

Planar Plasmonic Terahertz Waveguides for Sensor Applications

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Abstract : We investigate sensing capabilities of a planar plasmonic THz waveguide. The waveguide is comprised of one dimensional array of periodically arranged sub wavelength scale corrugations in the form of rectangular dimples in order to ensure the plasmonic response. The THz waveguide transmission is observed for polyimide (as thin film) substance filling the dimples. The refractive index of the polyimide film is varied to examine various sensing parameters such as frequency shift, sensitivity and Figure of Merit (FoM) of the fundamental plasmonic resonance supported by the waveguide. In efforts to improve sensing characteristics, we also examine sensing capabilities of a plasmonic waveguide having V shaped corrugations and compare results with that of rectangular dimples. The proposed study could be significant in developing new terahertz sensors with improved sensitivity utilizing the plasmonic waveguides.

Keywords : plasmonics, sensors, sub-wavelength structures, terahertz

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