

802. 标题: Plasmonic nanoparticles for a bottom-up approach to fabricate optical metamaterials

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来源出版物: PHOTONIC AND PHONONIC PROPERTIES OF ENGINEERED NANOSTRUCTURES II??丛书: Proceedings of SPIE??卷: 8269??文献号: 82691C??DOI: 10.1117/12.906983??出版年: 2012??

在 Web of Science 中的被引频次: 0

被引频次合计: 0

引用的参考文献数: 30

摘要: We investigate experimentally metallic nanoparticle composites fabricated by bottom-up techniques as potential candidates for optical metamaterials. Depending on the plasmonic resonances sustained by individual NPs and their nanoscale organization into larger meta-atoms, various properties might emerge. Here, the focus of our contribution is on the fabrication and optical characterization of silver NP clusters with a spherical shape. We start with the characterisation of the "bulk" dielectric constants of silver NP inks by spectroscopic ellipsometry for different nanoparticle densities (i.e from strongly diluted dispersions to solid randomly packed films). The inks are then used to prepare spherical nanoparticle clusters by an oil-in water emulsion technique. The study of their optical properties demonstrates their ability to support Mie resonances in the visible. These resonances are associated with the excitation of a magnetic dipole, which constitutes a prerequisite to the realization of metamaterials with negative permeability.

入藏号: WOS:000302582400015

语种: English

文献类型: Proceedings Paper

会议名称: Conference on Photonic and Phononic Properties of Engineered Nanostructures II

会议日期: JAN 23-26, 2012

会议地点: San Francisco, CA

会议赞助商: SPIE

作者关键词: Metamaterials; plasmonics; nanoparticles; bottom-up fabrication; optical magnetism

KeyWords Plus: NEGATIVE REFRACTIVE-INDEX; MAGNETIC RESPONSE; SPHERES; TERAHERTZ; CLUSTERS; SURFACE

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出版商: SPIE-INT SOC OPTICAL ENGINEERING

出版商地址: 1000 20TH ST, PO BOX 10, BELLINGHAM, WA 98227-0010 USA

Web of Science 分类: Optics

学科类别: Optics

IDS 号: BZR50

ISSN: 0277-786X

ISBN: 978-0-8194-8912-8

29 字符的来源出版物名称缩写: PROC SPIE

来源出版物页码计数: 8