

Terahertz multichanneled filter in a superconducting photonic crystal

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Abstract

Terahertz spectroscopic properties in a one-dimensional superconductor-dielectric photonic crystal are theoretically investigated. Based on the calculated results, a terahertz multichanneled transmission filter can be achieved within the photonic passband. This structure possesses the comb-like resonant peaks in transmission spectrum at low temperature. The number of resonant peaks is directly related to the number of periods. The resonant peak height is lowered and broadened as the temperature increases. The dependence of the filling factor in the superconductor layer is also discussed. This filter containing no defect layer in structure is fundamentally different from the usual multichanneled filter based on a photonic crystal containing a photonic quantum well as a defect layer.

Keyword : Photonic crystal, Optical properties, Thin films, Numerical approximation and analysis