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Title:Polarization characteristics of one-dimensional metallic wire-grating polarizer in terahertz frequency range
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Abstract:Based on the finite differential time domain (FDTD) method, numerical simulation of polarization characteristics of one-dimensional metallic wire-grating polarizer in the frequency range of 0.2~2.6 THz is carried out. The effects of structural parameters of metallic wire-grid polarizer such as metal duty cycle, the width of slit and the periodicity of wire-grating on the terahertz transmission at two kinds of polarization modes are investigated. With the technique of photolithography and the metal film deposition, a 200-nm-thick gold film is fabricated on a 1-mm-thick high-resistivity silicon substrate. A series of one-dimensional wire-gratings are formed on the silicon substrate. The transmission spectra of the wire-grating polarizer are measured by the terahertz time domain spectroscopy. The numerical simulations based on FDTD method show a good agreement with experimental results. The results show that it is possible to optimize the performance of one-dimensional wire-grating polarizer through reasonable design of structural parameters. This work provides a good reference for the manufacture of terahertz polarizer.
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Main heading:Wire
Controlled terms:Computer simulation - Diffraction gratings - Finite difference time domain method - Lithography - Optical instruments - Photolithography - Polarization - Time domain analysis
Uncontrolled terms:Duty cycles - Frequency ranges - Gold film - High-resistivity silicon substrate - Metal film deposition - Metallic wire-grating - Polarization characteristics - Polarization modes - Silicon substrates - Structural parameter - Tera Hertz - Terahertz frequency range - Terahertz time domain spectroscopy - Terahertz transmission - Time domain - Transmission spectrums - Wire grid polarizers

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