World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:14, No:08, 2020

Study of Photonic Crystal Band Gap and Hexagonal Microcavity Based on Elliptical Shaped Holes

Authors : A. Benmerkhi, A. Bounouioua, M. Bouchemat, T. Bouchemat

Abstract : In this paper, we present a numerical optical properties of a triangular periodic lattice of elliptical air holes. We report the influence of the ratio (semi-major axis length of elliptical hole to the filling ratio) on the photonic band gap. Then by using the finite difference time domain (FDTD) algorithm, the resonant wavelength of the point defect microcavities in a two-dimensional photonic crystal (PC) shifts towards the low wavelengths with significantly increased filing ratio. It can be noted that the Q factor is gradually changed to higher when the filling ratio increases. It is due to an increase in reflectivity of the PC mirror. Also we theoretically investigate the H1 cavity, where the value of semi-major axis (Rx) of the six holes surrounding the cavity are fixed at 0.5a and the Rx of the two edge air holes are fixed at the optimum value of 0.52a. The highest Q factor of 4.1359 × 10⁶ is achieved at the resonant mode located at λ = 1.4970 µm.

Keywords : photonic crystal, microcavity, filling ratio, elliptical holes
Conference Title : ICN 2020 : International Conference on Nanophotonics
Conference Location : Paris, France
Conference Dates : August 27-28, 2020