



Slow light generation by using one-dimensional photonic crystals for quantum memory applications

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Abstract

In this study, an efficient and compact optical device for slowing light in corrugated photonic crystals with different corrugation patterns are discussed. The proposed structure shows relatively large group delay with wide bandwidth and approximately zero group velocity dispersion in near-infrared region. Also, due to the zero group velocity dispersion applied on transmitted pulse, high quality pulse can be obtained by using this approach. For comparison, three different photonic crystal structures containing triangular, sinusoidal and graded sinusoidal corrugation patterns were investigated. The group index as much as 5 with the bandwidth about 50 nm is achieved in the sinusoidal corrugated photonic crystal with 8 μm length. This slow-light structure is very promising for application in quantum memories.

keywords: corrugated photonic crystal, group delay, dispersion, slow-light, near-infrared, quantum memory

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