

# Effects of superconducting film on the defect mode in dielectric photonic crystal heterostructure

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## Abstract

### Effects

of superconducting thin film on the defect mode in a dielectric photonic crystal heterostructure

(PCH) are theoretically investigated. The considered structure is  $(12)NS(21)N$ , in which both layers 1 and

2 are dielectrics, layer S is a high-temperature superconducting layer, and N is the stack number. The

defect

mode is analyzed based on the transmission spectrum calculated by using the transfer matrix

method. It is found that, in the normal incidence, the defect mode existing in the host PC  $Hof(12)N(21)N$

will be blue-

shifted as the thickness of layer S increases. In addition, the defect mode is also blue-

shifted for both TE and TM modes in the case of oblique incidence. The embedded superconducting thin

film

plays the role of tuning agent for the defect mode of PCH. As a result, the proposed structure can be

designed as a tunable narrowband transmission filter which could be of technical use in the

optoelectronic applications.

Keyword : photonic crystal