301
Accession number:20114414465799
Title:Electrical control of terahertz nano antennas on VO2 thin film
Authors:Jeong, Young-Gyun (1); Bernien, Hannes (1); Kyoung, Ji-Soo (1); Park, Hyeong-Ryeol (1); Kim, Hyun-Sun (1); Choi, Jae-Wook (1); Kim, Bong-Jun (2); Kim, Hyun-Tak (2); Ahn, Kwang Jun (1); Kim, Dai-Sik (1)
Author affiliation:(1) Department of Physics and Astronomy, Center for Subwavelength Optics, Seoul National University, Seoul, 151-747, Korea, Republic of; (2) Metal-Insulator Transition Creative Research Center, Electronics and Telecommunications Research Institute, Daejeon, 305-700, Korea, Republic of; (3) School of Advanced Device Technology, University of Science and Technology, Daejeon, 305-350, Korea, Republic of; (4) Kavli Institute of Nanoscience Delft, Delft University of Technology, P.O. Box 5046, 2600 GA Delft, Netherlands
Corresponding author:Jeong, Y.-G.(ygjeong@phya.snu.ac.kr)
Source title:Optics Express
Abbreviated source title:Opt. Express
Volume:19
Issue:22
Issue date:October 24, 2011
Publication year:2011
Pages:21211-21215
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 demonstrate an active metamaterial device that allows to electrically control terahertz transmission over more than one order of magnitude. Our device consists of a lithographically defined gold nano antenna array fabricated on a thin film of vanadium dioxide (VO2), a material that possesses an insulator to metal transition. The nano antennas let terahertz (THz) radiation funnel through when the VO2 film is in the insulating state. By applying a dc-bias voltage through our device, the VO2 becomes metallic. This electrically shorts the antennas and therefore switches off the transmission in two distinct regimes: reversible and irreversible switching.
Number of references:35