Dichroism, chirality, and polarization eigenstates in Babinet nanoslot-dimer membrane metamaterials

Dichroism, chirality, and polarization eigenstates in Babinet nanoslot-dimer membrane metamaterials

We present a detailed theoretical description of the optical properties of planar metamaterials comprising a metal membrane patterned with openings (microslots) arranged in closely located couples (dimers). Using the covariant coupled-dipole approach, the effective material tensors of such a metamaterial are recovered, and contributions responsible for elliptical dichroism and optical activity are identified. Polarization conversion properties of II-shaped and V-shaped dimers are determined and explained in terms of elliptically polarized eigenmodes of the metamaterial. Good agreement with direct numerical simulations is demonstrated. The results obtained are promising for the design of thin-film frequency selective polarization shapers for terahertz waves.

General information
State: Published
Organisations: Department of Photonics Engineering, Metamaterials, University of Wuppertal
Contributors: Zhukovsky, S., Chigrin, D. N., Kremers, C., Lavrinenko, A.
Pages: 353-361
Publication date: 2013
Peer-reviewed: Yes

Publication Information
Journal: Photonics and Nanostructures - Fundamentals and Applications
Volume: 11
Issue number: 4
ISSN (Print): 1569-4410
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.63 SJR 0.433 SNIP 0.762
Web of Science (2017): Impact factor 1.575
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.8 SJR 0.535 SNIP 0.823
Web of Science (2016): Impact factor 1.705
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.56 SJR 0.728 SNIP 0.668
Web of Science (2015): Impact factor 1.505
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.54 SJR 0.739 SNIP 0.772
Web of Science (2014): Impact factor 1.474
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.67 SJR 0.85 SNIP 0.743
Web of Science (2013): Impact factor 1.35
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.73 SJR 0.962 SNIP 1.094
Web of Science (2012): Impact factor 1.792
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.29 SJR 1.328 SNIP 1.183
Web of Science (2011): Impact factor 1.681