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Title:Bio-sensing by mach-zehnder interferometer comprising doubly-corrugated spoofed surface plasmon polariton (DC-SSPP) waveguide

Authors:Xu, Zhao (1); Mazumder, Pinaki (1)

Author affiliation:(1) Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI 48109, United States

Corresponding author:Xu, Z.

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Abstract:The paper describes the design and analysis of a Mach-Zehnder interferometer (MZI) structure consisting of doubly-corrugated spoofed surface plasmon polariton (DC-SSPP) waveguide. The dependence of phase change on the dielectric loading of the DC-SSPP structure causes the output from both arms to interfere and enhances features on the transmission spectrum of the MZI. The paper uses a mathematical model to predict the phase accumulation of THz signals travelling through each arm of the MZI with various sample loadings. HFSS simulation has been performed to verify the theoretical modeling and produce more sophisticated results. The paper demonstrates that compared with single-armed SSPP waveguide, the proposed MZI structure shows significant shift of the transmission maxima and minima with high quality factors for the transmission peaks when different materials are loaded. The paper also demonstrates that the proposed DC-SSPP MZI structure can be potentially used in tag-free bio-molecular sensing. The highly localized E-M field at frequencies close to SSPP resonance is shown to reduce the sample amount needed to produce interference patterns without affecting the selectivity of the sensing structure. © 2012 IEEE.

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