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Title:Numerical simulation of terahertz transmission through rectangular hole of metallic structure on substrate with different thicknesses

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Abstract:The terahertz transmission characteristics of the rectangular-hole metal structure on different materials and thicknesses of substrates are studied based on the finite difference time domain method. The results show that there exists the frequency selectivity in THz transmission spectrum of the rectangular-hole metallic structure. The frequency selectivity provides the basis of the terahertz filter. In practical applications, these metallic microstructures often need to be deposited on the substrates. Obviously, the substrate material and its thicknesses have influence on the terahertz transmission characteristics of metallic microstructures. We investigate how the different substrate materials and its thicknesses affect the terahertz transmission of entire structure. By numerical simulation, it is found that the transmission peak shifts into the lower frequency with increasing of the substrate thicknesses. Comparing Si and polytetrafluoroethylene (PTFE) as the substrate materials, it is shown that peak shift of Si substrates with high dielectric constant is more obvious.

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Controlled terms:Computer simulation - Dielectric materials - Finite difference time domain method - Microstructure - Optical devices - Silicon - Time domain analysis

Uncontrolled terms:Different substrates - Finite difference time domains - Frequency selectivity - High dielectric constants - Lower frequencies - Metal structures - Metallic microstructures - Metallic structures - Peak shift - Rectangular holes - Si substrates - Substrate material - Substrate thickness - Tera Hertz - Terahertz transmission - Transmission peaks - Transmission spectrums

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