646.

Accession Number

12388511

Author

Chen W-C. Mock JJ. Smith DR. Akalin T. Padilla WJ.

Author Unabbreviated

Chen W.-C; Mock J. J.; Smith D. R.; Akalin T.; Padilla W. J.

Author/Editor Affiliation

Chen W-C. Padilla WJ. : Department of Physics, Boston College, 140 Commonwealth Avenue, Chestnut Hill, MA 02467, USA

Mock JJ. Smith DR. : Department of Electrical and Computer Engineering, Duke University, Durham, NC 27708, USA

Akalin T. : Institute of Electronics, Microelectronics and Nanotechnology, Lille 1 University, UMR CNRS 8520, Lille, France

Title

Controlling gigahertz and terahertz surface electromagnetic waves with metamaterial resonators

Source

Physical Review X, vol.1, no.2, Dec. 2011, 021016 (6 pp.). Publisher: Published for the American Physical Society by the American Institute of Physics, USA.

Abstract

We computationally and experimentally investigate the use of metamaterial resonators as bandpass filters and other components that enable control of guided surface electromagnetic waves. The guided surface electromagnetic wave propagates on a planar Goubau line, launched via a coplanar waveguide coupler with 50 impedance. Experimental samples targeted for either microwave or terahertz frequencies are measured and shown to be in excellent agreement with simulations. Metamaterial elements are designed to absorb energy only of the planar Goubau line and yield narrow-band resonances with relatively high quality factors. Two independent configurations of coupled metamaterial elements are demonstrated that modify the otherwise flat transmission spectrum of the planar Goubau line. By physically shunting the capacitive gaps of the coupled metamaterial elements, we demonstrate the potential for a large dynamic range in transmissivity, suggesting the use of this configuration for high-bandwidth terahertz communications. (33 References).