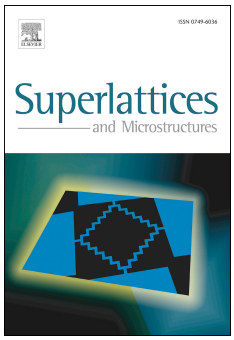
Accepted Manuscript



Performance enhancement of reflection-type magnetophotonic crystals backed with single-negative magnetic metamaterials

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PII: S0749-6036(18)30767-5

DOI: 10.1016/j.spmi.2018.06.005

Reference: YSPMI 5740

To appear in: *Superlattices and Microstructures*

Received Date: 12 April 2018

Revised Date: 3 June 2018

Accepted Date: 4 June 2018

Please cite this article as: M. Zamani, H. Nezhad Hajesmaeili, Performance enhancement of reflection-type magnetophotonic crystals backed with single-negative magnetic metamaterials, *Superlattices and Microstructures* (2018), doi: 10.1016/j.spmi.2018.06.005.

Performance enhancement of reflection-type magnetophotonic crystals backed with single-negative magnetic metamaterials

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Abstract

Herein we report the potential of polar bi-gyrotropic single-negative magnetic metamaterials to act simultaneously as a reflector and a magnetic rotator layer. We have studied such materials that their ϵ and μ are in the form of non-diagonal tensors (such medium is called as bi-gyrotropic). The reflectance and Kerr rotation responses have been simulated for both ϵ-negative and μ-negative types for different permittivity and permeability values. We have also examined the potential of such materials as simultaneous the reflector and the rotator layer in magnetophotonic crystal (MPC) structures. Results show that using these materials as the mentioned role can increase both Kerr rotation and reflectance, simultaneously. Additionally, a blue/red shift has occurred in MPCs containing ϵ-negative/μ-negative medium rather than the structure without them.

Keywords: Bi-gyrotropic magnetic medium, Single-negative metamaterial, Polar magnetization, Rotator layer, Reflective layer, Multilayer structures, Blue/red shift.

1. Introduction

Advances in simulation and fabrication technologies allow a rather broad exibility in electromagnetic responses with super performances by the design of

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