Resonant Tunneling in 2D-Photonic Superlattices

F.kanouni , A.Brezini, R.graine, F.arab, A.Assali

Research Unit of Photonics and Optics UROP-CDTA, Université Ferhat Abbas 01, El Bez, Sétif,19000, Algeria, fkanouni@cdta.dz

Abstract (Arial 10)

Transmissions and resonant tunneling of two-dimensional (2D) photonic superlattices (PhSLs) are discussed. We consider PhSL composed of two alternating 2D-photonic crystals. The structure is denoted as A/B/A/B......A/B, where photonic crystals A and B act as photonic wells and barriers, respectively. The transmission coefficient is calculated using the Transfer Matrix Method (TMM) in combination with Bloch theorem. The transmission spectra of the PhSLs indicate that the formation of photonic minibands and minigaps inside the wells. The positions and number of the minibands can be artificially tuned by varing the well width. By appropriately choosing the structure parameters, this interesting results can be used to develop new photonic devices.

References

[1] J. D. Cox, J. Sabarinathan , M. R. Singh. Resonant Photonic States in Coupled Heterostructure Photonic Crystal Waveguides. Nanoscale Res Lett (2010) 5:741–746

[2] Ch.Sh. Feng*, Liang-Mo Mei, L.Z. Cai, Ping Li, X.L. Yang. Resonant modes in quantum well structure of photonic crystals with different lattice constants. Solid State Communications 135 (2005) 330–334

[3] Xiaoshuang Chen*, Wei Lu, S.C. Shen. Photonic resonant transmission in the quantum-well structure of photonic crystals. Solid State Communications 127 (2003) 541–544

[5] Zhang Guo-Gang, Yang Xiang-Bo. Optical transmission through basic-structural-unit Superlattices. Chin. Phys. B Vol. 19, No. 9 (2010) 097808

[6] Chang-Sheng Yuan,HanTang,ChengHe,Xiao-LinChen,XuNi,Ming-HuiLu, Yan-Feng Chen n, Nai-BenMing. Resonant optical transmission

Figures

Energy band structure of the photonic superllatice