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Title:Band-pass filters for THz spectral range fabricated by laser ablation
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Abstract:The terahertz resonant metal-mesh filters were fabricated using the laser direct writing technique. UV picosecond laser was employed to cut matrixes of crossshaped holes in stainless steel foil and molybdenum layer deposited on polyimide substrate. Different laser processing strategies were developed: holes were cut through in the metal foil and the molybdenum film was removed from the polyimide by laser ablation. Band-pass filters with a different center frequency were designed and fabricated. The regular shape, smoothness of edges and sharpness of corners of the cross-shaped holes in the metal were the main attributes for quality assessment for the laser ablation process. Spectral characteristics of the filters, determined by the mesh period, cross-arm length, and its width, were investigated by terahertz time-domain spectroscopy and conventional space-domain Fourier transform spectroscopy. Experimental data were supported by three-dimensional finite-difference time-domain simulations.
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