tunable and functional devices which can be exploited for a broad range of applications [1] [2] [3] such as cavities [4] filters [5] ,sensors [6] [7] [8] and so on. In recent years, the research activity has focused on slow light in photonic crystals. Note that the term 'slow light' refers to a reduction in the group velocity of light. [9] Slow down the velocity of light has promising features in all-optical signal processing and offers the opportunity to compresses optical signals and optical energy in space. [10] In addition, it can be used for the enhancement of light-matter interaction in photonic crystal waveguides and miniaturization of optoelectronic integrated circuits. [11] Photonic crystal (PhC) line defect waveguide (W1) is one of the most suitable and attractive structures for realizing the slow light effect. This is because such a line defect structure operates