Accepted Manuscript

A flexible metamaterial absorber with four bands and two resonators

Yong Zhang, Junping Duan, Binzhen Zhang, Wendong Zhang, Wanjun Wang

PII: S0925-8388(17)30503-0

DOI: 10.1016/j.jallcom.2017.02.076

Reference: JALCOM 40804

To appear in: *Journal of Alloys and Compounds*

Received Date: 8 November 2016

Revised Date: 23 January 2017

Accepted Date: 8 February 2017

Please cite this article as: Y. Zhang, J. Duan, B. Zhang, W. Zhang, W. Wang, A flexible metamaterial absorber with four bands and two resonators, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.02.076.

A flexible metamaterial absorber with four bands and two resonators

Yong Zhang [a,b], Junping Duan [a,b], Binzhen Zhang [a,b*], Wendong Zhang [a,b], Wanjun Wang [c]

[a] Science and Technology on Electronic Test & Measurement Laboratory, North University of China, Taiyuan, Shanxi, 030051, China

[b] School of Instrument and Electronics, North University of China, Taiyuan, Shanxi, 030051, China

[c] Department of Mechanical Engineering, Louisiana State University, Baton Rouge, LA 70803, USA

*Email: zhangbinzhen@nuc.edu.cn; Tel: 0086 3923 640

Abstract

An efficient approach for achieving more resonance bands with fewer resonators is proposed in this paper. We investigate the theory, design, simulation, fabrication, and performance of a flexible metamaterial perfect absorber (MPA) with two resonators and four resonances located in GHz and THz ranges. The sandwich microstructure of the MPA consists of periodic "回" shaped metal patches on a metasurface, a dielectric of FR4 board on the interlayer, and a continuous copper film on the substrate. The four peaks of absorptivity owing to the coupling effect of the strong LC and surface resonance of the outer ring resonator as well as the strong LC and surface resonance of the inner ring resonator are 93.887%, 99.479%, 98.296%, and 93.035% at 38.165 GHz, 155.48 GHz, 231.71 GHz, and 275.27 GHz, respectively. The influences on absorptivity produced by angles, dimensions, and materials are also studied. The proposed MPA, equipped with strong flexibility, ultrathin thickness, light weight, strong absorption, sparks inspirations in designing the MPA with more resonances and fewer resonators.

Key words: metamaterial; absorber; microstructure; absorptivity; resonance.

1. Introduction

Absorbing materials have extensive applications in the stealth domain, which plays a key role in national defense. Conventional absorbing materials which contain ferrite, conductive polymer, nanomaterials, Salisbury screens and others, have many notable shortcomings, such as excessive