

327.

Accession number:20112714123826

Title:Terahertz meta-atoms coupled to a quantum well intersubband transition

Authors:Dietze, D. (1); Benz, A. (1); Strasser, G. (2); Unterrainer, K. (1); Darmo, J. (1)

Author affiliation:(1) Institute of Photonics, Vienna University of Technology, Vienna, Austria; (2) Institute of Solid-State Electronics, Vienna University of Technology, Vienna, Austria

Corresponding author:Dietze, D.(daniel.dietze@tuwien.ac.at)

Source title:Optics Express

Abbreviated source title:Opt. Express

Volume:19

Issue:14

Issue date:July 4, 2011

Publication year:2011

Pages:13700-13706

Language:English

E-ISSN:10944087

Document type:Journal article (JA)

Publisher:Optical Society of America, 2010 Massachusetts Avenue NW, Washington, DC 20036-1023, United States

Abstract:We present a method of coupling free-space terahertz radiation to intersubband transitions in semiconductor quantum wells using an array of meta-atoms. Owing to the resonant nature of the interaction between metamaterial and incident light and the field enhancement in the vicinity of the metal structure, the coupling efficiency of this method is very high and the energy conversion ratio from in-plane to z field reaches values on the order of 50%. To identify the role of different aspects of this coupling, we have used a custom-made finite-difference time-domain code. The simulation results are supplemented by transmission measurements on modulation-doped GaAs/AlGaAs parabolic quantum wells which demonstrate efficient strong light-matter coupling between meta-atoms and intersubband transitions for normal incident electromagnetic waves.

Number of references:22