14th CONFERENCE OF THE ASIAN CRYSTALLOGRAPHIC ASSOCIATION

AsCA 2016

December 4 – 7, 2016

PROGRAMME AND ABSTRACT

Hanoi – Vietnam

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MS19.P08	**Ultra-Broadband, Polarization Insensitivity and Wide-Angle Metamaterial Absorber for Visible Sp** Nguyen Thi Quynh Hoa, Phan Duy Tung, Phan Huu Lam
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RS.P06	**Controlling Size and Chirality of Supramolecular Cage Complexes** Stephanie A. Boer and David R. Turner
RS.P07	**Structural Analysis and Magnetic Properties of Substituted Ca-Cr Hexaferrites** Mamatha Ch, Krishnaiah M and Sreedhar B

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MS19.P09. Study on negative permittivity metamaterial based on CSRR structure and its application in improving characteristics of microstrip antenna

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Metamaterials (MMs) have been studied extensively due to their designable and controllable metamaterial parameters originating from the artificial inclusion of sub-wavelength resonant structure. In recent, experiment and simulation, it has been more attracted that certain MM configuration exhibit scattering behavior consistent with the assumption of approximate frequency dependent form for permittivity (ε) and permeability (μ) [1]. Among MM configurations, split ring resonators (SRRs) and complementary split ring resonators (CSRRs) are both planar configuration, which have gain interest for their potential application such as stealth technology, sensors and antenna designs.
Recently, using metamaterial (MTM) in antenna design has been developed for improving antenna parameters and miniaturizing antenna size [2,3]. Nevertheless, the approach method is required the sophisticated structures which can be fabricated costly and time consuming [2-4].

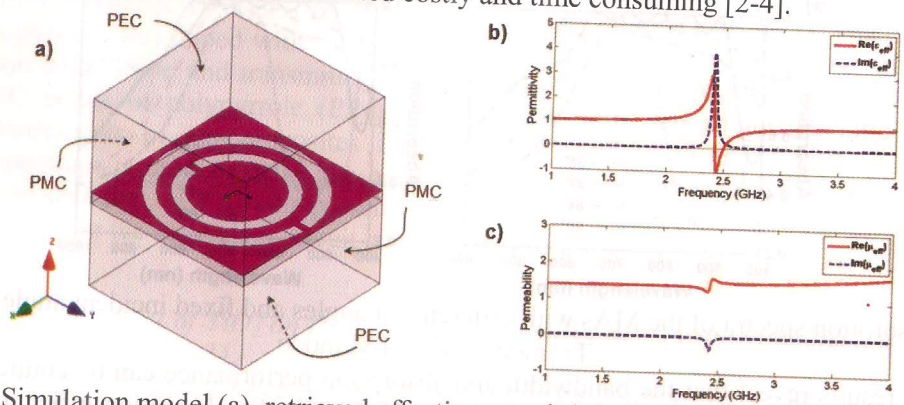

Figure 1. Simulation model (a), retrieved effective permittivity (b) and permeability (c) from S-parameters.

In this paper, the relationship between geometrical properties and physical properties of CSRR structure are simulated and evaluated by numerical simulation. Figure 1a shows the simulation model of CSRR structure. The frequency dependent of effective parameters of and permeability are shown in figure 1b,c, respectively. The desired resonance frequency band of the CSRR unit cell, which presents the negative permittivity metamaterial, can be controlled via varying the diameter of rings as well as spacing between rings. Furthermore, these applications in microstrip antenna are also implemented. The obtained results reveal that by using CSRR on ground plane of microstrip antenna, the proposed antenna parameters are improved such as the gain and bandwidth. Furthermore, the antenna size is reduced up to 77% compared to normal antenna. We will further discuss retrieved method to extracting metamaterial properties of CSRR structure and mechanism of enhancing antenna characteristics which use CSRR loaded on ground plane
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MS19.P10. Photonic Applications of Bacteriorhodospin

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Bacteriorhodopsin (bR) is a photodynamic protein complex found in living systems. The unique feature is its flexibility. Upon absorption of a visible photon, within the broad absorption with a maximum at 570 nm, the bR molecule goes through short lived intermediate states and transforms to relatively long-lived M state (with an absorption peak at 412 nm). Molecules in the M-state can be thermally transformed into the initial B state or they can go back directly to B state within 200 ns upon shining blue light. It can be approximated as a two level system. The process of switching between B and M states (trans-cis photoisomerization) can go in both directions depending on wavelength, intensity and polarization of the incident light, opening a variety of possibilities for manipulating amplitude, phase, polarization of the incident light and the index of refraction. It is a nontraditional nonlinear optical material with exceptionally high values of nonlinearity. A significant advantage of this system is that it is environmental friendly. Over the years we studied the basic nonlinear optics (four-wave mixing, phase conjugation, z-scan, and photoinduced anisotropy using microwatt power lasers) and successfully exploited the unique properties for a variety of photonic applications – all-optical switching, modulation, bistability, logic gates, photoinduced anisotropy and power limiting applications, optical Fourier processing, medical image processing for breast cancer diagnostics, optical wavelet, enhancement of photoinduced anisotropy with two exciting beams of orthogonal polarization, aligning molecules with optical polarization, information processing, slow and fast light. All these studies are performed using commercially available films of bR in a polymer matrix.

MS19.P11. Effects of Oxdation on the Optical Properties of One-Pot Syntheisized Silicon Nanocrystals

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Silicon nanocrystals (Si NCs) have been emerged as great potential nanomaterials for diverse (opto-)electronics applications including floating gate memory[1], solar cells[2], fluorescent bio-probles[3] due to their abundances, non-toxicity, and tunable photoluminescence. The optical properties of Si NCs depend not only on their dimensions but also on their surfaces chemistry whose chemical bonds greatly influence the electronic structure of Si NCs, the energy and confinement of excited carriers. Herein, absorption and photoluminescent properties of colloidal Si NCs were examined with respect to their surface oxidation. Si