SPECTROSCOPY OF INDIVIDUAL "ARTIFICIAL ATOMS"

MARTIN HUSNIK[1], NILS FETH[1,2], MICHAEL KÖNIG[3], JENS NIEGEMANN[3], KURT BUSCH[2,3], STEFAN LINDEN[1,2], MARTIN WEGENER[1,2]

[1]*Institut für Angewandte Physik, Universität Karlsruhe (TH), 76131 Karlsruhe, Germany*

[2]*Institut für Nanotechnologie, Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft, 76021 Karlsruhe, Germany*

[3]*Institut für Theoretische Festkörperphysik, Universität Karlsruhe (TH), 76131 Karlsruhe, Germany*

Abstract Metamaterials exhibiting a magnetic response at optical wavelengths have recently attracted much attention [1]. The magnetic response depends on both the design of the individual building blocks ("artificial atoms") and on electromagnetic coupling effects between them. Thus for future developments, investigation of the individual "artificial atoms" is crucial.

Here, we presented absolute extinction cross-section spectra of individual split-ring resonators (SRR) measured by means of a spatial modulation technique [2, 3]. The extinction cross-section at the fundamental magnetic resonance is found to be eight times the geometrical area covered by the SRR. The experimental results are in excellent agreement with microscopic calculations and can be understood by a simple electric circuit model.

1. V. M. Shalaev et al., Nat. Photon. 1, 41 (2007).
2. A. Arbouet et al., Phys. Rev. Lett. 93, 127401 (2004).
3. M. Husnik et al., Nat. Photon. 2, 614 (2008).

B. Di Bartolo and J. Collins (eds.), *Biophotonics: Spectroscopy, Imaging, Sensing, and Manipulation*,
DOI 10.1007/978-90-481-9977-8_19,