FREE-STANDING WIRE GRID WIDE-ANGLE ULTRAWIDE BAND POLARIZERS

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Polarizers make it possible to obtain polarized radiation from radiation of arbitrary polarization. The electric field of electromagnetic wave is transmitted if polarized perpendicularly and reflected if polarized parallel to the polarizer grid array. Due to the great demand for such products, there are many principles which polarizers can be based on: liquid crystals, carbon nanotubes, thin films of aluminum on silicon dioxide, and aluminum films deposited on silicon at the Brewster angle [1]. Most of the polarizers types cannot avoid losses since there will always be a reflection from the substrate and absorption losses [2]. Free-standing fine-wire grids, parallel strands of fine wire, are deprived of this deficiency due to the absence of any substrate and behave as low-loss polarizers at DC and submillimeter wavelengths. They can withstand high power of the radiation without losing their characteristics, unlike film polarizers [3,4]. The polarizing efficiency depends on the wire spacing, which can easily be varied. These characteristics make the grids a simple and versatile spectroscopic component.

In this paper the improved method for manufacturing free-standing fine-wire grids is described. Measurements of the power reflectivity and transmissivity of grids design in the frequency range of 0.1-2 THz are presented. The extinction ratio of polarizers is not less than 30 dB in the ultrawide frequency band from DC to 2 THz. The manufacturing method allows fabricating polarizers with a clear aperture from 2 to 6 inches with potentially to expand it to 9 inches.

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DESIGN AND INVESTIGATION OF A NARROWBAND TERAHERTZ FILTER BASED ON FABRY–PÉROT ETALON

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The Fabry-Pérot filter (FPF) was calculated and optimized in this work using the ANSYS® HFSS R19 tool. The fundamental grid design was based on the "classic" geometry of square-packed cells with square-shaped hales (Fig., on the left). On a polypropylene (PP) film, grid reflectors were applied.

Fig.1.