318

Accession number:20123315335217

Title:Wire metamaterials: Physics and applications

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Source title:Advanced Materials

Abbreviated source title:Adv Mater

Volume:24

Issue:31

Issue date:August 16, 2012

Publication year:2012

Pages:4229-4248

Language:English

ISSN:09359648

E-ISSN:15214095

CODEN:ADVMEW

Document type:Journal article (JA)

Publisher:Wiley-VCH Verlag, Buhringstrasse 10, Berlin, D-13086, Germany

Abstract:The physics and applications of a broad class of artificial electromagnetic materials composed of lattices of aligned metal rods embedded in a dielectric matrix are reviewed. Such structures are here termed wire metamaterials. They appear in various settings and can operate from microwaves to THz and optical frequencies. An important group of these metamaterials is a wire medium possessing extreme optical anisotropy. The study of wire metamaterials has a long history, however, most of their important and useful properties have been revealed and understood only recently, especially in the THz and optical frequency ranges where the wire media correspond to the lattices of microwires and nanowires, respectively. Another group of wire metamaterials are arrays and lattices of nanorods of noble metals whose unusual properties are driven by plasmonic resonances. Wire metamaterials appear in various settings, and they can operate in a wide range of frequencies. Such materials are known to possesses extreme optical anisotropy, and their important properties have been revealed and understood only recently, especially in the optical frequency ranges where the wire media correspond to the lattices of nanowires or nanorods. Examples shown include wire media employed for subwavelength imaging, and also an array of free-standing nanorods. © 2012 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

Number of references:168

Main heading:Wire

Controlled terms:Dielectric materials - Metamaterials - Nanorods - Nanowires - Natural frequencies - Optical anisotropy - Optical materials - Plasmons - Precious metals

Uncontrolled terms:Dielectric matrixes - Electromagnetic materials - indefinite media - Metal rods - Micro wire - Optical frequency - Plasmonic - Subwavelength imaging - Useful properties - Wire media - Wire medium

Classification code:933.1 Crystalline Solids - 933 Solid State Physics - 761 Nanotechnology - 741.3 Optical Devices and Systems - 951 Materials Science - 741.1 Light/Optics - 708.1 Dielectric Materials - 547.1 Precious Metals - 535.2 Metal Forming - 712.1 Semiconducting Materials

DOI:10.1002/adma.201200931

Database:Compendex