Photonic crystal (PhC) nanowires for infrared photodetectors

ABSTRACT

We report the Photonic Crystal (PhC) nanowires performance for potential phototodetectors integration application. The refractive index of PhC can be tailored to guide specific resonance wavelength precisely. This paper presents the numerical approach of 1D PhC with 12 periodic holes to observe the range of stop band acquired, transmission and the quality factor of the resonance wavelengths. By splitting the holes equally with a range of cavities from 440 to 450 nm, the stop band observed are between 1.5 to 2.1 εm. By varying the cavity length, the value of resonance wavelengths and quality factors observed have also changed. The introduction of 442 nm cavity shows the highest transmission but the lowest Quality factor (Q-factor) where both are observed at 0.87 and 284 respectively. The values indicate a good confinement of light in the waveguide designed thus enabling wavelength selectivity for photodetectors application in highly sensitive wavelength selection application.

Keyword: Cavity; Graphene; Nanowires; Photodetectors; Photonic band-gap; Photonic crystal; Transmission