

A mid-infrared multichanneled filter in a photonic crystal heterostructure  
containing negative-permittivity materials

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Abstract

A design of mid-infrared frequency multichanneled transmission filter in a one-dimensional photonic crystal heterostructure containing negative-permittivity materials is proposed. It is found that the number of resonant peaks in transmittance is just related to the number of stacked number. These peaks are located within the passband of the ideal host photonic crystal, which is fundamentally different from that of using photonic quantum well structure. The peak positions can be tuned by varying the thicknesses of the constituent layers. In addition, they are also shifted as a function of angle of incidence for both the transverse electric (TE) and the transverse magnetic (TM) waves.

Keyword : Mid-infrared frequency, one-dimensional photonic crystal heterostructure, transmittance, photonic quantum well, resonant peak.